Testing the Generalizability of the Teachers' Sense of Efficacy Scale Using Data from Pre-Service Teachers in Botswana: A Principal Component Analysis Approach

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Abstract

Principal component analysis procedure was used to validate, in a disparately different population, Teachers' Sense of Efficacy Scale**.** This was done by establishing the dimensionality of data collected from a sample of 589 pre-service teachers in Botswana. The analysis extracted two components with the first one accounting for 40% of the total scale variance while the second one accounted for only about 5% of the variance. The scree plot indicated a dominance of the first factor hence the scale could be said to be unidimensional, confirming the findings of earlier studies in different pre-service populations. The finding was discussed and recommendations made.

Keywords: Teachers' Sense of Efficacy Scale, Teacher Efficacy, Principal component Analysis, Pre-service teachers, Botswana.

1. Introduction

Delivery of quality instruction within the classroom is influenced by a variety of elements such as availability of recourses classrooms, text books, and computers to mention a few of the input variables. It was noted in the Report of the National Commission on Education document published in 1993 that '... the reason why the quality of primary education is poor is due to the lack of educational inputs, including adequate facilities'. (p. 95).The teacher as a content specialist is also a key input variable in the delivery of quality instruction; collectively, 'teachers are agents of all curriculum implementation, and their centrality to the education system can therefore not be overemphasized' (Report on the National commission on Education, 1993, p. 335). The tendency has been to focus more on the subject matter expertise of the teacher with little attention placed on the teacher's self-efficacy. Teacher efficacy is one dimension that has been identified as having a significant impact in the delivery of quality instruction by teachers in the classroom. According to Henson, Kogan and Vacha-Haase (2001) "Teacher efficacy has proven to be an important variable in teacher effectiveness. It is consistently related to positive teaching behaviors and student outcomes' (p. 404).

Researchers have developed and validated different psychometric instruments to measure teacher self-efficacy (e.g., Teacher Self Efficacy Scale developed by Tschannen-Moran and Woolfolk-Hoy in 2001). The current study therefore, intends to establish the extent to which the Teacher Self Efficacy Scale (TSEC) to the educational context in Botswana.

2. Teacher Self- Efficacy Construct

Teacher Self Efficacy construct has been widely researched by scholars in different countries and the construct has been identified as a powerful variable in the learning and teaching process (Guskey & Passaro, 2011). One of the earliest research work on the efficacy construct was done by the Rand Corporation study. The Rand Corporation study used two items to distinguish between teachers who belief that their ability to teach is limited by external home factors and those who belief that they have the power and conviction to succeed in spite of external mitigating factors(Woolfolk & Hoy, 1990). The centrality of the teacher efficacy variable has been thought to be significantly related to the performance levels of learners, teachers' content delivery proficiency. This sentiment was expressed by Brouwers, Tomic and Stijnen (2002) when they observed that;

> Down through the years, the concept of teacher efficacy has been connected with many important educational variables such as student achievements, student attitudes towards school, student attitudes toward the subject matter being taught, student attitude toward the teacher, teacher's classroom behavior, teachers' attitudes toward teaching, teacher stress and burnout and teachers' willingness to implement innovation (p. 211).

Some researchers (e.g., Brookover & Lezotte, 1979) have gone as far as suggesting that self-efficacy differentiates between more effective schools and less effective ones. Efficacy construct has also been defined from various angles. According to Guskey and Passaro (2011), efficacy can be defined as "teachers' belief or conviction that they can influence how well students learn, even those who may be considered difficult or unmotivated" (p. 628). Therefore,

teacher self-efficacy refers to the conviction held by each teacher that he or she has the personnel capacity and the expertise to facilitated acquisition of knowledge, skills and attitudinal change on students irrespective of their individual differences that may be related to cognitive or affective domains. The development or creation of efficacy construct owes its existence to the pioneering work done by Rotter (1966) and Bundara (1977).These two pioneers have led to the development of two traditions in the study of teacher efficacy; the Rotter tradition is based on the social learning theory and the Bandura tradition is based on the social cognition theory. The Social Learning Theory posits that 'teachers who believe that they are competent to teach difficult or unmotivated students are considered to have internal control, whereas teachers who believe that the environment has more influence on student learning than their teaching abilities are considered to have external control (Brouwers, Tomic,& Stijnen, 2002, p. 211). In general, the teacher's classroom behavior can generally be classified into two groups; general teaching efficacy corresponding to external control and personal teaching efficacy which correspond to internal control. An example of an instrument designed to measure teacher efficacy along Rotter tradition is Responsibility for Student Achievement- RSA (Guskey, 1981)

On the other hand, the social cognitive theory provides that the teaching behavior of teachers generalizes into two domains being self-efficacy and outcome expectancies.According to Bandura's social cognitive theory as reflected in Guskey and Passaro (2011);

> Behavior is affected by both outcome expectations and efficacy expectations. Outcome expectations are the judgments an individual makes about the likely consequences of specific behavior in a particular situation or context. Efficacy expectations, on the other hand, are an individual's beliefs about his or her own capabilities to achieve a certain level of performance in that situation or context (p.629).

Teachers who believe that they have the knowledge, expertise and confidence to organize and execute their plans to influence learning are said to exhibit self-efficacy. The conviction that an individual has based on his or her potential is quite different from the level of success that the individual will achieve when implementing the course of action. The determination of the level of success an individual's expected from a course of actionexpress the level of outcome expectancies possessed by the specific person. Guskey and Passaro (2011) define outcome expectation as "the judgments and individual makes about the likely consequences of specific behaviors in aparticular situation or context" (p. 629). The distinction between self-efficacy and outcome expectancies can be used to account for the different level of performance between teachers. The social cognitive theory was seen to have some relevance in the teaching professional and as such could be used to predict or explain certain actions an behaviors exhibited by teachers on a daily basis (Ashton & Webb, 1982, 1986).

> Some teachers may believe, for example, that teaching is a potentially powerful factor in student learning, but that they lack the personal ability to affect their own students. At the same time, others may believe that teaching in general has little influence on students, but that they are exceptions to the rule (p. 629).

Availability of an empirically sound efficacytheory motivated measurement experts to generate scales that measure the construct. The first efficacy scale was developed by Gibson and Dembo in 1984. The scale is made up of 30 likert scale items ranging from strongly disagree to strongly agree. The dimensionality of the questionnaire was tested using a sample of 208

elementary school teachers; the resultant intercorrelation matrix was submitted to a principal component analysis with Varimax rotation. The analysis extracted two components that accounted for 29% of the variance in the intercorrelation, the researchers named the factors as teacher sense of personal efficacy and teacher's sense of teaching efficacy. The Gibson and Dembo Teacher Efficacy Scale (TES) has since become an instrument of choice for researchers interested in the efficacy construct (Brouwers, Tomic,& Stijnen, 2002; Yusuf, 2010; Woolfolk & Hoy, 1990).

The second instrument designed to measure the efficacy contract was developed by Woolfolk and Hoy (1990). The researchersadopted 16 items from the Gibson and Dembo scale and combined them with 6 other items to generate a scale with a total of 22 measured variables. The variance/ covariance matrix from 182 (85% females and 15% males) liberal arts pre-service teachers who responded to the scale was 'submitted to a principal axis analysis in which squared multiple correlations were entered on the diagonal and iteration procedures was used to improve the estimation of communality (Woolfolk & Hoy, 1990,p. 86). The initial factor loadings were rotated using both orthogonal and oblique techniques. The final solution indicated two components that mirrored personal efficacy and teaching efficacy dimensions; variance accounted for in the original matrix of the measured variables was 27%.The factor analyst went further to reanalyze the data using different methods of factor extraction. The scree plot and Kaiser's criterion lead to the extraction of three actors that accounted for 32.8% of the variance. While items that loaded on the general Teaching Efficacy (GTE) or Factor Two remained stable in two and three factor solutions, the same was not true for the Personal Efficacy (PE) item. The items split into two moderately correlated factors indicating responsibility for positive student outcomes factor and responsibility for negative outcomes factor.

The implication of the three factor solution was that Gibson and Dembo (1984) two factor solution indicating GTE and PE was really a measure of teachers' attitudes (Woolfolk & Hoy, 1990). The researchers also noted that most of the teaching efficacy items are formulated in a negative sense while most of the personal efficacy items are state positive attitude. Therefore, the items cluster into positive and negative dimensions because of differences in response directions (Woolfolk & Hoy, 1990).

Another informative study that explored the dimensionality of the efficacy construct was done by Fives and Buehl (2011). Specifically, the researchers wanted to compare the factor structure for practicing teachers and that for pre-service teachers. Previous research done by Tschannen-Moran and Woolfolk-Hoy (2001) confirmed a three factor structure for practicing teachersand a unidimensional one for pre-service group (Fives & Buehl, 2011).

The main objective of Fives and Buehl (2011) research was to test whether the three factors and unidimensional structure for practicing and pre-service teachers respectively could be independently replicated. The researchers sampled 102 practicing teachers and 270 pre-service of which 77% were females. The respondents were administered an efficacy scale (TSES) developed by Tschannen-Moran and Woolfolk-Hoy (2001). The instruments required participant to rate their own efficacy in the three subscales of classroom management, instructional practices and student engagement. The TSES is a nine point likert scale that comprises both a long form (24 items)and short form (12 items)version. Principal Axis factoring method was used to analyze

the covariance matrix and Parallel Analysis (Horn, 1965) was used to extract salient factors. The final solution for both long and short form converged on three factors for practicing teachers. As for pre-service teachers, both long and short forms indicated a unidimensional structure. The conclusion made by the researchers was that "factor structure for pre-service teachers is less distinct and that a one-factor solution is a more appropriate representation for pre-service teachers" (p. 127). This conclusion is in consonance with the findings madeby Tschannen-Moran and Woolfolk (2001).

Table 2 shows the variance explained for both samples using short and long forms. It is worth noting that the short form in both cases has produced higher variance explained. Whether the difference between the two is statically significant is a matter for further research as convention dictates that the longer the instrument the more reliable.

Table 2: Variance Explained in the TSES Long and Short form

	Practicing Teachers %	**Pre-service Teachers %**
Long Form	57.09	47.98
Short Form	64.99	52.88

The factor structure of the Teacher Self Efficacy scale developed by Gibson and Dembo (1984) was originally established using sample of practicing and pre-service teachers in the United States (Yusuf, 2010). The question always arises whether the same structure is generalizable to other populations with different contextual variables. Yusuf (2010) conducted a study entitled 'Teacher efficacy scale: the study of validity and reliability and pre-service teachers' self-efficacy beliefs' the purpose of which was to examine the factor structure of the TES (Turkish version) among pre-service teachers in Turkey. A total of 512 beginning-level and ending-level pre-service teachers were sampled; however, only 79% or 405 teachers completed the questionnaire (Yusuf, 2010). The result of the analysis recovered three factors for beginning and ending pre-service groups. Table 2 shows the values of the goodness of fit indices used to extract three factors; the RMSEA is particular impressive for the ending preserve group.

In light of this findings the researcher concluded that "One of the significant findings of the study is that Gibson and Dembo's two-factor teacher self-efficacy scale may not be a valid instrument to evaluate efficacy beliefs of pre-service teachers in Turkey"(Yusuf, 2010, p. 81). However, the significant difference between the beginning level and ending level efficacy scores lead the researcher to recognize the fact that teacher training improves the level of efficacy beliefs of teachers and that higher self-efficacy beliefs contributes positively to the quality of education.

The literature on teacher efficacy construct reveals some inconsistencies or contradictions amongst researchers who purport to be measuring the same construct. Some researchers have confirmed a two factor structure for practicing teacher and one factor for pre-service teachers (e.g., Gibson & Dembo, 1984; Woolfolk& Hoy, 1990). Other researchers have challenged the two factor model as the best fitting model for practicing teacher. Yusuf (2010) for example, found that a three factor model was the most parsimonious model for pre-service teacher in Turkey while Brouwers et. al (2002) realized that a four factor model was the most plausible due

to superior goodness of fit indices. The contradictory result poses an interesting questioning relating to factor structure stability as well as generalizability of the scale to other population. According to Dunham and Song' Ony (2008) 'Research carried out to establish the construct validity of the TSE scale was done mostly in developed countries' (p.406). There is a need to extent the validity studies to other countries with different socio-economic and cultural conditions. Moalosi and Forcheh (2015) observed in their study that research on teacher self-efficacy is lacking in Botswana. The lack of extensive literature on level of efficacy in developing countries is a major problem as the construct has been linked to variables that have direct impact on delivery of quality education. Therefore, the main objective of the current study is to establish the factor structure of the TSE among pre-service teachers in Botswana. This analysis is significant in that the result will indicate whether the established structure is consistent with Gibson and Dembo two factor structure. Replication of the TSE structure would enable researchers to apply the instrument with the knowledge that the instrument has high validity evidence.

3. Method

The long form of the Self Efficacy Scale (Tschannen-Moran & Woolfolk, 2001) was administered to pre-service teachers in five teacher training colleges in Botswana. The instrument has 24 likert styled items and it is divided into three subscales each with a total of 8 questions (Moalosi & Forcheh, 2015). The measured variables in each of the subscales have been designed to tap on the three hypothesized domains that are thought to underlie observed variance in the whole scale. The hypothesized latent domains have previously been identifies as efficacy in student engagement, efficacy in classroom management and efficacy in instructional strategies. The scale ranges from "Nothing – 1"which represents the belief that the teacher has no influence on the activity to "A great Deal - 5" showing the teacher's maximum influence on the behavior or action implied by the question.

4. Sampling Procedure

The research study targeted all students in the five colleges who were left with one month to complete their pre-service training programme. A total of 589 teacher-trainees completed the instrument in the presence of trained research assistants so that any issue relating to clarity of the items could be dealt with immediately. Gender representation is reflected in Table 3. It can be seen from the table that females comprised 71% of the sample. The high proportion of females in the teaching profession mirrors the national figure which shows that over 70% of the teachers in senior secondary schools are females. Therefore, the derived sample is a faithful representation of the population of teachers in Botswana.

Table 3: Gender Representation in Percentage in the Sample Colleges of Education

Gender	Molepolole	Tonota	Francistown	Serowe	Tlokweng	Totals
Females	15	4	3	2	5	29
Males	12	23	11	16	9	71

Totals	27	27	14	18	14	100

A research permit was obtained from the Ministry of Education and Skills Development and all teachers who participated in the study agreed by signing a letter of consent. The teachers were also informed that the informationtheyprovide will be kept confidential and the data will only be used for researchpurposes.

5. Analysis

5.1 Determining the Factorability of an Inter-correlation Matrix

Though a successful factor analysis procedure depends on the covariance amongst a set of measured variables, the matrix of correlation should not exhibit a high degree of collinearity as this might results in an identity matrix. It is imperative for any factor analytic study to determine beforehand the factorability of the matrix. There are two common procedures that are applied to establish factorability; there are the Bartlett's Test of Sphericity and Kaiser-Meyer-Oklin Measure of Sampling Adequacy (KMO).

Bartlett's Test of Sphericity was applied by calculating the determinate of a matrix of the sums of products and cross-products; then the determinate of the matrix is converted to a chi-square statistic and a test of significance is used as a basis of a decision. A value of zero or close to zero leads to the retention of the null that states that the matrix observed is an identity matrix. The chi-square value is 5536.08 and it is significant indicating that the matrix factorable. .966 (Table 4) indicating that substantial variance exist within the matrix. The KMOmeasure varies between 0 and 1, and values closer to 1 are better. In this case the KMO value is .966 which is excellent.

Table 4: KMO and Bartlett's Test for A sample of Pre-service Teachers

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.966
Bartlett's Test of Sphericity	Approx. Chi-Square	5536.080
	df	276
	Sig.	.000

5.2 Modeling Procedure

The inter-correlation matrix was analyzed using principalcomponentanalysisprocedure (SPSS Version 20). Principalcomponentanalysis is a structural equation modeling procedures that explores the linear combination of the measures variables to establish inter-correlation between the measured variables. The correlation matrix shows the degree of relationship between each variable and all other variables in the data set together with correlation of the

variable with itself. Hence, the PCA matrix characteristically reflects unities in the diagonal.The most important information that can be extracted from the correlation matrix is variable communality.

Variable Communalities

The communality of a variable shows the relationship between a variable and all other variables in the scale. A variable with high communalityshares a lot of variance with extracted factors/ components and as such its variation can be predicted or explained with greater certainty. Low communality is an indication of uniqueness of a variable; items with low communality have very limited common variance with the factors. Such items should be replaced or removed from the analysis.

The communalities of the 24 items in the TES scale are generally high as shown in Table 5. Four items had communalitybelow .40 while another four had communality above .50 indicating that the extracted factors account for over 25% of the variance in each of the variables.

It is interesting to note that three of the items with low communality deal with the aspect of Student Engagement while three of items with high communality are in the Instructional Strategy subtest. Suffice to mention at this juncture that none of the variables was removed on the basis of low communality.

Table 5: Variable Communalities in the TES Scale

Item	Extraction
how much can you do to control disruptive behavior in the classroom	.414
how much can you do to motivate students who show low interest in school work	.330
to what extent can you make your expectation clear about students behavior	.475
how much can you do to get students to believe they can do well in school work	.450
how well can you respond to difficult questions from your students	.455
how well can you establish routine to keep running smoothly	.424
how much can you do to help your students value education	.485
how much can you gauge student comprehension of what you have taught	.448
to what extent can craft good question for your students	.433
how much can you do to foster students creativity	.424
how much can you do to get children to follow classroom rules	.406
how much can you do to improve the understanding of student who is failing	.467
how much can you do to calm a student who is disruptive or noisy	.381
how well can you establish a classroom management system with each group of students	.442
how much can you do to adjust your lessons to the proper level for individual student	.511
how much can you use a variety of assessment strategies	.518
how well can you keep a few problem student from ruining an entire lesson	.429
to what extent can you provide an alternative explanation or example when students are confused	.468
how well can you respond to difficult students	.477

how much can you assist families in helping their children to do well in school	.534
how well can you implement alternative strategies in your classroom	.519
how well can you provide appropriate for very capable students	.433
how much can you do to get through to the most difficult students	.366
how much can you do to help your students think critically	.383

5.3 Number of Factors Extracted

Since factor analysishas no final solution due to the fact that the total variance in the matrix if extracted will equal to the total number of items used, the researcher should useeither theoretical background or experience from previous research or both to extract an optimal number of components that will account for as much of the variance in the originalmatrix. According to Henson, Capraro and Capraro (2004);

> The number of possible factors in the analysis equals the number of variables factored. However, many of these factors may not reproduce enough variance to matter or simply may not be interpretable. Therefore, only a small set of factors are extracted with the intent to maximize the interpretability and variance explained. If all possible factors were kept, then the will be a 1:1 ratio between the number of factors and the number of variables (p. 63).

Several factor extraction procedures have been developed to assist researchers extract optimal number of factor that would result in the best estimation of population parameters. The most popular of these rules are the ScreenTest and KaiserEigen Value Greater than One rule.The Scree Plotbelow shows a one factor solution as the best fitting model. Retention of two or more factors would create a problem since there is no clear cut break point between the second and third factor or between the third and fourth factor. The decision at this juncture is to retain only one factor.

The other factor extraction techniques used as mentioned above is the Kaiser criterion. Table 6shows the factor loading of the items in the Teacher Self Efficacy Scale. According to the table, two factors have eigenvalue that are greater than one; the first factor accounts for 39.825% of the variance while the second one has 3.909%. Therefore, Kaiser Criterion suggests retention of two factors.The dilemma at this point is to retain either one factor as suggested by the Scree plot (Figure 1) or two factors as indicated by the Kaiser Criterion. Therefore, there is the real likelihood of either extracting too few factors (under factoring) or extracting too many factors (over factoring). According to Fabrigar, Wegener, MacCallum and Strahan (1999) under factoring is a much more serious problem because measures variables that load on a factor not included in the model can falsely load on a factor included in

Table 6: Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

	1	9.558	39.825	39.825	9.558	39.825	39.825
	2	1.113	4.636	44.462	1.113	4.636	44.462
	3	.938	3.909	48.371			
	4	.901	3.753	52.124			
	5	.885	3.686	55.811			
	6	.759	3.161	58.972			
	7	.748	3.119	62.090			
	8	.710	2.958	65.048			
	9	.673	2.802	67.850			
	10	.659	2.745	70.596			
	11	.647	2.698	73.294			
	12	.613	2.555	75.849			
	13	.588	2.450	78.299			
	14	.565	2.355	80.654			
	15	.546	2.277	82.931			
	16	.536	2.235	85.166			
	17	.509	2.120	87.286			
	18	.496	2.068	89.354			
	19	.483	2.014	91.367			
	20	.461	1.922	93.289			
	21	.443	1.845	95.134			
	22	.420	1.749	96.883			
	23	.379	1.577	98.460			
	24	.370	1.540	100.000			

the model. Errors of estimation will result as the falsely loading variables will influence the interpretation and naming of the factor. Over factoring on the other hand presents manageable error as the additional factors include in the model will be indicated by very few items thus diluting the empirical and theoretical importance.

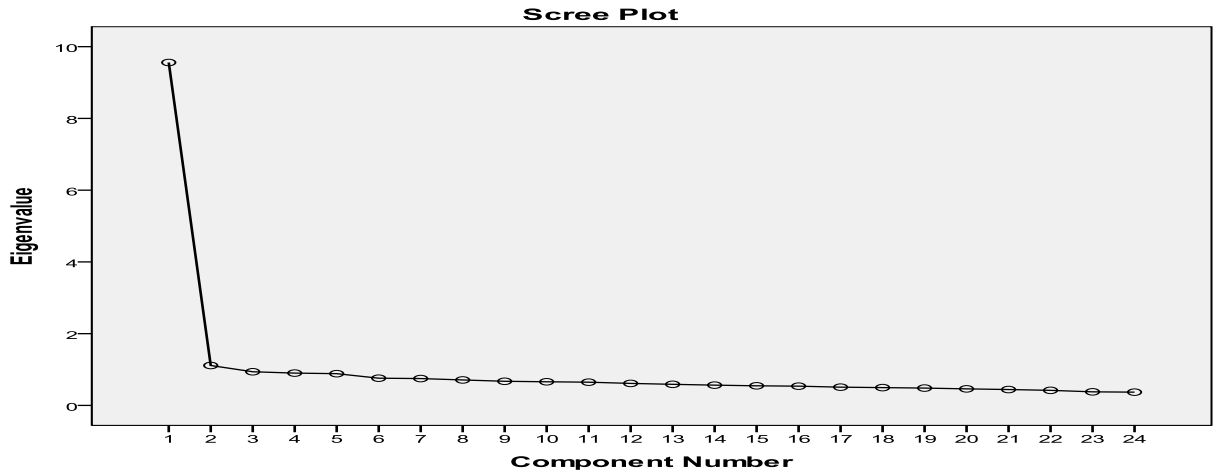

Figure 1 Scree plot

Wood, Tataryn and Gorsuch (1996) conducted a Monte Carlo research to examine the effects of under factoring and over factoring on estimated factor loadings. The researchers were able to establish that:

> The effects of under- and over extraction on principal axis factor analysis with Varimax rotation were examined in 2 Monte Carlo studies involving 6,420 factor analyses. It was found that (a) when under extraction occurs, the estimated factors are likely to contain considerable error; (b) when over extraction occurs, the estimated loadings for true factors usually contain substantially less error than in the case of under extraction… (p. 354).

However, Comrey (1978) cautions researcher against the tendency to include too many factors in the model as this might lead to generation of instable factors. Obviously, there is a school of thought in the methodological literature that support over factoring but at the same time some researchers are sure whether over factoring is the right thing to do. Do decide on whether do retain one factor or a two factor model, the researchers used factor loadings. A factor loading of a variable is correlation coefficient that indexes the extent of association between the extracted factor and a variable. A high loading shows that a variable is strongly related to the factor on the hypothesized factor explains a considerable variance in the variable. If the coefficient is squared and multiplied by hundred, then the obtained figure represents the percent of variation that the variable has in common the unrotated patter (Rummel, 1967, p.463). Table 7 shows factor loading for the 24 items.

Table 7: Teacher Efficacy Scale Factor Loadings for a sample of Pre-service Teachers in Botswana

Rotated Component Matrix[a]		
	Component	
	1	2
how much can you do to control disruptive behavior in the classroom	.204	.611
how much can you do to motivate students who show low interest in school work	.306	.486
to what extent can you make your expectation clear about students behavior	.223	.652
how much can you do to get students to believe they can do well in school work	.302	.599
how well can you respond to difficult questions from your students	.200	.644
how well can you establish routine to keep running smoothly	.345	.552
how much can you do to help your students value education	.292	.632
how much can you gage student comprehension of what you have taught	.374	.555
to what extent can craft good question for your students	.376	.541
how much can you do to foster students creativity	.540	.364
how much can you do to get children to follow classroom rules	.492	.404
how much can you do to improve the understanding of student who is failing	.623	.279
how much can you do to calm a student who is disruptive or noisy	.446	.428
how well can you establish a classroom management system with each group of students	.563	.353

how much can you do to adjust your lessons to the proper level for individual student	.624	.349
how much can you use a variety of assessment strategies	.630	.348
how well can you keep a few problem student from ruining an entire lesson	.525	.390
to what extent can you provide an alternative explanation or example when students are confused	.558	.396
how well can you respond to defiant students	.667	.178
how much can you assist families in helping their children to do well in school	.721	.121
how well can you implement alternative strategies in your classroom	.650	.311
how well can you provide appropriate for very capable students	.547	.366
how much can you do to get through to the most difficult students	.283	.535
how much can you do to help your students think critically	.217	.579
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

One major point that is apparent in Table 8 is that that 13 or 52% of the items in the scale have significant loading on both factors. The high incidence of variable complexity is a strong indication of a one factor solution. The researchers have decided to reject the two factor model on the basis of the following points. Firstly, the loadings do not show any distinct pattern due to the high number of cross loading items. Secondly, identification and naming of the factors will be almost impossible as naming of a factor depends on items that significantly load on the factor. The final decision then is that teacher efficacy as represented by pre-service teacher in Botswana is a unidimensional construct.

6. Findings

The responses from 589 pre-service teachers who rated their self-efficacy on a five point likert scale type questionnaire were factor analyzed to map out component structure of the instrument. The data was tested for factorability using two indicators; the KMO and Bartlett's test of sphericity, both test indicated that matrix of correlation was not an identity matrix. The size of the sample also conformed to guidelines provided in the methodological literature. The variance/ covariance matrix were submitted to principal component analysis procedures to generate communalities and factor loadings. The Scree Plot and Kaiser Criterion was used to extract salient components. Due to previous research studies that indicated low correlation amongst the components (Woolfolk & Hoy, 1990), the first level factor loadings were rotated to a Varimax orientation to improve interpretability or generate a more parsimonious model.

Evidence from the Scree Plot and significant factor loading pointed to a one factor solution that accounted for 39.8 of the variance in the matrix. Though the Kaiser criterion retained two components, the second component was not theoretically meaningful' the items that loaded on the factor did not provide coherent meaning to assist in the naming of the factor. Studies that generated a two factor model (e.g., Gidson & Dembo, 1984) identifies the factors as general teaching efficacy and personal teaching efficacy on account of the content of the items that significantly loaded on the respective factor. The factor loadings on the current study to not break clearly into general and personal teaching efficacy as suggested by theory and research

experience. The failure of the analyses to crystallize into either general or personal efficacy (following the Rotter tradition, 1966) or the internal and external efficacy as suggested by the Rotter tradition is a strong indication of a unidimensional construct.

The observed unidimensional construct for pre-service teachers in Botswana corresponds to previous findings from Gibson and Dembo (1984) and Woolfolk and Hoy (1990). In the case of Woolfolk and Hoy research, two factors of the Personal TeachingEfficacy and General Teaching Efficacy were recovered accounting for 27% of the variance. In the present case, the variance explained is 39.8%, thus 12% higher and therefore presenting a stronger case for a one factor model as the best fitting model for pre-service teacher in Botswana.

7. Conclusion

The principal component analysis with Varimax rotation on an intercorrelation matrix from response of pre-service teacher in Botswana strongly points to the existence of a unidimensional construct. This is a successful replication of findings from research studies done by other researchers such as Gibson and Demo (1984). Replication of previous two factor model increases the credibility as well as the generalizability of the Teacher Efficacy scale. The results are an indication of the stability of the structure irrespective of contextual variables. Since teaching is a universal construct, consistency of the findings across settings is further evidence of universal phenomena.

Observed difference in the structure of the efficacy model may really be due to the different techniques applied by different researchers and not necessarily the underlying construct. The result of the study is also of great significance to the teacher training programme in Botswana. The unidimensionalmodel suggests that pre-service teachers still view teaching as just one homogeneous entity. This perception is erroneous if it is reflected against the three elements of efficacy construct being Student Engagement, Instructional Strategies and Classroom Management efficacies. A lot of time and effort have to be expended to assist the pre-service teacher to appreciate the complex nature of teaching and thus be prepared and well equipped for the classroom. In a nutshell, teacher training programme should be improved so that in the end it enhances the self- efficacy believes of pre-service teachers.

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