Young Lives

An International Study of Childhood Poverty

YOUNG LIVES SCHOOL SURVEY

VALIDATION OF THE TEACHER EFFICACY SCALE IN THE VIETNAM SCHOOL SURVEY ROUND 1

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Overview

An abbreviated 20 item version of Gibson and Dembo's (1984) teacher efficacy scale was administered to teachers in Vietnam (n= 176) in autumn 2011. Teacher Efficacy is defined as the extent to which teachers believe that they can bring about positive student development (Gibson & Dembo, 1984). Understanding teachers' level of efficacy in Vietnam may be particularly relevant to help to identify ways in which teachers can be enabled to overcome the challenges that they face and to ensure that children receive a quality education. This note describes the selection, adaptation and administration of a scale measuring teacher efficacy in Vietnam. This is followed by a preliminary validation of the scale using exploratory factor analysis.

Rationale for the Inclusion of a Measure of Teacher Efficacy

Teacher Efficacy is defined as the extent to which teachers believe that they can bring about positive student development and has been conceptualised to consist of two dimensions (Gibson & Dembo, 1984). 'General' teaching efficacy refers to the teacher's general beliefs about their ability to have an influence on student's academic outcomes regardless of student's home environment, family background or parental influences. 'Personal' teaching efficacy', on the other hand, refers to whether teachers believe that they can personally enhance the learning of their students. In general research has demonstrated that teacher efficacy is strongly linked to teacher's motivation and behaviour. For example, teachers with higher levels of teaching efficacy have been found to persist longer and to be more effective in the classroom which subsequently impacts upon student's learning (Gibson & Dembo, 1984; Bandura, 1997). For this reason, understanding the development of teacher efficacy may provide important insights for helping to improve the quality of education that children receive.

The Teacher Efficacy Scale

Gibson & Dembo (1984) have developed one of the most widely used teacher efficacy scales, based on Bandura's conceptualization of self-efficacy, consisting of two sub-scales of general teaching efficacy and personal teaching efficacy. An example of an item which assesses general teaching efficacy is 'If a teacher has adequate skills and motivation, she/he can get through to the most difficult students'. An example of an item assessing personal teaching efficacy is 'I have enough training to deal with almost any learning problem'. Responses to these items were given on a six point scale ranging from 'strongly disagree' to 'strongly agree'. This scale demonstrated

good internal consistency (alpha = 0.79) (Gibson & Dembo, 1984). For the Vietnamese teacher survey 22 of the 30 items from Gibson and Dembo's (1984) original scale were retained. Items which were not thought to be relevant in a Vietnamese context were removed. An example of an item which was excluded is 'Some students need to be placed in slower groups so they are not subjected to unrealistic expectations'. Three items were reworded from 'teacher' to 'I', while four items were reworded from 'I' to 'teacher'. Three items were re-orientated from positive to negative phrasing. The scale was translated into Vietnamese and back-translated into English. In the current study answers were rated on a four-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Following an initial pilot study, two items were subsequently removed resulting in a final 20-item scale.

Validation: Exploratory Factor Analysis

Researchers have indicated that instrument validity and factor structure should be demonstrated for different populations and cultures when used in these contexts (Reise, Waller & Comrey, 2000). Therefore it is important to assess the instrument validity and factor structure of the teacher efficacy scale in the Vietnamese context. The 20 items of the 'Teacher Efficacy' scale were subjected to Principal Components Analysis (PCA) using SPSS statistical software package, version 18 using the data collected from the teacher efficacy scale was administered to 176 grade 5 teachers in Vietnam.

Prior to analysis, the variables were examined through various SPSS programs for accuracy of data entry, missing values and outliers. In addition all relevant items were re-coded (Item 3, 4, 5, 6, 7, 8, 11, 12, 15, 20). Accuracy of the data file was confirmed and for all items and summary statistics were generated for each item and these are presented in Appendix A. The percentage of missing data fell within the range of 0.6% to 1.1%. Due to this low percentage of missing data it was concluded that the data were missing at random. The correlation matrix was inspected to assess linearity as it is suggested that if an item does not correlate at least moderately (e.g. r = .20 or greater) with other items for the construct, then the item will likely perform poorly in a factor analysis (Floyd & Widman, 1995). The correlation matrix was inspected (see Appendix B) and it was decided that there was sufficient correlation among the variables to conduct factor analysis.

To assess the factorability of the data, Bartlett's test of sphericity (Bartlett, 1954) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970, 1974) were conducted (see Appendix C). The KMO index was found to be .67 which was considered adequate and above the recommended minimum of .6 (Tabachnick & Fidell, 2007). The null hypothesis was rejected for

Bartlett's test of sphericity ($p < .05$) and therefore it is considered appropriate to conduct factor analysis (Tabachnick & Fidell, 2007).

To decide what factors to retain for the teacher efficacy scale three decision rules were used: Kaiser's criterion, inspection of the scree-plot (Cattell, 1966) and parallel analysis (Horn, 1965). First of all, principal components analysis revealed the presence of seven components with eigenvalues exceeding 1, which explained a total of 60% of the variance. Secondly, the scree-plot was inspected and this indicated a significant elbow after the three factors. Finally parallel analysis (Watkins, 2000) was conducted and the size of the eigenvalues obtained from principal components analysis were compared to those obtained from a randomly generated set of data of the same size with the same number of variables. Four components were found to have eigenvalues exceeding those generated by the random data. As demonstrated, disparities were found from the results for each of these methods. For this reason a decision was made to manually determine the best number of factors to retain by running multiple rotations.
The items were rotated using oblique rotation using the oblique method (Direct Oblimin) as it was decided that the factors generated were likely to be related (Costello & Osborne, 2005). The rotations were run for a two, three and four factor model and the item loadings were compared for each rotation. The two factor solution was found to provide the cleanest loading in that all items loadings were above 0.30 and no items were cross-loading (see Appendix F). This also produces the most parsimonious solution and best reflects the two-factor models proposed in previous studies (Gibson & Dembo, 1984; Guskey & Passaro, 1994). The two factor solution was thus retained. As a rule of thumb, only variables with loadings of 0.30 and above were interpreted (Tabachnick & Fidell, 2007) and as such items 15, 18 and 19 were deleted. The items were found to load well on the two components and accounted for a total of 29% of the variance (17% and 12% respectively). An example of an item comprising the first subscale is 'If I try really hard I can get through to the most difficult or unmotivated students' while an example of an item on the second subscale is 'The amount a student can learn is primarily related to family background'. The subscales each demonstrated good internal reliability. The Cronbach's alpha was 0.74 for factor one and 0.68 for factor two.

Gibson and Dembo (1984) suggest that the two factors from the teaching efficacy scale corresponded to general teaching efficacy and personal teaching efficacy. However, other researchers have suggested that the teacher efficacy scale consists of different factors than those proposed by Gibson and Dembo (1984). For example Guskey and Passaro (1994) identified a two factor structure consisting of internal factors and external factors. Internal teaching efficacy represents perceptions of personal influence, power, and impact in teaching and learning situations while external teaching efficacy is related to teacher's perception of the influence, power

and impact of elements that lie outside the classroom and thus beyond the direct control of individual teachers. They believe this distinction more accurately represents teachers' perceptions of the impact of different factors on teaching practices. The factors retained in the current study appear to be more representative of the internal factors and external factors suggested by Guskey and Passaro (1994). However, these results should be interpreted with caution as examination of the results indicates that the items loadings of the two factors are strongly influenced by the positive and negative phrasing of the items. A possible explanation for this may be that difficulties were encountered in the translation of the negatively phrased items.

Rasch Analysis

The teacher efficacy scale was subjected to Rasch analysis to determine the fit of the data to the model and to detect any problematic items. The first approach to the analysis was to undertake Rasch analysis using the Partial Credit Model (PCM) which is appropriate for use with likert scales. However, this approach was not suited to the data as the model failed to converge. Thus an alternative approach was taken whereby the responses to the individual items were dichotomised and Rasch analysis was then undertaken. The frequencies of the dichotomised responses are presented in Appendix H.

Rasch Analysis of Factor One

Following the dichotomisation of the responses to the individual items, Rasch analysis was undertaken using the CML estimation. An iterative process was undertaken and items 2 and 16 demonstrated a bad fit to the Rasch model as indicated by a significant U value and outfit and infit statistics and were removed from the model. The remaining six items had a non-significant *R*1*c,* U, infit and outfit statistics (see Table 1).

Table 1: Fit Statistics

	Difficulty				Standardized			
Items	**Difficulty Parameters**	**Std Err.**	**Ric**	**Df**	**p-values**	**Oufit**	**Infit**	**U**
tchat01	1.02129	0.19177	0.673	1	0.4120	-1.058	-0.988	-1.009
tchat09	-0.64637	0.21689	0.301	1	0.5831	1.011	1.782	1.133
tchat10	0.53611	0.19071	0.020	1	0.8879	0.106	0.535	0.502
tchat13	-0.17470	0.20141	0.000	1	0.9851	-0.679	-0.930	-0.535
tchat14	-0.03214	0.19809	0.099	1	0.7534	-1.060	-1.163	-1.115
tcaht17	-0.70420	0.21930	0.406	1	0.5241	0.620	-0.002	0.864
R1c test		R1c= 2.240	5 0.8150					
Andersen LR test		Z= 2.044	5 0.8431					
The mean of the difficulty parameters is fixed to 0								

Rasch Analysis of Factor Two

Rasch analysis was undertaken using the CML estimation on Factor Two of the Teacher Efficacy Scale. In the first analysis item 7 demonstrated a bad fit to the Rasch model demonstrated a bad fit as indicated by a significant U value and outfit and infit statistics. When this item was removed, item 5 was also found to have a bad fit and this item was also removed from the model. The remaining seven items had a non-significant *R1c,* U, infit and outfit statistics (see Table 2 and Figure 1).

Table 2: Fit Statistics

	Difficulty				Standardized			
Items	**Difficulty Parameters**	**Std Err.**	**Ric**	**Df**	**p-values**	**Oufit**	**Infit**	**U**
Tchat03	-0.14842	0.17849	0.174	2	0.9166	0.133	0.163	0.071
Tchat04	1.16597	0.23541	1.643	2	0.4398	-0.614	0.223	0.132
Tchat06	0.81805	0.21431	0.271	2	0.8734	0.226	-0.177	0.062
Tchat08	1.53126	0.26334	0.611	2	0.7367	-0.975	-0.238	-0.607
Tchat11	-3.34614	0.28745	0.431	2	0.8060	-0.843	-0.177	-0.928
Tchat12	0.12771	0.18559	1.351	2	0.5089	-0.608	-0.916	-0.872
Tchat20	-0.14842	0.17849	3.729	2	0.1550	1.062	1.550	1.352
R1c test		**R1c= 7.990 12 0.7859**						
Andersen LR test		**Z= 10.410 12 0.5800**						
The mean of the difficulty parameters is fixed to 0								

The summary statistics for the scores obtained through Rasch analysis for factor one (Internal Teaching Efficacy) and factor two (External Teaching Efficacy) are presented in Table 3.

Table 3: Summary Statistics for Internal and External Teaching Efficacy

Scale	***Mean***	***SD***	***Minimum***	***Maximum***
Internal Teaching Efficacy	1.14	1.57	-2.75	2.78
External Teaching Efficacy	-1.06	1.49	-4.44	3.36

Conclusions

To investigate the factor structure of scale Principal Components Analysis was carried out using SPSS statistical software package, version 18. It was found that a two factor solution was best at yielding a clear pattern of loading which accounted for a total 29% of the total variance between items (17% and 12% respectively) and demonstrated good internal consistency. Rasch analysis was then used to create interval level measurements from the scales. Overall, the evidence suggests that the adapted version of Gibson and Dembo's (1984) teacher efficacy scale can be

used to confidently assess internal and external teaching efficacy amongst teachers in the Vietnamese context.

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Appendices

Appendix A: Summary Statistics for Each Item

	N	Range	X	s.d.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20				
1. If I try really hard I can get through to even the most difficult or unmotivated students.	176	1-3	2.57	.52
2. When a student does better than usually, many times it is because the teacher exerts a little extra effort.	176	1-3	2.60	.50
3. The hours in my class have little influence on students compared to the influence of their home environments. **REVERSE**	176	1-4	2.26	.65
4. The amount a student can learn is primarily related to family background. **REVERSE**	175	1-4	2.06	.57
5. If students aren't disciplined at home, they aren't likely to accept any discipline. **REVERSE**	175	1-4	2.82	.63
6. I have not been trained to deal with many of the learning problems my students have. **REVERSE**	175	1-4	2.10	.57
7. My teacher training programme and/or experience did not give me the necessary skills to be an effective teacher. **REVERSE**	176	1-4	1.84	.63
8. When a student is having difficulty with an assignment I have trouble adjusting it to his/her level. **REVERSE**	176	1-4	1.95	.53
9.When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student	176	1-3	2.80	.42
10. When I really try I can get through to most difficult students.	175	1-3	2.65	.48
11. I am very limited in what I can achieve because a student's home environment is a large influence on his/her achievement. **REVERSE**	175	1-4	2.95	.51
12. Teachers are not a very powerful influence on student achievement when all factors are considered. **REVERSE**	175	1-4	2.18	.66
13. When the grades of students improve it is usually because their teachers found more effective teaching approaches.	175	1-3	2.74	.45
14. If a student masters a new concept quickly this might be because the teacher knew the necessary steps in teaching that concept.	174	1-3	2.72	.46
15. If parents would do more for their children teachers could do more. **REVERSE**	174	1-4	2.67	.72
16. If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson.	175	1-3	2.73	.46
17. If a student in my class becomes disruptive and noisy I feel assured that I know some techniques to redirect him/her quickly.	175	1-3	2.81	.41
18. The influences of a student's home experience can be overcome by good teaching.	174	1-3	2.59	.52
19. If a student couldn't do a class assignment, most teachers would be able to accurately assess whether the assignment was at the correct level of difficulty.	175	1-3	2.63	.55
20. Even a teacher with good teaching abilities may not reach many students. **REVERSE**	175	1-4	2.28	.65

Appendix B: Correlation Matrix

1	1.00																				
2	.07	1.00																			
3	-.05	-.09	1.00																		
4	.082	-.080	.409	1.00																	
5	.129	-.048	.201	.205	1.00																
6	.083	.115	.274	.213	.112	1.00															
7	.081	.062	.187	.105	-.062	.428	1.00														
8	.116	-.004	.166	.196	.110	.377	.452	1.00													
9	.360	.263	-.080	-.070	.053	-.084	.023	.035	1.00												
10	.530	.143	-.087	-.027	.034	.034	.017	.162	.271	1.00											
11	.034	.040	.208	.225	.263	.152	-.041	.139	-.098	-.004	1.00										
12	.106	.056	.151	.110	.194	.200	.194	.219	.174	.156	.263	1.00									
13	.288	.253	-.013	.034	-.041	.031	-.049	.046	.235	.246	-.051	.039	1.00								
14	.333	.304	-.012	-.010	-.001	-.004	.022	.087	.263	.306	-.013	.102	.560	1.00							
15	-.097	-.090	.039	.102	-.042	.023	-.095	-.070	.010	-.217	-.010	-.110	-.085	-.155	1.00						
16	.166	.205	-.062	-.074	-.004	.057	.123	-.003	.160	.198	-.053	.007	.220	.211	-.007	1.00					
17	.281	.122	.012	.048	.089	.081	.074	.116	.167	.237	-.042	.192	.473	.346	-.238	.363	1.00				
18	-.047	.041	-.008	.032	.023	-.039	.003	.015	.073	-.015	-.169	-.022	.051	.112	.024	.104	.180	1.00			
19	.063	-.021	.247	.013	.158	-.048	-.013	-.058	.090	.005	.021	.088	.122	.248	.025	.218	.238	.201	1.00		
20	.222	-.060	.187	.157	.208	.268	.057	.120	.128	.202	.142	.276	.228	.169	.121	.081	.377	.027	.164	1.00	

Appendix C: Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity

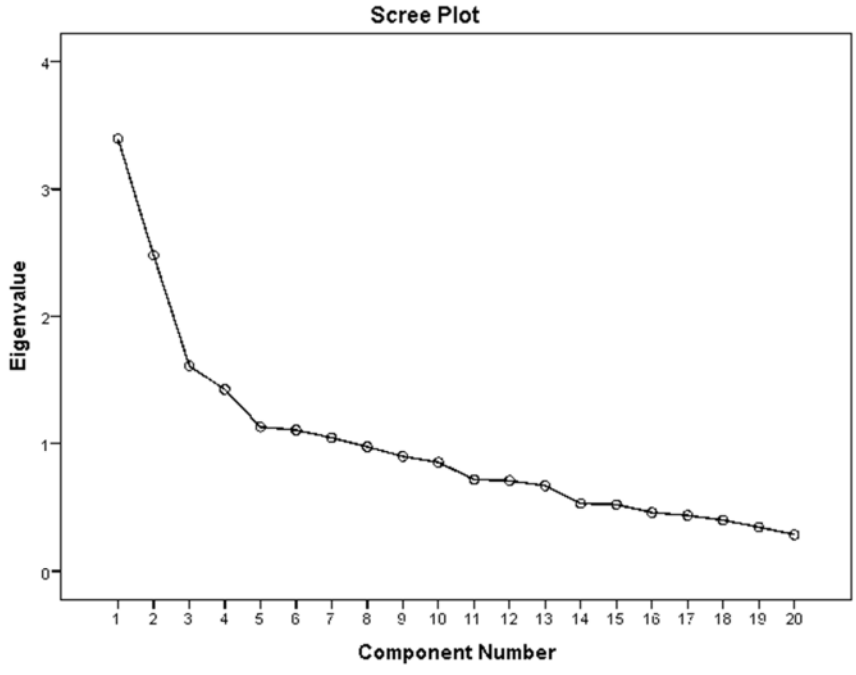
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.667
Bartlett's Test of Sphericity	Approx. Chi-Square	698.735
	df	190
	Sig.	.000

Appendix D: Initial Eigenvalues for Unrotated Solution

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**3.394**	**16.972**	**16.972**	3.394	16.972	16.972
2	**2.480**	**12.398**	**29.369**	2.480	12.398	29.369
3	**1.609**	**8.045**	**37.415**	1.609	8.045	37.415
4	**1.425**	**7.123**	**44.538**	1.425	7.123	44.538
5	**1.130**	**5.650**	**50.189**	1.130	5.650	50.189
6	**1.106**	**5.531**	**55.720**	1.106	5.531	55.720
7	**1.046**	**5.230**	**60.950**	1.046	5.230	60.950
8	.975	4.874	65.824			
9	.900	4.498	70.322			
10	.853	4.265	74.587			
11	.719	3.594	78.180			
12	.710	3.549	81.730			
13	.670	3.351	85.080			
14	.531	2.653	87.733			
15	.523	2.616	90.350			
16	.460	2.299	92.649			
17	.437	2.186	94.835			
18	.401	2.005	96.840			
19	.345	1.727	98.567			
20	.287	1.433	100.000			

Extraction Method: Principal Component Analysis.

Appendix E: Scree Plot



Appendix E: Scree Plot

Component Number	Actual Eigenvalues from PCA	MCPCA1	MCPCA1	MCPCA1	Decision
1	**3.394**	1.6488	1.6393	1.6463	Accept
2	**2.480**	1.5243	1.5309	1.5315	Accept
3	**1.609**	1.4338	1.4400	1.4345	Accept
4	**1.425**	1.3524	1.3566	1.3509	Accept
5	**1.130**	1.2840	1.2855	1.2974	Reject

Appendix F: Pattern and Structure Matrices for Two Factor Solution

	Pattern Matrix		**Structure Matrix**	
	Component		**Component**	
	1	**2**	**1**	**2**
tchat01	.595		.604	
tchat02	.412		.406	
tchat03		.625		.615
tchat04		.574		.566
tchat05		.429		.430
tchat06		.649		.647
tchat07		.476		.478
tchat08		.577		.582
tchat09	.541		.537	
tchat10	.595		.599	
tchat11		.475		.466
tchat12		.495		.507
tchat13	.690		.689	
tchat14	.714		.714	
tchat15				
tchat16	.489		.487	
tchat17	.660		.670	
tchat18				
tchat19				
tchat20	.314	.463	.345	.484
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. a. Rotation converged in 5 iterations.				

Appendix G: Factor Solution Generated from Young Lives Vietnamese Sample

Internal Teaching Efficacy		External Teaching Efficacy	
1	If I try really hard I can get through to even the most difficult or unmotivated students.	**3**	The hours in my class have little influence on students compared to the influence of their home environments. **REVERSE**
2	When a student does better than usually, many times it is because the teacher exerts a little extra effort.	**4**	The amount a student can learn is primarily related to family background. **REVERSE**
9	When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student	**5**	If students aren't disciplined at home, they aren't likely to accept any discipline. **REVERSE**
10	When I really try I can get through to most difficult students.	**6**	I have not been trained to deal with many of the learning problems my students have. **REVERSE**
13	When the grades of students improve it is usually because their teachers found more effective teaching approaches.	**7**	My teacher training programme and/or experience did not give me the necessary skills to be an effective teacher. **REVERSE**
14	If a student masters a new concept quickly this might be because the teacher knew the necessary steps in teaching that concept.	**8**	When a student is having difficulty with an assignment I have trouble adjusting it to his/her level. **REVERSE**
16	If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson.	**11**	I am very limited in what I can achieve because a student's home environment is a large influence on his/her achievement. **REVERSE**
17	If a student in my class becomes disruptive and noisy I feel assured that I know some techniques to redirect him/her quickly	**12**	Teachers are not a very powerful influence on student achievement when all factors are considered. **REVERSE**
		20	Even a teacher with good teaching abilities may not reach many students. **REVERSE**

Appendix H: Frequency for Dichotomised Reponses

		False	True
1	If I try really hard I can get through to even the most difficult or unmotivated students.	70	97
2	When a student does better than usually, many times it is because the teacher exerts a little extra effort.	64	103
3	The hours in my class have little influence on students compared to the influence of their home environments. **(R)**	52	115
4	The amount a student can learn is primarily related to family background. **(R)**	22	145
5	If students aren't disciplined at home, they aren't likely to accept any discipline. **(R)**	119	48
6	I have not been trained to deal with many of the learning problems my students have. **(R)**	28	139
7	My teacher training programme and/or experience did not give me the necessary skills to be an effective teacher. **(R)**	12	155
8	When a student is having difficulty with an assignment I have trouble adjusting it to his/her level. **(R)**	17	150
9	When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student	33	134
10	When I really try I can get through to most difficult students.	58	109
11	I am very limited in what I can achieve because a student's home environment is a large influence on his/her achievement. **(R)**	145	22
12	Teachers are not a very powerful influence on student achievement when all factors are considered. **(R)**	44	123
13	When the grades of students improve it is usually because their teachers found more effective teaching approaches.	42	125
14	If a student masters a new concept quickly this might be because the teacher knew the necessary steps in teaching that concept.	45	122
15	If parents would do more for their children teachers could do more. **(R)**	97	70
16	If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson.	43	124
17	If a student in my class becomes disruptive and noisy I feel assured that I know some techniques to redirect him/her quickly.	32	135
18	The influences of a student's home experience can be overcome by good teaching.	66	101
19	If a student couldn't do a class assignment, most teachers would be able to accurately assess whether the assignment was at the correct level of difficulty.	57	110
20	Even a teacher with good teaching abilities may not reach many students. **(R)**	52	115