

PSYCHOMETRIC PROPERTIES OF THE ACADEMIC SELF-EFFICACY SCALE FOR HIGHER SECONDARY STUDENTS

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ABSTRACT

In response to the scarcity of grade-specific academic self-efficacy scale, the present study was aimed to adapt a scale for measuring academic self-efficacy for higher secondary students in the context of Bangladesh. Main objective of this study was to assess psychometric properties of the Academic Self-efficacy Scale for Bangladeshi higher secondary students. This measure was administered on a sample 207 higher secondary students who were selected from 3 administrative districts of Bangladesh by non-probability sampling techniques. Psychometric properties were assessed through item analysis (item-total correlation, Cronbach's Alpha and split-half reliabilities), differential item function, and Pearson product moment correlation coefficient (Predictive validity). One item excluded from the scale as this item had insufficient item-total correlation. Findings revealed that this scale had sufficient internal consistency reliabilities and predictive validity and suggested that this could be applicable for assessing academic self-efficacy of higher secondary students in Bangladesh.

Keywords: self-efficacy, academic achievement, reliability, validity

INTRODUCTION

Self-efficacy can be defined as what one believes one can do with own skills under certain conditions (Maddux 2002; Schultz and Schultz, 2008). Academic self-efficacy motivates and energizes students to regulate their academic thoughts and provide a way of better academic achievement. It is the most extensively studied variables. Studies suggested strong relationship between academic self-efficacy and academic achievement (Pintrich and De Groot 1990; Wolters and Pintrich 1998; Ahangi and Sharaf 2013).

Ogunmakin and Akomolafe (2013) suggested academic self-efficacy as a predictor of academic achievement. It has a strong relationship with exam performance rather class participation (Galyon *et al.*, 2012). It suggested that students, who have strong academic self-efficacy beliefs, have a greater tendency to do better in their academic task (Galyon *et al.*, 2012). Students with higher self-

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efficacy studied more when they approached difficulties than students with low self-efficacy. Students with low self-efficacy performed worse at learning tasks and tend to avoid difficult tasks (Schunk 1994). Learning strategies such as elaboration, critical thinking, organization, self-regulated leaning strategy, time and study environment management etc. have been reported to be significantly correlated with academic self-efficacy (Ahmed *et al.*, 2016).

There were some adapted questionnaires for assessing academic self-efficacy belief. The translated Bangla (Rahman *et al.*, 2015) of the academic self-efficacy scale (Owen and Froman 1988) was one of these measures. This scale is the most widely used and recognized as a sound questionnaire for assessing students' academic performance and is being used to identify students' academic self-efficacies (both high and low) related to their academic performances including assessing the academic self-efficacy of the secondary school students (Grade 6-10). The present study was designed to adapt the translated version of this scale for higher secondary students (Grade 11-12) in Bangladesh.

The main objective of the present study was to evaluate the psychometric properties of the academic self-efficacy scale (Owen and Froman, 1988) for higher secondary students. Here we also report the item-total correlations of the measure, the internal consistencies reliabilities of the measure, the predictive validity of the measure and the item response bias of the measure.

MATERIALS AND METHODS

Participants

The study population of the present study was the higher secondary students of Bangladesh. Participants were selected from 4 colleges of 3 districts (2 from Chattagram, 1 from Dhaka, and 1 from Madaripur) which were selected on the basis of convenience. From these colleges, a sample of 207 students was recruited as the sample utilizing the purposive sampling technique. Respondents' age *mean* was 17.39 with *standard deviation* .77. Among respondents, 106 (51.2%) were male and 101 (48.8%) were female and, 80 (38.7%) from rural colleges and 127 (61.3%) from urban colleges. Among them, 108 (52.2%) were from science, 58 (28.0%) from business studies, and 41 (19.8%) from humanities group.

Measures

In the present study, the translated Bangla version (Rahman, Nahar, Tany, and Khatun, 2015) of the Academic Self-efficacy Scale (ASE: Owen and Froman 1988) is a 33-items self-report measure to assess students' academic self-efficacy.

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Participants responded to each item about their confidence to perform the described task using a five-point Likert type scale, ranging from 1= (very little) to 5= (quite a lot). Internal consistency reliabilities (ranged from .90 to .92) were reported by the authors of the scale (Owen and Froman 1998). *Cronbach's Alpha* reliability of the translated version of the ASE was .98 and test-retest reliability was .98.

Procedure

Above-described measure was administered on the study sample for collecting necessary data. Along with written instructions, the students were also instructed verbally to make sure that they had understood the task. Then they were requested to answer the questions sincerely and honestly. Confidentiality of their responses were also assured. They were informed that their responses regarding the questionnaire would be used in research purpose only. There was no time limit for the respondents to complete their task. After accomplishment of their task, they were thanked for their sincere cooperation.

RESULTS AND DISCUSSIONS

Item Analysis

The collected data of the present study was subjected to item analysis to estimate the *corrected item-total correlations* of items. Results are presented in Table 1.

TABLE 1: CORRECTED ITEM-TOTAL CORRELATIONS AND CRONBACH'S ALPHA IF ITEM DELETED OF EACH ITEM OF THE ACADEMIC SELF-EFFICACY SCALE

Scale Items	Corrected Correlation	Item-Total	Cronbach's Alpha if item Deleted
Item-1	.564		.911
Item-2	.521		.911
Item-3	.622		.910
Item-4	.485		.912
Item-5	.303		.914
Item-6	.495		.912
Item-7	.405		.913
Item-8	.289		.914
Item-9	.428		.913
Item-10	.342		.914
Item-11	.514		.911
Item-12	.600		.911

Item-13	.454	.912
Item-14	.471	.912
Item-15	.311	.915
Item-16	.386	.913
Item-17	.327	.914
Item-18	.482	.912
Item-19	.349	.914
Item-20	.507	.912
Item-21	.614	.910
Item-22	.487	.912
Item-23	.324	.914
Item-24	.596	.910
Item-25	.562	.911
Item-26	.535	.911
Item-27	.455	.912
Item-28	.573	.911
Item-29	.620	.910
Item-30	.468	.912
Item-31	.376	.913
Item-32	.666	.909
Item-33	.534	.911

Table 1 shows that all items are positively correlated, and item-total score ranged from .289 (item-8) to .666 (item-32). The item-8 had low item-total correlation. This item was excluded from the further analysis for determining reliability and validity of the measure.

Determining reliability:

Reliability coefficients of the Bangla version of the Academic Self-Efficacy Scale were determined by calculating Cronbach's Alpha, Split-half reliability through *Spearman-Brown Correction coefficient*. The *Cronbach's Alpha* reliability of the measure was .91 (95% *CI* [.897, .930]). The *split-half reliability* through *Spearman-Brown coefficient* was .92. The standard error of measurement (SEM) was 5.45.

Differential Item Functioning (DIF):

To estimate the item response bias across gender of individual items of the Bangla version of the Academic Self-Efficacy Scale, data were analyzed through DIFAS 5.0 (Penfield 2013). Results are presented in Table 2.

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TABLE 2: DIFFERENTIAL ITEM FUNCTIONING (DIF) INFORMATION ACROSS GENDER OF THE BANGLA VERSION OF THE ACADEMIC SELF-EFFICACY SCALE

Items	Mantel χ^2	LORZ	COXZ	Items	Mantel χ^2	LORZ	COXZ
1	6.38*	-2.23	-2.53	18	1.003	1.06	1
2	.48	.70	.70	19	.47	.70	.68
3	1.53	-1.15	-1.24	20	.003	-.06	-.06
4	2.11	1.45	1.45	21	.01	-.07	-.07
5	.21	-.45	-.46	22	.13	-.37	-.36
6	.06	.26	.25	23	.71	-.87	-.84
7	8.87*	-2.30	-2.30	24	3.53	1.92	1.88
8	.36	-.61	-.60	25	4.87*	2.27	2.21
9	1.81	-1.27	-1.35	26	.48	-.72	-.69
11	.14	-.34	-.37	27	.02	.13	.13
12	1.15	-1.05	-1.07	28	.60	.80	.78
13	1.50	-1.14	-1.22	29	1.82	-1.43	-1.35
14	.87	1	.93	30	1.69	1.36	1.30
15	3.38	1.78	1.84	31	1.87	-1.39	-1.37
16	2.80	1.59	1.67	32	1.12	1.10	1.05
17	.92	1.06	.96	33	.09	-.30	-.30

*p<.05; Reference group = Male, Focal group = Female;

LOR Z = *Standardized Liu-Agresti Cumulative Common Log-Odds Ratio*, COX Z = *Standardized Cox's Noncentrality Parameter estimator*

Table 2 shows that three items (item-1, item -7, and item-25) have response bias across gender. The DIF contrast is not present in the rest of the items.

Determining Validity

The validity of the Bangla version of Academic Self-efficacy Scale was measured by using following methods.

Face Validity: The Bangla version of Academic Self-efficacy Scale had face validity as expert panel members recognized all items of the scale seem to assess academic self-efficacy of college level students.

Content Validity: The essential remarks of the expert panels assured the content validity of the Bangla Academic Self-efficacy Scale.

Predictive Validity: The collected data were subjected to *Pearson product moment correlation coefficient* to estimate the relation between academic

achievement and academic self-efficacy measure by this measure. Analysis revealed that academic self-efficacy significantly correlated to academic achievement ($r=.591, p<.001, 95\% CI [.494, .673]$).

There were several instruments for measuring academic self-efficacy in Bangladesh. But, Grade-specific adapted or developed instrument for measuring students' academic self-efficacy was unavailable. The present study was aimed to adapt the Academic Self-efficacy scale (Owen and Froman 1988) and estimate the psychometric properties of this scale for higher secondary students in Bangladesh. The translated Bangla version of this measure was adopted for targeted study population. This scale was administered on a sample of 207 higher secondary students who were selected through non-probability sampling techniques. Findings from Table 1 revealed that except item-8 all items had sufficient level of item-total correlations. The item-total correlation $\geq .3$ is considered sufficient to retain an item in a measure. An item-total correlation value less than .3 indicates that the item does not correlated very well with the scale overall (Field 2017).

The Bangla ASES had sufficient level of internal consistency reliabilities for administering on higher secondary students. As a rule of thumb, Cronbach's Alpha should be .70 or higher for using as an instrument (Nunnally 1978). Kilne (2000) suggested that acceptance range of Cronbach's Alpha (i.e. $.50 <$ is unacceptable, $.50-.60$ is poor, $.60-.70$ is acceptable, $.70-.90$ is good, and above $.90$ is excellent). For Spearman-Brown coefficient, as a rule of thumb, a reliability $.80$ or high is adequate reliability. The *standard error of measurement* (SEM) of this scale was 5.45. The acceptable point of SEM of a scale is less than half of its corresponding standard deviation. The standard deviation of the Bangla version of ASES was 18.58. The SEM value is less than half of this value.

Differential item functioning (DIF) present in 3 items of this measure. Mantel-Haenszel χ^2 value ≥ 3.84 is significant at .05 (Penfield, 2013). Values which are greater than -2 to +2 of Standardized Liu-Agresti Cumulative Common Log-Odds Ratio, and Standardized Cox's Noncentrality Parameter suggest the presence of DIF (Penfield 2013). Mantel-Haenszel χ^2 , Standardized Liu-Agresti Cumulative Common Log-Odds Ratio, and Standardized Cox's Noncentrality Parameter values of these three items exceeded corresponding limits of the presence of DIF contrast.

The significant correlation between academic self-efficacy scores obtained by this measure and academic achievement suggested predictive validity of the measure.

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As studies suggested that the self-efficacy is a strong predictor of academic achievement (Pintrich and De Groot 1990; Wolters and Pintrich 1998; Adeyemo 2007; Klassen *et al.*, 2008; Ahangi and Sharaf 2013), so any academic self-efficacy measure's scores should have significant correlation to academic achievement.

Information about psychometric properties of the Bangla version of the Academic Self-efficacy scale (Owen and Froman 1988) described above suggested that this measure could be applied for measuring Bangladeshi higher secondary students' academic self-efficacy. However, norms of this measure for target population were not developed. So, a large scale study would be required to establish the norms of this measure. This scale could be applied to indentify students having higher self-efficacy, lower self-efficacy. This scale would be useful to students, teachers, guardians, and others related to the field. They could take intervening steps or program for increasing students' academic self-efficacy belief for better academic performance. Overall, this measure could contribute to increase quality of education in Bangladesh.

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