

Factorial Structure and Predictive Validity of Approaches and Study Skills Inventory for Students (ASSIST) in Egypt: A Confirmatory Factor Analysis Approach

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Abstract

Introduction. The purpose of this study is double. First, to evaluate the factorial structure of Approaches and Study Skills Inventory for Students (ASSIST) as a measure of approaches to learning with bilingual Egyptian higher education students by testing the plausibility of reproducing its intended three-factor structure. Second, the study aimed at testing the predictive validity of ASSIST.

Method. The sample of the study consisted of (n=516) college students from one international university in Egypt. To cross-validate the factor structure, the subjects were divided into two equal samples. Confirmatory factor analysis was used to test the structure of ASSIST.

Results. The findings of this study confirmed the underlying constructs of three distinctive approaches to learning. ASSIST main scales and subscales' scores showed appropriate internal consistency and predictive validity to academic achievement.

Conclusion. It was concluded that ASSIST is a valid research tool for the assessment of approaches to learning, however caution should be taken with respect to the interpretation of particular subscales and possible sample effects.

Keywords: Approaches to Learning, Confirmatory Factor Analysis, ASSIST, Predictive Validity, Factorial Structure, Learning Environment.

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Estructura Factorial y Validez Predictora del cuestionario "Approaches and Study Skills Inventory for Students" en Egipto: Aproximación por Análisis Factorial Confirmatorio

Resumen

Introducción. El objetivo de este estudio es doble. En primer lugar, para evaluar la estructura factorial de los enfoques y el Estudio de Inventario de Habilidades para Estudiantes (ASSIST) como una medida de los enfoques de aprendizaje con estudiantes bilingües de educación superior de Egipto por las pruebas de la verosimilitud de la reproducción de su intención de tres factores de estructura. En segundo lugar, el estudio destinado a comprobar la validez predictiva de asistencia.

Método. La muestra del estudio consistió en (n = 516) estudiantes universitarios de una universidad internacional en Egipto. Para una validación cruzada de la estructura de factores, los sujetos fueron divididos en dos muestras iguales. El análisis factorial confirmatorio se utilizó para probar la estructura de asignación.

Resultados. Los resultados de este estudio confirman los constructos subyacentes de estos tres enfoques distintivos para el aprendizaje. Las escalas principales y subescalas demostraron una consistencia interna adecuada y la validez predictiva de los logros académicos.

Conclusión. Se concluye que ASSIST es una herramienta de investigación válidos para la evaluación de los enfoques de aprendizaje, sin embargo se debe tener cuidado con respecto a la interpretación de las subescalas en particular y los posibles efectos de la muestra.

Palabras Clave: Métodos de aprendizaje, análisis factorial confirmatorio, ASSIST, la validez predictiva, estructura factorial, ambiente de aprendizaje.

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Introduction

Substantive research continuously provides constant evidence that individual differences in how students approach learning exist. These differences in turn have a powerful influence on many aspects of learning and teaching everyday. One of the most widely used frameworks for understanding student learning in higher education, from a student learning perspective, is the approaches to learning paradigm (Biggs, 1987a; Biggs, 1987b; Biggs, 1987c; Marton & Saljo, 1976b).

Approaches to learning may be regarded as a description of acquired intentions, motives and strategies, which are partly determined by the learning context in terms of the students' responses to situational demands (Entwistle, 1981). They have a relational nature and can vary according to learning context (Entwistle & Ramsden, 1982; Garcia-Ros, Perez Gonzalez, & Talya, 2008; Kember, Leung, & McNaught; 2008; Leung, Ginns, & Kember, 2008; Ramsden, 1987; Richardson, 2003; Trigwell & Prosser, 1991). Therefore, Biggs, Kember, and Leung (2001) suggested that, in general, students adjust their approaches to learning based upon the demands of the course that they enrolled in. The way a student relates to a learning situation is not an intrinsic characteristic of the student, but is rather dependent on the 'learning context' (Entwistle, Tait, & McCune, 2000; Entwistle, McCune, & Hounsell, 2002; Ramsden, 1987; Prosser and Trigwell, 1999).

Because of the culture specificity of approaches to learning, theoretical constructs embodied in the approaches to learning instruments, such as ASSIST might not be consistent across cultures and contexts. Therefore, differences in the conceptual and empirical composition of the factorial structure of the same instrument across different countries and cultures are possible. Consequently, it is very important to confirm that the instrument demonstrate the hypothesized factorial structure before using it in new cultures or learning contexts. Such confirmation of the validity of the use of the instrument across cultures would facilitate comparative national and international research and would help educators in designing and implementing effective teaching and learning strategies and making better instructional and referral decisions. Hence, the purpose of this paper was to investigate the factorial structure of ASSIST as a measure of approaches to learning with bilingual Egyptian

higher education students by testing the plausibility of reproducing the intended three-factor structure of ASSIST. According to the last formal statistics published by Central Agency for Public Mobilization and Statistics (CAPMAS) in Egypt, there were 59852 bilingual higher education students in Egypt in 2008/2009 academic year (CAPMAS, 2009). To our knowledge, this study might be considered the first one testing the structure of ASSIST or any other measure of approaches to learning in any Arabic culture. To avoid cross culture adaptation and translation risks of affecting the underlying structure of the instrument (see Byrne & Watkins, 2003; Osterlind, Miao, Sheng, & Chia, 2004), ASSIST was administered in its original English language. Confirmatory factor analysis appeared to be a powerful statistical technique to achieve the study goals (Bollen, 1989b).

Approaches to learning are derived from two bodies of work. Deep and surface approaches to learning were identified in Marton and Saljo's (1976a, b) qualitative analysis of students' reports of what they did when studying a specific academic text, whereas a strategic approach to learning was identified in Ramsden's (1979) work. Approaches to learning have later been investigated quantitatively using different instruments to assess what a student usually does when they are involved in a specific learning task. A very substantial amount of empirical research and theory development in the field of student learning in higher education has been conducted in the last two decades (Biggs, 1999; Diseth, 2003; Marton & Booth, 1997; Marton, Hounsell, & Entwistle, 1997). Table (1) shows characteristics, learner intention, motivation and main strategy for the approaches to learning.

Table 1. Characteristics, learner intention, motivation and main strategy for the approaches to learning.

Approach to Learning	Characteristics	Learner Intention	Learner Motivation	Learner Main Strategy
Surface Approach	<ul style="list-style-type: none"> - Focusing on memorizing facts - Reproduction of information in an unrelated manner - A lack of recognition of any personal meaning in the studied material - Viewing the task as a demand to be met 	<ul style="list-style-type: none"> - Reproducing the learning material 	<ul style="list-style-type: none"> - Mainly extrinsic - Focused on avoiding failure with minimal personal and involvement effort 	<ul style="list-style-type: none"> - Dependence on memorizing
Deep Approach	<ul style="list-style-type: none"> - Focusing on personal interest, and enjoyment in learning. 	<ul style="list-style-type: none"> - Understanding the studied material. 	<ul style="list-style-type: none"> - Mainly intrinsic - Focused on interest in 	<ul style="list-style-type: none"> - Seeking meaning - Relating

	- Relating learning material prior knowledge		ideas	information to conclusions
	- Evaluating the extent to which conclusions are justified by the evidence presented			
Strategic Approach	- Focusing on achieving the highest possible grades	- Achieving the highest possible grade	- Focused on achievement and maximization of grades	- No distinct learning strategy
	- Learner is concerned with both the academic content of the learning material and the course grades			- Learner selects an optimal strategy that maximizes his chances of success
	- Requirements of the assessment system is as important as course content			

Because Students with a strategic approach have no distinct learning strategy, it is possible to combine a strategic approach with either a surface, or a deep one with respect to strategies (Biggs, 1987c), but with the motivation of maximization of grades, rather than interest in ideas or avoiding failure. Although the approach was originally proposed as a third category. Some evidences has recently found that it is better to be integrated into the other two approaches (see for example; Justicia, Pichardo, Cano, Berbén, & De la Fuente, 2008).

A relation between approaches to learning and measures of student learning (e.g. grade) is well established (Betoret & Artiga, 2011; Biggs, Kember, & Leung, 2001; Byrne, Flood, & Wills, 2004; Davidson, 2002; Diseth, Pallesen, Brunborg & Larsen, 2010; Trigwell & Prosser, 1991), therefore it could be used as an evidence of the predictive validity of the approaches to learning instruments. Researches generally found a relation between approaches to learning in higher education and quality of student learning (Biggs, Kember, & Leung, 2001; Trigwell & Prosser, 1991; Watkins, 1983). A deep approach was found to be associated with high quality of student learning, whereas surface learning was found to be related to poor learning outcomes (Biggs, Kember, & Leung, 2001; Marton & Saljo, 1976a; Trigwell & Prosser, 1991). Positive correlations between the strategic approach and achievement have been found (Entwistle & Ramsden, 1982; Byrne, Flood, & Willis, 2002), as well as negative ones between the surface approach and achievement (Entwistle & Ramsden, 1982; Booth, Luckett, & Mladenovic, 1999).

Measuring Approaches to Learning

A number of instruments have been developed to measure students' approaches to learning. These instruments measure what the student usually does when approaching a learning situation. In Australia, Biggs (1987c) designed the study process questionnaire (SPQ) for college level students and its school-level companion, the learning process questionnaire (LPQ, Biggs, 1987a; Biggs et al., 2001; Justicia et al., 2008). Weinstein, Schulte and Palmer (1987) have developed Learning and Study Strategies Inventory (LASSI). In Britain, Entwistle and Ramsden (1982) developed the approaches to studying inventory (ASI), which is a widely used questionnaire to assess student learning in higher education (Richardson, 2000). However, some studies have found that ASI scores had a limited reliability and validity and troubles in reproducing the intended three-factor structure (Harper & Kember 1989; Tait, Entwistle, & McCune, 1998). To avoid these limitations in ASI, Tait, Entwistle, and McCune (1998) have developed the approaches to study skills inventory for students (ASSIST) after extensive research. The instrument used in the current study is the most recent revision of ASSIST (Entwistle, 2000). This version appears to possess appropriate psychometric properties. Furthermore, a three-factor structure (surface, deep, and strategic) has been supported for ASSIST using first-year British university students (Entwistle, 2000).

The factorial structure of ASSIST has been studied in various samples and cultures, with evidences of plausibility of the reproduction of its intended three-factor structure. Entwistle, Tait, and McCune (2000) compared the plausibility of the three-factor solution across English, Scottish, and South African university students and found no major differences in terms of factor structures among the three samples. However, many subscales have been cross-loaded. A Norwegian version of ASSIST has been validated (Diseth, 2001) and the expected three-factors were reproduced. However, two of the subscales failed to load appropriately on the strategic approach. When omitting these subscales, the factor analysis was better supported by the three-factor solution. Many subscales, such as achieving, time management, and fear of failure were cross-loaded as well. Recently ASSIST has been validated using Flemish and Chinese university students (Chang, Martin, & Tammy, 2008). Results again supported the three-factor structure of ASSIST across the two cultural groups.

Richardson (1995), in a study of students at the university of the South Pacific, has concluded that approaches to studying are culture specific, therefore one should be cautious about using approaches to learning instruments in non-western cultures. In this context, Berberogula and Hei (2003) have investigated university students' approaches to learning across Turkey and Taiwan using an older version of the ASSIST, the ASI. They found significant differences between students in both cultures in all instrument dimensions. Prior to this study, no attempt has been made to investigate the factorial structure of ASSIST in the Arabic culture.

The present study hypotheses

It is hypothesized that the students' data would reproduce the three-factor structure of the ASSIST. It is also hypothesized to find a significant positive correlation between both the deep and strategic approach and the total assessment marks, and a significant negative correlation between the surface approach and the total assessment marks. In addition, negative correlation is expected between the deep and surface approaches, whereas positive correlation is expected between the deep and strategic approaches.

Method

Participants

The sample of the study consisted of (n=516) Egyptian students who studying engineering (116, 22.5%), computer science (120, 23.3%), business administration (202, 39.1%), and political sciences (78, 15.1%) in the British University in Egypt (BUE). Slightly more than half the sample was male (276, 53.5%). Age ranged from 17 to 23 years (mean= 17.2, SD= 1.2). Students mainly from high socioeconomic status (486, 94.2%). All participants were full-time undergraduate preparatory, first, or second year students. English is the language of instruction in the BUE. ASSIST was distributed to students during attending English classes.

Procedures

The purpose of the research was explained to students and the confidentiality of their responses was assured. Students were asked to respond to items with regard to the specific English module they were attending. The assessment marks for this module were extracted from the record system of the university. Three assessment components were used to assess students' learning: a group project, individual presentation, and final examination. Therefore, the assessment mark captured a broad range of learning outcomes including knowledge of the material, basic and advanced skills, as well as understanding and application of knowledge in new settings.

Table 2. Descriptive statistics, Cronbach's alpha and % of missing for the ASSIST's Subscales

Scale	M	SD	Skewness	Kurtosis	Cronbach's alpha	% of Missing
Seeking Meaning (SM)	14.16	2.71	0.41	-0.65	0.82	0
Relating Ideas (RI)	14.01	2.56	0.53	0.45	0.85	0
Use of Evidence (UE)	14.34	2.88	-0.17	0.22	0.80	1
Interest of Ideas (II)	12.52	3.31	-0.35	-0.04	0.77	1.5
Organized Studying (OS)	13.12	2.23	-0.97	0.05	0.82	1
Time Management (TM)	12.99	3.87	-0.03	0.55	0.83	0
Alertness to Assessment Demands (AAD)	15.49	2.23	0.07	-0.36	0.79	0
Achieving (A)	14.11	2.17	-0.22	0.24	0.86	0
Monitoring Effectiveness (ME)	14.12	2.94	0.67	-0.56	0.82	0
Lack of Purpose (LP)	13.23	3.61	0.89	-0.89	0.72	0
Unrelated Memorizing (UM)	10.76	3.53	-0.56	0.61	0.78	1
Syllabus-boundness (S-b)	13.16	2.91	0.39	-0.73	0.81	1.5
Fear of Failure (FF)	14.86	3.73	-0.19	-0.78	0.85	1

Missing values were minimal (1.5% at most, see Table 2) since the size of administration groups was small and students were instructed not to leave any item without response. Mean substitution was used as an imputation value if missing value is existed. Although it is not a preferred imputation technique due to its limitation in reducing the variance, mean substitution could be justifiable given that the missing values were very rare. The sample size was acceptable according to the rule of thumb recommendation of the minimum requirement of the case to variable ratio to be five (Bryant & Yarnold, 1995).

Instrument- The ASSIST

ASSIST consists of four sections. The first section is a six item measurement of the student's own conception of the term 'learning'. The second section consists of 52 items and students respond to items on a five-point Likert scale where 5=Agree, 4=Agree somewhat, 3=Unsure, 2=Disagree somewhat, 1=Disagree. These items are designed to measure the three main approaches to learning: deep, strategic and surface apathetic. Each approach to learning comprises of four or five subscales (see Table 2). Each subscale comprises four items. Subscale scores are formed by adding together the responses on the items in that subscale. Scores on the three main approaches are created by adding together the subscale scores which contribute to each approach (see Table 2). The third section of ASSIST is an eight item questionnaire measuring preferences for different types of learning and teaching. In the present study only the 52 items producing the three approaches to learning with their respective subscales were utilized.

Data Analysis

Data were analyzed using SPSS for windows, Rel. 15.0 (SPSS for Windows, 2006) and EQS for windows, Rel. 6.1 (Bentler, 2008). Confirmatory factor analysis (CFA) was performed to test the factorial structure of ASSIST. Maximum likelihood parameter estimation method was used. Assessment of overall goodness of fit of the model to the data was based on multiple criteria using both absolute and relative fit indices (Gadelrab, 2004; Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004). Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993) was used with values less than 0.07 indicating acceptable fit and less than 0.05 indicating good fit. Relative and noncentrality-based goodness-of-fit indices were used in evaluating model fit as well; the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and Incremental Fit index (IFI; Bollen, 1989a) with values of 0.95 and greater were indicative of good fit. In addition, Standardized Root Mean-squared Residuals (SRMR) was used, with values of less than 0.08 indicating relatively good fit between the hypothesized model and the observed data (Hu & Bentler, 1999). Values greater than 0.08 might indicate an area of local misfit (Raykov & Marcoulides, 2000).

To assess local misfit standardized covariance residuals are consulted to locate the discrepancy between the observed and model-implied covariances. In order to overcome capitalizing on chance problem, cross-validation of the fitted model is needed (Raykov & Marcoulides, 2000), therefore the present full sample was randomly assigned to two equal subsamples of (n=258) using SPSS random selection algorithm. Sample 1 was used to investigate the three-factor structure of ASSIST, and sample 2 was used to cross-validate the factorial structure from sample 1.

Results

Unidimensionality and reliability of ASSIST subscales

The unidimensionality of each of the ASSIST's subscales was separately tested by fitting a single factor model to the corresponding four items. The results of separately testing each of the subscales are shown in Table 3. Excellent to perfect fits of the single factor models for all of the 13 subscales were supported and hence it is concluded that the items are unidimensional for each of the 13 subscales.

Table 3. Model-data fit indices for the thirteen ASSIST's subscales and their internal consistency coefficients

Scale	χ^2 (df), p value	χ^2/df	RMSEA	IFI	CFI	TLI	SRMR
Seeking Meaning (SM)-Deep Approach	3.62 (2), 0.16	1.81	0.040	1.00	1.00	1.00	0.009
Relating Ideas (RI)-Deep Approach	4.03 (2), 0.13	2.02	0.044	1.00	1.00	1.00	0.008
Use of Evidence (UE)-Deep Approach	5.05 (2), 0.08	2.52	0.054	0.97	0.99	0.99	0.015
Interest of Ideas (II)-Deep Approach	10.26 (2), 0.01	5.13	0.073	0.99	0.97	0.99	0.021
Organized Studying (OS)-Strategic Approach	7.85 (2), 0.02	3.93	0.074	0.99	0.98	0.99	0.014
Time Management (TM)-Strategic Approach	9.59 (2), 0.01	4.80	0.069	0.99	0.99	0.98	0.017
Alertness to Assessment Demands (AAD)-Strategic Approach	11.71 (2), <0.01	5.86	0.074	0.99	0.99	0.97	0.020
Achieving (A)-Strategic Approach	5.88 (2), 0.05	2.94	0.061	1.00	1.00	0.99	0.008
Monitoring Effectiveness (ME)-Strategic Approach	9.01 (2), 0.01	4.51	0.072	0.99	0.99	0.98	0.015
Lack of Purpose (LP)-Surface Approach	9.56 (2), 0.01	4.78	0.073	0.99	0.99	0.96	0.023
Unrelated Memorizing (UM)-Surface Approach	7.59 (2), 0.02	3.80	0.074	0.99	0.99	0.98	0.018

Syllabus-boundness (S-b)-Surface Approach	5.25 (2), 0.07	2.63	0.056	1.00	1.00	0.99	0.011
Fear of Failure (FF)-Surface Approach	9.73 (2), 0.01	4.87	0.075	0.99	1.00	0.98	0.012
Full Model	1988.55 (1183), <0.01	1.68	0.036	0.99	0.99	0.98	0.009

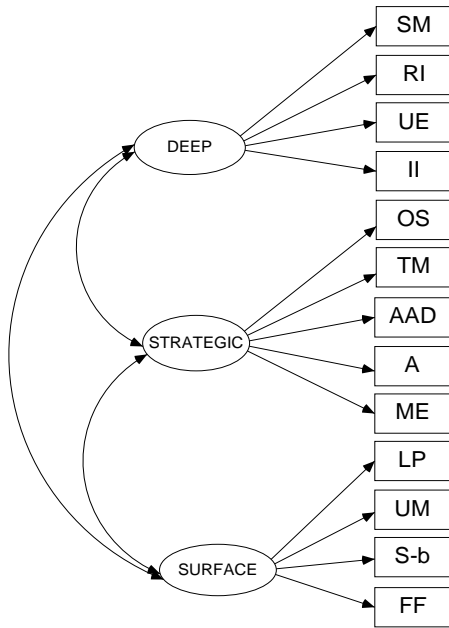
Although Cronbach's alpha is a well-known measure of internal consistency, it does not take into account measurement error, and in most cases yields biased estimates of reliability, unless the items are parallel or tau-equivalent (Reuterberg & Gustafsson, 1992). Therefore, the reliability coefficients reported here (see Table 2) were computed using the formula given by Reuterberg and Gustafsson (1992), which is based on CFA results of testing unidimensionality and address some of the above mentioned weaknesses of Cronbach's alpha. All ASSIST's 13 subscales reliability coefficient values reached acceptable levels, indicating that the subscales can be interpreted as internally consistent.

Descriptive statistics, univariate and multivariate normality distributions for the 13 subscales (see Table 2) were examined using the total sample. The univariate skewness and kurtosis values of the indicators approximately ranged within ± 1.0 . Plots of normal probability showed approximate linear patterns for all of the 13 subscales. Shapiro-Wilk test values were not significant for any of the 13 subscales using the α level of 0.05. Therefore, the data were considered to approximate a normal distribution. To assess multivariate normality; "for each combination of two observed variables, a graph is created that plots the Mahalanobis distance for each observation against its ordered chi-square percentile value" (Marcoulides & Hershberger, 1997, pp. 48-52). An examination of the graphs revealed that the plotted values were reasonably close to a diagonal straight line, indicating that the data did not deviate considerably from multivariate normality.

Models' evaluation and hypotheses testing

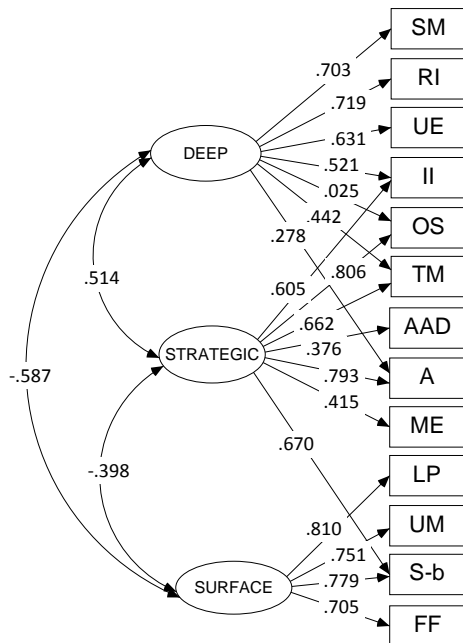
Model specification of ASSIST is shown in Figure 1 (Model 1). The fit of this model to data (sample 1) was poor with goodness fit indices far from cutoff scores of acceptable fit as shown in Table 3. This might indicate that the model needs respecification. Checking the standardized residual matrix to locate the areas that might reflect misfit and consulting Lagrange multiplier test in EQS, five more paths were relaxed to be freely estimated, which were so selected because they appeared to make sense based on theory and previous

empirical research (Model2, Figure 2). As shown in Table 4, a dramatic improvement in the model-data fit could be noted. All fit indices were consistent and showing a very good fit of the model to data.



Note: SM = Seeking Meaning, RI = Relating Ideas, UE = Use of Evidence, OS = Organized Study, TM = Time Management, AAD = Alertness to Assessment Demands, A = Achieving, LP = Lack of Purpose, UM = Unrelated Memorizing, S-b = Syllabus-boundness, FF = Fear of Failure

Figure 1: ASSIST's Model Specification



Note: SM = Seeking Meaning, RI = Relating Ideas, UE = Use of Evidence, OS = Organized Study, TM = Time Management, AAD = Alertness to Assessment Demands, A = Achieving, LP = Lack of Purpose, UM = Unrelated Memorizing, S-b = Syllabus-boundness, FF = Fear of Failure

Figure2: The re-specified model with estimated model parameters

Table 4. Fit Indices of the Fitted Models

Model	χ^2	df	p	χ^2/df	RMSEA	IFI	CFI	TLI	SRMR
Model 1 (sample 1)	1126.5	62	<0.001	18.75	0.183	0.82	0.82	0.77	0.140
Model 2 (sample 1)	100.1	57	<0.001	1.76	0.038	0.99	0.99	0.99	0.027
Model 2 (sample 2)	111.09	57	<0.001	1.95	0.043	0.99	0.99	0.99	0.024

To cross-validate Model 2, it was fitted to sample 2 data. Resultant fit indices showed very good fit between Model 2 and sample 2 data as shown in Table 4, which might refute the hypothesis that Model 2 fitted the sample 1 data only due to chance fluctuations. Checking the standardized residual matrix revealed that most of the standardized residual were very close to zero, and the largest standardized residual was -0.063 which indicated that Model 2 fitted the data very well. Positive and moderate correlation coefficients between deep and strategic approaches and negative correlation coefficients between both deep and strategic approaches and surface approach were found (see Table 5).

Predictive validity

Predictive validity of the use of ASSIST main scales' scores was tested using regression analysis by using the estimated factor scores (from model 2 on sample 2) as independent variables to predict the total assessment score. The expected significant regression weight of the deep score was supported ($r = .56$, $p < .001$). In addition significant regression weight of the strategic factor score ($r = .35$, $p < .001$) was found. However the negative regression weight of the surface approach score that have been found in some studies (Booth, Luckett, & Mladenovic, 1999; Entwistle & Ramsden, 1982) was not supported in the current study ($r = .03$, $p = .09$).

Table 5. Estimated standardized regression weights, and correlations among factors for Model 2 as fitted to both sample 1 and sample 2 data

Scale	Model 2 (sample 1)			Model 2 (sample 2)		
	DA R.W.	SA R.W.	SAA R.W.	DA R.W.	SA R.W.	SAA R.W.
SM	0.698*			0.703 *		
RI	0.713*			0.719 *		
UE	0.550*			0.631 *		
II	0.462*	0.676*		0.521*	0.605*	
OS	0.133*	0.776*		0.025	0.806*	
TM	0.427*	0.620*		0.442*	0.662*	
AAD		0.417*			0.376*	
A	0.261*	0.730*		0.278*	0.793*	
ME		0.383*			0.415*	
LP			0.788*			0.810*
UM			0.693			0.751*
S-b		0.454*	0.889*		0.670*	0.779*
FF			0.714*			0.705*
		SA	SAA		SA	SAA
		Cor.	Cor.		Cor.	Cor.
DA		0.578*	-0.500*		0.514*	-0.587*
SA			-0.333*			-0.398*

Note: SM = Seeking Meaning, RI = Relating Ideas, UE = Use of Evidence, II = Interest of Ideas, OS = Organized Study, TM = Time Management, AAD = Alertness to Assessment Demands, A = Achieving, LP = Lack of Purpose, UM = Unrelated Memorizing, S-b = Syllabus-boundness, FF = Fear of Failure, DA = Deep Approach, SA = Strategic Approach, SAA = Surface Apathetic Approach, R.W. = standardized Regression Weight, S.E. = Standard Error, Cor. = Correlation coefficient.

* p<.05

Discussion and Conclusion

The findings of this research lent support to the three-factor structure of approaches to learning in higher education students. Some debate has been made about the notion and need of strategic approach (Kember & Leung, 1998; Wong, Lin, & Watkins, 1996; Biggs, Kember, & Leung, 2001; Kember, Biggs, & Leung, 2004). However, the existence of the strategic approach to learning in Egyptian college students was not unexpected. Assessment procedures applied in higher education system in Egypt which often reward those who are concerned with both the academic content and the course grades, who keep in mind how to organize answers in a way that impresses the marker, and who have also memorized material are legitimate reasons to expect such approach.

Three subscales that originally belong to strategic approach; organized studying, time management and achieving were loaded on the deep approach in addition to their anticipated loadings on the strategic approach. One subscale that originally belongs to deep approach, interest in ideas, and one subscale that originally belongs to surface approach were loaded on the strategic approach in addition to their expected loadings on their respective approaches. This might support findings found in some studies (Biggs, 1987c; Biggs & Kirby, 1984; Biggs et al., 2001) that most students combine strategic approach with either surface or deep approach. On the other hand many research results found similar patterns of cross loadings (Byrne, Flood, & Wills, 1999; Byrne, Flood, & Wills, 2004; Diseth, 2001; Entwistle, Tait, & McCune, 2000). Moreover, the original author of ASSIST, argued that some interconnection between domains should not be seen as a weakness, rather it is an inevitability of the seamlessness of human behavior (Entwistle & McCune, 2004). Additionally, Entwistle, Tait, and McCune (2000) commented on that cross loadings among the subscales of the approaches to learning as entirely understandable in conceptual terms.

Among all of the main subscale loadings on their respective approaches to learning, two of the subscales of strategic approach; alertness to assessment demands and monitoring effectiveness, showed relatively low factor loadings. Alertness to assessment demands was the last subscale to be added to ASSIST (Entwistle, Tait, & McCune, 2000), to be used particularly with students in the final stage of their studies, whereas the students in this study are mainly undergraduate preparatory, with some first and second year students. Byrne, Flood, and Wills (2004) and Diseth (2001) in their validation of ASSIST reported similar difficulties with the behavior of the alertness to assessment demands subscale. Monitoring effectiveness is a related subscale, which encompasses metacognition and self-regulation remarks, therefore this particular subscale is applicable primarily to graduate students more than undergraduate ones (Entwistle, Tait, & McCune, 2000). Caution should be taken with respect to the interpretation of such subscales with undergraduate-especially freshman-students. In sum, the results seem to indicate that the deep factor is a general factor accounting for inter-relationship among deep and surface sub-scales, whereas the strategy factor is accounting for unexplained variance above and beyond deep factor.

The negative correlation between surface approaches and achievement that have been found in some studies (Booth, Lockett, & Mladenovic, 1999; Diseth, 2010; Entwistle & Ramsden, 1982) was not supported in the current study, instead a nonsignificant positive

correlation was found, which could be seen within the assessment requirements which might reward students who combine the characteristics of the surface approach with those of the strategic one. The moderately high positive correlation found between both the deep and strategic approaches and academic success might also be seen within the same assessment system. Because many students personally sought academic success, most of them seemed to deliberately combine focusing on understanding the studied material with achieving the highest possible grades. This latter conclusion deserves more extensive qualitative and quantitative research.

Limitations of the current study might include administering to a sample from only one private university thus possibly limiting the variation of students. College students enrolled in private universities like BUE might differ from average Egyptian college students in variables that could influence their approaches to learning such as socioeconomic status. However, since the formal language of teaching at BUE is English, the administration of ASSIST in its original language without having to adapt the instrument to the Arabic culture was allowed. Although using an English version of the ASSIST on English-competent students was able to sidestep the complexities of changes in lexicon and meaning due to translation and adaptation, it also had its limitation in drawing conclusions. The sample used for this study was a group of Egyptian college students who were receiving their higher education in a British university; therefore caution should be taken with respect to ASSIST score interpretation. Although the obtained sample size was considered acceptable according to the rule of thumb recommendations of Bryant and Yarnold (1995), it might have been relatively small as far as CFA studies go, which might affect the stability of parameter estimates and generalizability of the current study results. Beyond the scope of the current study, it might be interesting to test the measurement invariance of ASSIST underlying structure in its Arabic and English versions.

In conclusion, the findings of this study confirmed the underlying constructs of three distinctive approaches to learning. ASSIST main scales and subscales' scores showed appropriate internal consistency and predictive validity to academic achievement. Therefore, ASSIST could be used as an valuable instrument to assess students' approaches to learning with bilingual Egyptian college students.

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