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Assessing Psychometric Properties of a Learning Styles Indicator vis-à-vis ELI Students within Saudian Context

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Abstract
The present study focuses on studying the psychometric properties of the Learning Style Indicator (LSI). It is a cross-sectional study with a sample of 204 male/female students studying in four modules in English Language Institute (ELI) in King Abdulaziz University, Jeddah. Confirmatory Factor Analysis (CFA) was carried to study the psychometric properties of the LSI. Kuder Richardson's Cronbach's coefficient 'α' was used to assess the reliability of the three factors of the LSI. Findings of the study revealed that three factors of the LSI had a good model fit. Hence, it is suggested that LSI is quite valid and reliable for use within the English language teaching in Saudi Arabia. This study also compares the findings of the current study with previous findings. Results of the present study will provide much-needed stimulus for future research in LSI particularly, within the English Language teaching throughout Saudi Arabia and generally in other Arab speaking countries of the region. The results of the present study will herald future research in appreciating the learning styles of Saudi EFL students.

Keywords: Psychometric Properties, Confirmatory Factor Analysis, Discriminant Validity, Convergent Validity

1. Introduction/Literature Review

In saudian educational system almost all students in their first year of university have to study English as a second language in ELI, as medium of instruction, both at the undergraduate and postgraduate level, is English. Currently more than 3/4th of the pedagogical staff in ELI are foreigners coming from diversified cultures which warrants the knowhow of learning style preferences of saudian students. If the teacher is well versed with the preferred learning styles of the students, then he/she can effectively engage his/ her students in achieving the intended learning objectives. Learning styles may be defined as the inherent preferences of individuals for how they engage in the learning process (Ehrman and Oxford, 1990; Oxford, 2000). Learning styles vary with varying personalities and also on the exposure to different teaching/learning circumstances. Learning styles of students have been assessed through instruments containing items measuring different measurable characteristics. Most commonly used

instrument to assess learning style in non-native environment is Reid's (1984) PLSPQ, which is based on the concept of six learning style preferences. Eliason (1995) argues that Inclan (1986) and Melton (1990) found no significant differences in how students responded to a questionnaire based on the language of the questionnaire, whether Spanish and English or Chinese and English, respectively.

Current study will use learning styles instrument developed by Wintergerst & DeCapua (1999) which is a revised version of Reid's (1984) PLSPQ instrument. Wintergerst & DeCapua (2001) worked on exploring the learning styles of Russian-speaking students of English as a second language. Wintergerst & DeCapua. (2005) assessed the reliability and validity of the LSI across ESL students, freshman English composition students in three pre-conceptualized situations: project orientation (PO), group activity orientation (GAO), and individual activity orientation (IAO) with 24 items and during the assessing process one item was deleted and finally the updated LSI contained 23 items. The aforementioned three dimensions used in the LSI are (1) PO which refers to a student's preference of learning best when involved in ''hands-on'' activities or when working with materials in a learning situation. The student may be working individually or with others, showing that project work is not mutually exclusive to individual work or group work, (2) GAO refers to a student's preference of learning best when interacting or working with one or more students in a learning situation, and (3) IAO refers to a student's preference of learning best when working alone in a learning situation.

During literature research one comes across a lot of researches conducted using the aforementioned instrument but only in western setting or in far eastern setting but no research on the said subject is carried on in Middle Eastern educational setting thus, arises the *raison d'etre* for carrying out the present study. Scale for the present study has been adapted from DeCapua & Wintergerst (2005).

1.1. Format of the paper: The rest of the paper proceeds as follows Section 2 presents the methods and material to be used for addressing the proposed psychometric validation; section 3 elaborates the results, and section 4 gives elaborate discussion with brief conclusion of the study coupled with future implications. Some limitations of the study are enumerated in section 5.

2. Methods/Material:

2.1. Sampling Design/method

Quantitative retrospective design using cross-sectional data when we have one time contact with the respondent

2.2. Instrument

Data was collected through Learning Style Indicator (LSI) consisting of 23 items which is a four-point response scale ranging from 1 to 4 with 1 = Never and 4= Always. LSI consists of three dimensions with Project Orientation (PO) consisting of items (2,3,4,7,10,13,15,16,19,20,23), Group Activity Orientation (GAO) consisting of items (1,6,11,18,21) and Individual Activity Orientation (IAO) items (5,8,9,12,14,17,22). The questionnaire was translated to Arabic language for ease of comprehension through the method of transliteration for eliciting the right perspective of the respondents. Questionnaire used to elicit information from the respondents is appended in Appendix 'A'.

2.3. Sample

A total of 250 questionnaires were distributed among the male/female students of ELI during normal class lectures. Of the total 250 questionnaires collected 46 questionnaires were discarded due to incomplete information hence, the response rate was 81.6%.

2.4. Statistical tools/software

Apart from studying the socio-demographic profile of respondents and inter-item consistency of the sub-dimensions, a Confirmatory Factor Analysis (CFA) is carried out to assess the fit of the data. Cronbach's coefficient 'α' is used to assess the reliability of the scales. Statistical package for social sciences (SPSS) version 23.0 and AMOS version 23.0 is used for extracting desired results.

3. Results:

3.1. Sampling Characteristics

Socio-demographic profile of 204 respondents is exhibited in Table 1. Gender is approximately equi-represented (males = 54.6% and females =45.1%) in the current study, more than 3/4th of the respondents were from age group [18-20 years (77%)] which is generally the age group in the preparatory year program (PYP). Regarding the educational stream, science versus arts, majority of the students (55.4%) are from the science stream. Of the four modules, level 2 (102) has more representation (34.3%) as compare to other modules.

Table 1: Socio-Demographic Profile of the Respondents

		n	%
Gender	Female	112	54.9
	Male	92	45.1
Age	<18	10	4.9
	18-20	157	77.0
	21-23	37	18.1
Level	101	59	28.9
	102	70	34.3
	103	41	20.1
	104	34	16.7
Subjects	Science	91	44.6
	Arts	113	55.4

3.2. Confirmatory Factor Analysis

Both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are dimension reduction tools for assessing whether a set of scales assesses the concept it is developed for. But CFA has an added advantage to quantify the goodness of fit of the resulting structure. In the current study a CFA was performed to test the model (LSI) consisted of three dimensions PO, GAO, IAO as proposed by Wintergerst et al. (2001). Since LSI has been discussed in previous studies, as can be seen in the literature review; hence, CFA was chosen as an appropriate measure to assess the scale and study the goodness of fit. Most appropriate index to assess the goodness of fit is Chi-square but it is very sensitive to sample size, i.e., as the sample size increases, the Chi-square gives a good fit (Hinkin et al. 1997). Due to the restrictiveness of the Chi-Square, researchers have sought alternative indices to assess model fit Hooper et al. (2008). The main criteria used in the current study to judge model fit included goodness of fit (GFI) created by Jöreskog and Sörbom (1996), Bentler's (1990) comparative fit index (CFI) and the Root Mean Square Error of Approximation (RMSEA) developed by Steiger (1990). Regarding GFI, an omnibus cut-off point of 0.90 has been recommended as CFI Hu, and Bentler (1999) suggested a cut-off point of 0.90 as indicative of a good fit. For RMSEA, a cut-off value close to 0.06 Hu and Bentler (1999) or a strict upper limit of 0.07 suggested by Steiger (2007) appears to be more appealing. RMSEA is a function of the discrepancy between an estimated matrix and a population matrix, while at the same time accounting for the complexity of the model. One of the most significant advantages of RMSEA is its suitability for a confidence interval (C.I) to be calculated around its value MacCallum et al., (1996). It is generally reported in conjunction with RMSEA, and for a good-fitting model, the lower limit is close to 'zero' while the upper limit should be less than 0.08. For more on the model fit guidelines, see Hooper et al. (2008).

Results of confirmatory factor analysis for the LSI are shown in Figure 1, and model fit statistics are presented in Table 2. Keeping in view the Chi-square value of 1.573 for LSI with three dimensions, it is evident that the model does not fit the data well, so the other option is to look at the modification indices to improve the model. According to (Hair et al.,2010), an acceptable factor loading value 0.35 and above is considered suitable. Indices shown in Table 1 clearly indicates that three factor model fits the data well and can be used in the English language teaching in Saudi Arabia.

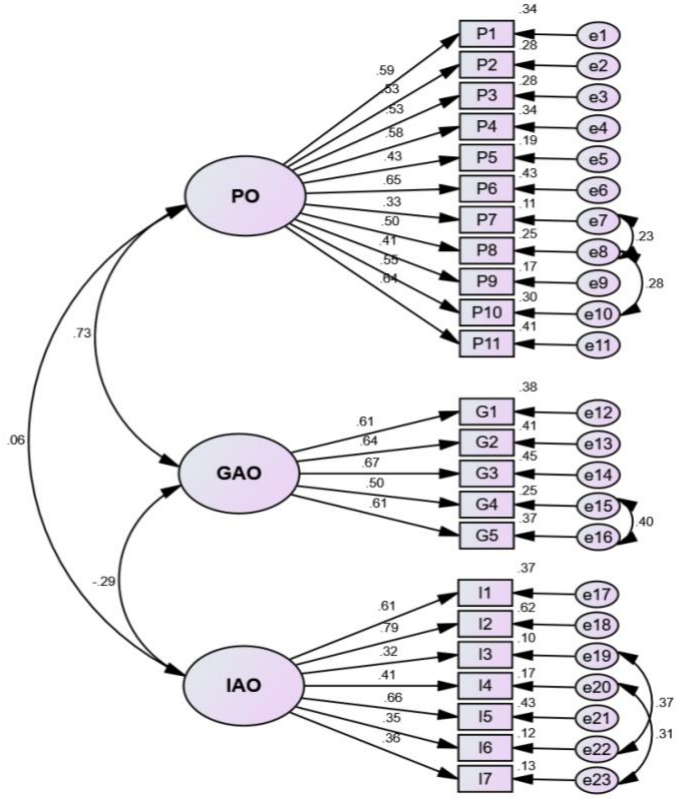

Figure 1: Confirmatory Factor Analysis for Learning Style Indicator

Table 2: Fit Statistics for Measurement Models of Learning Style Indicator

Model (*CFA*)	χ^2/df	*GFI*	*CFI*	*RMSEA*	*AIC*	*BCC*	*BIC*	*CAIC*
3 subscales	1.573	0.88	0.90	0.053	457.20	471.68	636.38	690.38

3.3. Reliability

Nunnally (1978) suggested that a large coefficient α (α > 0.70) is an indication of substantial item homogeneity and suggests that the sampling sphere has been adequately captured. Cronbach's 'α' (1951) for the three dimensions ranged from (0.731 -0.813) thus indicating a good structure for the instrument and are shown in table 3.

Table 3: Scale Statistics and Inter-Item Consistency for Learning Style Indicator

Sub Dimensions	Items	Mean ± S.D	Cronbach's α
Project Orientation	11	33.05 ± 6.21	0.813
Group Activity Orientation	5	14.39 ± 3.56	0.763
Individual Activity Orientation	7	20.23 ± 4.45	0.731

4. Conclusion/Discussion

The current study provides evidence concerning the psychometric properties of the LSI using data of 204 male/female students studying in four modules in English Language Institute (ELI) in King Abdulaziz University, Jeddah, Saudi Arabia. The instrument exhibited a three-dimensions structure, consisting of 23 items. LSI has exhibited satisfactory reliability and validity and is fit for use in studying the learning styles vis-à-vis Saudi educational context. Regarding the three dimensions the highest impact on Project Orientation (PO) of the students is through *doing things in class* followed by *making something for a class project*, the highest impact on Group Activity Orientation (GAO) of the students is through *working with others in class* followed by *more work done when working with others*, whereas, Individual Activity Orientation (IAO) of the students is through *working alone* followed by *preferring to work by myself*. Results of the present study are consistent with the results of Wintergerst & DeCapua. (2005) exhibiting three factor solutions for the instrument using CFA. Keeping in view the findings of the present study it is suggested that LSI is a valid and reliable instrument and can be used effectively to conduct research on the learning styles of ELI students within the Saudian Educational Context. Future research is endorsed to be steered using larger samples representing various programs/levels in ELI to address measurement and validation issues using LSI with 23 items.

5. Limitations

a. Data has been collected from only one institution which may to some extent mars the generalizability of the current study.
b. Control variables like gender and level of modules are not included in the CFA which may be incorporated as control variables in future research to crystallize the under study variables.
c. This research used LSI and is a self-reported survey; however, for a broader understanding of learning styles within the Saudi educational context, qualitative research, such as structured interviews and case studies, are also recommended. A mixed research approach shall also be conducted since, the present study only focuses on the quantitative aspect of the issue.

Author Contributions

Conceived idea, prepared instruments for collection of data and discussion of results by Dr. Nisrin, writing of literature review and methods by Fariha, selection of appropriate statistical tools/analysis of the data and results reporting by Khushnoor.

Conflicts of Interest

The authors declare no conflict of interest regarding this article.

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Appendix

Learning Styles Indicator (LSI) (English Version)

S.No	Statements	Always	Very often	Sometimes	Never
1	I enjoy working on an assignment with 2 or 3 classmates. (GAO)				
2	I learn best in class when I can participate in related activities.(PO)				
3	I understand things better in class when I participate in role playing.(PO)				
4	I learn more when I can make a model of something.(PO)				
5	When I study alone I remember things better.(IAO)				
6	I get more work done when I work with others. (GAO)				
7	I enjoy learning in class by doing experiments.(PO)				
8	When I work alone I learn better.(IAO)				
9	I understand better when I read instructions.(IAO)				
10	When I build something, I remember what I have learned better.(PO)				
11	In class, I learn best when I work with others.(GAO)				
12	I learn more by reading textbooks than by listening to lectures.(IAO)				
13	When I do things in class, I learn better.(PO)				
14	I prefer to wok by myself.(IAO)				
15	When someone tells me how to do something in class, I learn better.(PO)				
16	I enjoy making something for a class project.(PO)				
17	When I read instructions, I remember them better.(IAO)				
18	I prefer to study with others.(GAO)				
19	When the teacher tells me the instructions, I understand better.(PO)				
20	I learn more when I can make something for a class project.(PO)				
21	I learn more when I study with a group.(GAO)				
22	I learn better by reading than by listening to someone.(IAO)				
23	I prefer to learn by doing something in class.(PO)				
Statements drawn from Reid (1984)					

Learning Styles Indicator (LSI) (Arabic Version)

اختر الإجابة المناسبة في كل فقرة مما يلي بناء على كيفية تعلمك أو بناء على كيف تعلمت اللغة الانجليزية

	الفقرة	**دائما**	**غالبا**	**أحيانا**	**لا أبدا**
1	استمتع بالعمل على مهمة/تمرين مع 2 أو 3 زملاء دراسة.				
2	اتعلم أفضل في الفصل عندما استطيع المشاركة في تمارين ذات علاقة				
3	أفهم الأمور بشكل أفضل في الفصل عندما أشارك في تمارين تتطلب القيام بدور ما(لعب الأدوار.)				
4	اتعلم المزيد عندما اتمكن من عمل نموذج لشيء ما.				
5	عندما ادرس بمفردي، اتذكر الأشياء بشكل أفضل				
6	اقوم بالكثير من العمل عندما اعمل مع الآخرين				
7	استمتع بالتعلم في الفصل من خلال القيام بالتجارب				
8	اتعلم أفضل عندما أعمل بمفردي				
9	افهم بشكل أفضل عندما أقرأ التعليمات				
10	في الفصل أتعلم بشكل أفضل عندما أعمل مع الآخرين				
11	عندما اقوم ببناء شيء ما، اتذكر ما تعلمته بشكل أفضل				
12	اتعلم عن طريق قراءة الكتب الدراسية أكثر مما اتعلمه من خلال الاستماع إلى المحاضرات				
13	عندما افعل أشياء داخل الفصل، اتعلم بشكل أفضل				
14	أفضل أن أعمل بنفسي				
15	عندما يخبرني شخص بكيفية القيام بعمل ما في الفصل اتعلم بشكل أفضل				
16	استمتع بعمل شيء لمشروع يخص الفصل				
17	عندما اقرأ التعليمات، اتذكرها بشكل أفضل				
18	أفضّل الدراسة مع الآخرين.				
19	عندما تخبرني/يخبرني المعلمة/المعلم بالتعليمات، افهمهابشكل أفضل				
20	اتعلم اكثر عندما اتمكن من تقديم شيء لمشروع الفصل.				
21	اتعلم اكثر عندما أدرس مع مجموعة				
22	اتعلّم بالقراءة أفضل مما اتعلمه بالاستماع إلى شخص ما				
23	أفضّل التعلّم من خلال عمل شيء ما في الفصل				