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Project Work and Life Skills: Psychometric Properties of the Life Effectiveness Questionnaire for Project Work

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The present study examined the psychometric properties of the Life Effectiveness Questionnaire – Version H (LEQ-H), an instrument for the assessment of life skills in project work (PW) context with Singaporean students. Specifically, we examined the internal consistency, as well as discriminant and convergent validity of the subscales in LEQ-H. Second, we tested the proposed measurement model against four other alternative models and confirmed with a second sample. In addition, we

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examined the invariance of the measurement tool across gender. A total of 1,264 secondary school students were recruited from nine typical government funded co-educational secondary schools in Singapore. All the subscales had adequate internal consistency but two subscales lacked convergent validity. Five competing models were compared using confirmatory factor analyses. The results provide evidence of a seven first-order measurement model of the LEQ-H. Multigroup analysis demonstrated invariance of the factor forms, factor loadings, factor variances, and factor covariances, error variances and disturbances across gender. In summary, the findings affirm that the LEQ-H, with the seven first-order measurement model, can be an appropriate measurement tool to assess the effects of PW on students' life skills such as time management, social competence, achievement motivation, task leadership, emotional control, active initiative and self-confidence.

Key words: life effectiveness, life skills, collaborative learning

Although Singapore is a very small country with about four million people on an island of 680 km^2, it is one of the most successful developing nations in the world. It has a reputation for being a "first world oasis in a third world region" (Kluver & Weber, 2003). The success of the nation is largely hinged on its human resources. Traditionally, the school curriculum in the country focused on subject-centred learning and this has been successful over the last few decades. Its students outscore American students in math and science and have done so for a long time (Smith, 1996). In fact, the Third International Mathematics and Science Study found that by academic test scores, Singapore is number one in the world. However, in reality, it fails to produce many world leaders in the field of science and technology. This leads policy makers in the nation to realise that having in-depth knowledge of a particular subject-content area may not be sufficient for practical success in the workforce. There is clearly a distinct need to develop "life skills" to do well in the knowledge-based economy.

Project work (PW), commonly known as project-based learning in other countries, was introduced in Singapore' schools in the year 2000 to improve students' depth of learning and achievement by fostering critical and creative thinking, self-directed inquiry, collaborative learning and communication skills (Ministry of Education, 1999). In the real world setting, Singapore needs people who can incorporate ideas from different areas of specialisation and improve through practice. In PW lessons, explicit links between different subject knowledge are made by engaging students in interdisciplinary tasks so that they get to see the "relevance of multiple banks of knowledge, and acquire practical, problem solving skills" (Ministry of Education, 2002). PW is investigative in nature and students work in groups to select their own project idea, plan and execute their plan. As such, it is essentially a form of collaborative learning. The teacher acts as a facilitator or a resource person. At the end of PW, students need to submit two group deliverables, that is, an oral presentation as a group, and a product which can be an artefact, a report or a performance.

Research into PW in Singapore is in its elementary stage. A few studies have been conducted to examine students' perceptions of PW (e.g., Koh, Tan, Wang, Ee, & Liu, 2007) and students' motivation in PW (e.g., Liu, Tan, Wang, Koh, & Ee, 2007; Liu et al., 2006). Other studies have also looked at the effects of PW in terms of students' communication and teamwork (Tan, 2002), thinking and problem-solving skills (Chang & Chang, 2003), knowledge application and independent learning (Chua, 2004). In addition, Quek and Wong (2002) have investigated the learning environments of PW in hope of finding effective measures to encourage better collaboration among students during PW. No studies have looked into the effects of PW on other life skills such as time management, social competence, leadership skills, self-confidence, emotional control, and intellectual flexibility. This could be due to an absence of an appropriate measurement tool. The purpose of the present study was to examine the psychometric properties of an existing measurement tool for life effectiveness in the context of PW.

The 24-item LEQ-H was developed by Neill and his colleagues (Neill, 2008; Neill, Marsh, & Richards, 2003) to measure the levels of, or changes in, personal development in certain life skills domains as a result of intervention programs, particularly in the outdoor adventure domain. Life skills are conceptualised as "the psychological and behavioural aspects of human functioning which determine a person's effectiveness or proficiency in any given situation" (Neill et al., 2003, p. 6).

The first life skill included in the LEQ-H is time management, which is the ability to plan and make optimum use of time. Time management is considered as essential skills for personal effectiveness. The second essential life skills included in the LEQ-H is social competence. This is defined as the extent to which one feels confident in social situations. Achievement motivation is a person's orientation to strive for task success, persist in the face of failure, and experience pride in accomplishments (Gill, 2000). Intellectual flexibility refers to the ability of a person to adapt and accommodate the views of others. Task leadership is also included in the LEQ-H. It refers to the ability to lead others effectively for task completion or goal achievement. Emotional control measures the ability of an individual to retain or dominate his or her reactions provoked by pleasant or unpleasant emotion. Active initiative refers to the ability to act and initiate actions and thoughts in a variety of different settings. The final dimension included in the LEQ-H is self-confidence, which refers to a person's beliefs in his or her abilities (see Table 1).

There are several different versions of the LEQ used within the outdoor education program evaluation and research (LEQ-G, LEQ-H, LEQ-YAR, and LEQ-Corporate). The LEQ-YAR is developed for youth-at-risk adventure-based or experiential interventional programs and the LEQ-Corporate focuses on life skills in three domains: personal, social, and work place. The LEQ-H is the standard version with 24 items and contains the eight generic skills for personal effectiveness (see Table 1, Neill et al., 2003).

Table 1 Hypothesised Dimensions of Life Effectiveness

LEQ Dimensions	Description
Time Management	The extent that an individual makes optimum use of time.
Social Competence	The degree of personal confidence and self-perceived ability in social interactions.
Achievement Motivation	The extent to which the individual is motivated to achieve excellence and put the required effort into action to attain it.
Intellectual Flexibility	The extent to which the individual adapts his/her thinking and accommodates new information from changing conditions and different perspectives.
Task Leadership	The extent to which the individual leads other people effectively when a task needs to be done and productivity is the primary requirement.
Emotional Control	The extent to which the individual maintains emotional control when faced with potentially stressful situations.
Active Initiative	The extent to which the individual initiates action in new situations.
Self Confidence	The degree of confidence the individual has in his/her abilities and the success of his/her actions.

The fit indices of the LEQ-H hypothesised model was adequate (χ^2 = 718.94, *df* = 224, TLI = .946, RNI = .956) (Neill et al., 2003). A hierarchical model with a single second-order factor was also tested and found to have lower fit indices (χ^2 = 972.55, *df* = 244, TLI = .926, RNI = .936). Multisample analyses showed that the proposed measurement model was invariant across gender and age. Neill and his colleagues mentioned that LEQ has been used in 20 research studies involving roughly about 5,000 individuals in the outdoor education setting.

However, none of the studies have been published and no other studies have examined the psychometric properties of the LEQ-H outside of the outdoor education domain. This study examined the LEQ-H as a possible measurement tool for the effects of PW on the various life skills aspects.

Measurement Model of LEQ-H

The LEQ-H was designed to measure eight dimensions of life effectiveness (see Table 1). It is normally used for the evaluation of the effects of psychosocial intervention programmes on a person's life skills. The proposed measurement model was an eight first-order factors measurement model with 3 indicators each.

Purposes of the Study

The purpose of the present study was to investigate the psychometric properties of an instrument for the assessment of life skills (LEQ-H) in a PW context. Specifically, we sought to examine the internal consistency, as well as discriminant and convergent validity of the subscales in LEQ-H. Internal consistency is the reliability of the measures, and validity refers to the degree to which a measure accurately reflects or assesses the specific concept that the researcher is attempting to measure. In social science research, it is important to show that measuring instruments, and the constructs they purport to measure, are consistent and have an acceptable level of construct validity before interpreting the results. Secondly, we aimed to test the proposed measurement models against four alternative models and to confirm these analyses with a second sample. Mueller (1996) contends that formulating some alternative or competing models is useful in establishing the construct validity of the measurement models. The rationale is that if the data fit the proposed measurement model, it should not fit the alternative models. Lastly, we sought to test the invariance of the measurement tool across gender.

Method

Participants

A total of 1,264 secondary school students were recruited from nine government co-educational secondary schools in Singapore. The first sample consisted of 751 Secondary Two students aged 12 to 14 years (M = 13.29, SD = .94) from five schools. The Secondary Two students were chosen because schools in Singapore usually conduct PW for a period of 10 weeks at this level. There were 376 males and 313 females (62 missing information). A second sample consisted of 513 Secondary Two students (249 males, 224 females, 40 missing information) from four other similar schools were collected for validation of the modified measurement model.

Procedures

After securing permission from the head teachers, the PW coordinators of the schools were contacted and arrangements for survey administration were made. Administration of the questionnaires took place in quiet classroom conditions under the supervision of a researcher. Students were told that their participation in the study was voluntary and they were free to withdraw at any time and were assured that their responses would be kept confidential. All students gave informed consent and took about 15 minutes to complete the LEQ-H administered at the beginning of their PW lessons. Normal informed consent and ethical procedures were followed and conformed to guidelines of the British Psychological Society.

Measures

The LEQ-H measures eight domains (three items each) of life effectiveness. It focuses on measuring the extent to which a person's actions, behaviour, and feelings are effective in managing and succeeding at life, or more specifically, generic life skills. The eight factors are: Time Management, Social Competence, Achievement

Motivation, Intellectual Flexibility, Task Leadership, Emotional Control, Active Initiative, and Self-Confidence. Participants' responses to each item were scored using a seven-point Likert scale anchored by the end points "False, not like me" (1) and "True, like me" (7).

Results

The mean scores, standard deviations, skewness and kurtosis for the items of the subscales are displayed in Table 2. We also obtained the internal consistency for each of the subscale scores of the LEQ-H by calculating the rho's coefficients and average variance extracted (AVE) values for each subscale. Cronbach's (1951) coefficient alpha and item-total correlation were not computed because both are based on the assumption of no measurement error covariances; this may be bias at the population level (Raykov, 1998). The use of the rho's coefficient corrects for this "bias". A composite reliability coefficient (rho) of greater than 0.60 is considered as acceptable (Bagozzi & Yi, 1988). The AVE index is a measure of the shared or common variance in a latent variable, that is, the amount of variance that is captured by the latent variable in relation to the amount of variance due to measurement error (Dillion & Goldstein, 1984). It is a measure of convergent validity and a value of greater than 0.50 is considered as acceptable (Fornell & Larcker, 1981). Convergent validity refers to the degree to which measures hypothesised to indicate the respective constructs actually load highly on the constructs (Bagozzi & Kimmel, 1995).

From Table 2, it can be seen that all the subscales had adequate internal consistency but six out of the eight subscales showed unsatisfactory AVE values. However, four subscales were close to .50 (Time Management, Social Competence, Emotional Control, and Self Confidence). This indicates that several of these subscales were highly correlated with each other.

To test for discriminant validity, the confidence intervals of the latent factor correlation between each pair of factors were examined (ϕ-coefficients). If the correlations are significantly less than unity, the discriminant validity of the measure is supported (Bagozzi, 1981). From

Table 3, the confidence intervals between Achievement Motivation and Intellectual Flexibility, Self Confidence and Achievement Motivation, and Self Confidence and Intellectual Flexibility, exceeded 1. This shows that Achievement Motivation and Intellectual Flexibility are not empirically justified as independent constructs.

Univariate skewness and kurtosis values indicate that the observed variables in the main sample were approximately normal (± 1.00). Multivariate normality was evaluated based on Mardia's coefficients and normalised estimates. Mardia's coefficient was 255.47 and the Normalised estimate was 95.25, showing slight multivariate nonnormality. Therefore, Robust Maximum Likelihood method was used in the Confirmatory Factor Analysis (CFA).

CFA was conducted on the LEQ-H to examine its factorial validity using EQS for Windows 6.1 (Bentler, 2006). Five measurement models were compared. The first model was a one factor model including all 24 items (Model 1). The second model was the original LEQ-H measurement model which has eight first-order factors (Model 2). The third model was a hierarchical model comprising eight first-order factors and one higher-order factor (Model 3). The fourth model was a seven first-order factors with Intellectual Flexibility deleted (Model 4). The final model was a hierarchical model with the seven first-order factors in Model 4 and a higher-order factor (Model 5).

Various criteria were used to assess model fit. They were: Satorra-Bentler scaled chi-square statistics, robust comparative fit index (robust CFI), and robust root mean square error of approximation (robust RMSEA). These scaled chi-square and robust indices outperform the ML indices when the data are non-normal (Curran, West, & Finch, 1996). Yu and Muthen (2002) suggest that a good fit is achieved when the robust RMSEA is 0.05 or less, and when robust CFI is at or above approximately .95. When testing for invariance, we examined the difference between the robust goodness-of-fit indexes (robust CFI). Cheung and Rensvold (2002) suggest that change in CFI is trustworthy in testing the between-group invariance of CFA models. If the difference in the CFI between the two models is smaller than or equal to –.01, the null hypothesis of invariance should not be rejected.

Table 2 Descriptive Statistics and Reliability Coefficients

LEQ-H Item	*M*	*SD*	Composite Reliability (Rho)	AVE (ρ)	Skewness	Kurtosis
Time Management						
I plan and use my time efficiently.	4.29	1.45			–.03	–.03
I do not waste time.	4.20	1.62	.72	.46	.02	–.40
I manage the way I use my time well.	4.29	1.39			–.05	.09
Social Competence						
I am successful in social situations.	4.24	1.41			.00	–.01
I am competent in social situations.	4.12	1.41	.72	.47	.00	.13
I communicate well with people.	4.66	1.50			–.21	–.28
Achievement Motivation						
When working on a project, I do my best to get the details right.	4.90	1.41			–.28	–.18
I try to get the best results when I do things.	5.18	1.46	.76	.52	–.50	–.21
I try to do the best that I possibly can.	5.06	1.47			–.34	–.29
Intellectual Flexibility						
I change my thinking or opinions easily if there is a better idea.	4.71	1.47			–.20	–.29
I am open to new ideas.	4.90	1.49	.64	.39	–.28	–.28
I am adaptable and flexible in my thinking and ideas.	4.65	1.42			–.21	–.09

Task Leadership						
I can get people to work for me.	3.51	1.68			.26	–.52
I am a good leader when a task needs to be done.	4.02	1.57	.62	.37	.05	–.34
As a leader I motivate other people well when tasks need to be done.	4.47	1.48			–.04	–.26
Emotional Control						
I can stay calm in stressful situations.	3.98	1.68			–.01	–.57
I stay calm and overcome anxiety in new or changing situations.	4.35	1.36	.71	.46	–.02	.17
I stay calm when things go wrong.	4.20	1.60			–.06	–.41
Active Initiative						
I like to be busy and actively involved in things.	4.14	1.71			–.10	–.63
I like to be active and energetic.	4.90	1.61	.75	.50	–.32	–.47
I like to be an active, ‘get into it’ person.	4.56	1.59			–.13	–.50
Self-Confidence						
I know I have the ability to do anything I want to do.	4.49	1.61			–.16	–.50
When I apply myself to something I am confident I will succeed.	4.58	1.48	.73	.48	–.06	–.34
I believe I can do it.	5.01	1.51			–.36	–.39

Table 3 Latent Factor Correlations for the LEQ-H Subscales and Discriminant Validity Information

Variable	1	2	3	4	5	6	7
1. Time Management							
2. Social Competence	.83*						
	(.070)						
	.69, .97						
3. Achievement Motivation	.79*	.73*					
	(.068)	(.065)					
	.66, .98	.60, .86					
4. Intellectual Flexibility	.67*	.80*	.90*				
	(.054)	(.060)	(.065)				
	.56, .77	.68, .92	.78,1.02				
5. Task Leadership	.77*	.88*	.78*	.85*			
	(.059)	(.064)	(.060)	(.051)			
	.65, .88	.76, 1.00	.66, .90	.75, .95			
6. Emotional Control	.74*	.75*	.69*	.81*	.86*		
	(.071)	(.071)	(.068)	(.064)	(.067)		
	.60, .88	.61, .89	.56, .82	.69, .93	.73, .99		
7. Active Initiative	.64*	.74*	.73*	.78*	.77*	.71*	
	(.069)	(.074)	(.074)	(.066)	(.065)	(.077)	
	.51, .77	.60, .88	.59, .87	.65, .91	.64, .90	.56, .86	
8. Self-Confidence	.78*	.77*	.88*	.87*	.85*	.75*	.80*
	(.073)	(.072)	(.077)	(.067)	(.067)	(.075)	(.083)
	.64, .92	.63, .91	.73, 1.03	.74, 1.00	.72, .98	.60, .90	.64, .96

Note: * $p < .05$

In each cell, first row = latent factor correlation; second row = SE of latent correlation coefficient

last row = correlation confidence intervals within plus/minus 2 SE

Table 4 The Fit Indices for the Five Alternative CFA Models

Fit Index	Model 1 (1 factor model)	Model 2 (8 first-order factors)	Model 3 (Hierarchical 9 factors)	Model 4 (7 first-order factors)	Model 5 (Hierarchical 8 factors)
Scaled χ^2	824.40	471.65	512.32	337.54	392.70
df	252	224	244	168	182
χ^2/ *df*	3.27	2.11	2.11	2.01	2.16
Robust CFI	.887	.951	.947	.961	.952
RMSEA	.057	.040	.040	.038	.041
(Confidence Intervals)	(.053, .062)	(.035, .045)	(.035, .045)	(.032, .044)	(.035, .047)

Note: Robust CFI = Robust Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation

Table 5 First-Order Standardised Loadings for Models 4 and 5

LEQ-H Item	Model 4 Factor Loading	Error Variance	Model 5 Factor Loading	Error Variance
Time Management				
I plan and use my time efficiently.	.65	.76	.65	.76
I do not waste time.	.65	.76	.64	.77
I manage the way I use my time well.	.78	.63	.78	.63
Social Competence				
I am successful in social situations.	.69	.72	.70	.72
I am competent in social situations.	.72	.69	.71	.70
I communicate well with people.	.68	.73	.69	.73
Achievement Motivation				
When working on a project, I do my best to get the details right.	.68	.73	.71	.70
I try to get the best results when I do things.	.72	.69	.74	.67
I try to do the best that I possibly can.	.70	.72	.71	.70

Task Leadership				
I can get people to work for me.	.46	.89	.34	.94
I am a good leader when a task needs to be done.	.71	.71	.71	.71
As a leader I motivate other people well when tasks need to be done.	.72	.69	.73	.68
Emotional Control				
I can stay calm in stressful situations.	.57	.82	.57	.82
I stay calm and overcome anxiety in new or changing situations.	.83	.56	.82	.57
I stay calm when things go wrong.	.62	.79	.62	.78
Active Initiative				
I like to be busy and actively involved in things.	.61	.80	.61	.79
I like to be active and energetic.	.73	.68	.73	.69
I like to be an active, “get into it” person.	.81	.59	.81	.59
Self-Confidence				
I know I have the ability to do anything I want to do.	.61	.79	.63	.78
When I apply myself to something I am confident I will succeed.	.73	.68	.73	.69
I believe I can do it.	.75	.66	.74	.67

Table 4 shows the fit indices for the five models. There was no support for the single-factor model (Model 1). There were small differences between the other four models. All the four models seem to be acceptable based on the fit statistics. However, based on the evidence of the discriminant and convergent validity, Models 4 and 5 should be better fit than Models 2 and 3. A closer comparison was then made between Models 4 and 5. In terms of the robust CFI, Model 4 was about .01 higher than Model 5, according to Cheung and Rensvold (2002), this should be a better fit model. Table 5 details the factor loadings and the measurement errors for each item of the two models. Not much difference was found between the first-order factor loadings and error variances. The second-order standardised factor loadings and error variances of Model 5 was also examined (see Table 6). All the second-order factor loadings were above .82 and the error variances lower than .56. Based on the high factor loadings and low error variances, the hierarchical model (Model 5) may also be accepted on the basis of being a more parsimonious model although it has a slightly lower robust CFI than Model 4.

In order to validate the modified measurement model of the LEQ-H, we used a second sample and conducted CFAs on both Models 4 and 5. The fit indices were adequate for both models (Scaled χ^2 = 248.58, *df* = 168; robust CFI = .969; RMSEA = .034, CI of RMSEA = .025 and .042 for Model 4, and Scaled χ^2 = 360.65, *df* = 183; robust CFI = .933; RMSEA = .048, CI of RMSEA =.040 and .055 for Model 5).

Table 6 Second-Order Standardised Loadings for Model 5

LEQ-H Subscale	Factor Loading	Error Variance
Time Management	.86	.52
Social Competence	.87	.49
Achievement Motivation	.87	.50
Task Leadership	.94	.35
Emotional Control	.85	.52
Active Initiative	.82	.56
Self-Confidence	.93	.37

Again, the results confirmed that the seven first-order measurement model is better than the hierarchical model. Therefore, the seven first-order measurement model (Model 4) was accepted.

The next step of the analyses was to determine the invariance of the factor structure across gender. We adopted a sequential order in the invariance testing (Little, 1997). After testing the unrestrictive model, the constraints of equality of factor loadings, factor covariances and variances, and error variances and disturbances were added.

In the first CFA, we tested the factor forms of the LEQ-H (Model A). The procedure involved testing an unrestricted model across two groups with a multigroup analysis. In the second CFA, equality constraints were imposed on the coefficients linking the observed and latent variables (Model B). This provides evidence of invariance in the factor loading. In the next multigroup analysis, the invariance of the factor variance-covariance structures (Model C) was tested in addition to the factor loading invariance. Finally, the error variances and disturbances were constrained to be equal across the two groups to test the equality of the error variances (Model D).

Table 7 presents the results of the multigroup analyses. The results of the first unrestricted model (Model A) show that the model fits the observed data adequately. The conclusion to this result means that the measurement model based on the male sample is similar to the female sample in form and number of factors.

The second model (Model B) tested the invariance of the factor loadings across the samples. The fit indices were similar to the previous model and did not exhibit significant difference in the goodness of fit indices using the change in CFI value (ΔCFI = –.001). When equality constraints were imposed on the factor variances and covariances (Model C), the loss in fit again was minimal (ΔCFI = –.001). Finally, when the invariance of the error variances and disturbances were added (Model D), the change in CFI was -.002, which is still below the –.01 criterion suggested by Cheung and Rensvold (2002). Considering this is the most restrictive test of measurement invariance (Vandenberg & Lance, 2000), we concluded that LEQ-H has equivalent measurement properties across the two genders.

Table 7 Results of the Multi-Group CFAs Testing for Invariance across Gender

Model	Scaled $\chi 2$	*df*	$\Delta\chi 2$	Δdf	Robust CFI	ΔCFI	RMSEA (CI)
M_A Free Model	636.31	361	—	—	.934	—	.049 (.042, .055)
M_B Equality of factor loading	654.83	375	18.52	14	.933	–.001	.048 (.042, .054)
M_C Equality of factor loading, factor var/cov	663.74	381	27.43	20	.933	–.001	.048 (.042, .054)
M_D Equality of error variance	697.33	405	61.02	44	.932	–.002	.048 (.041, .053)

Note: CFI = Comparative Fit index; RMSEA = Root Mean Square Error of Approximation

Discussion

Many educators and policy makers have claimed that PW has the potential to impart life skills. However, there is a lack of research evaluating the effectiveness of PW in this aspect. This could be due to an absence of appropriate measurement tools. The present study was designed to evaluate the psychometric properties of an existing measure commonly used in the outdoor adventure literature, the LEQ-H, in the Singapore PW context with secondary school students.

In this study, we examined the internal consistency, convergent validity, and discriminate validity of the subscales in LEQ-H. We also tested several measurement models and examined the invariance of the measurement tool across gender. In terms of reliability, all the subscales of the LEQ-H were found to have adequate internal consistency. Cronbach's (1951) coefficient alpha is commonly used as an index of reliability of subscales, multiple item tests, questionnaires and inventories. However, Cronbach's alpha underestimates the population composite reliability unless the measures are essentially τ-equivalent (Raykov, 1998). In other words, alpha coefficient may be biased at the population level because it is based on the assumption of no measurement error covariances. The use of the rho's coefficient correct for this "bias".

The results showed that six out of the eight LEQ-H subscales had unsatisfactory AVE values. Fornell and Larcker (1981) consider a construct to display convergent validity if average variance extracted (AVE) is at least .50 (that is, when variance explained by the construct is greater than measurement error). The test of discriminant validity suggested that Achievement Motivation and Intellectual Flexibility were not independent constructs as the confidence intervals between them exceeded 1.00. This provided the basis for testing alternative measurement models with Intellectual Flexibility deleted. According to McClelland (1985), one of the characteristics of achievement-motivated people is that they constantly seek improvements and ways of doing things better. Therefore, Intellectual Flexibility may be a trait for Achievement Motivated individuals. However, this relationship was not found in previous study by Neill and his colleagues (Neill et al., 2003).

It is possible that there could be cultural differences, which warrants further investigation.

We compared five measurement models of the LEQ-H. The results show that other than the one factor model, there were small differences between the other four models based on the fit statistics generated by the EQS programme. This merely means that the data failed to disconfirm the a priori hypothesised measurement structure of the instrument. Mueller (1996) suggests that if the CFA results indicate acceptable data-model fit, a more in-depth assessment of validity should be conducted. Information from the discriminant and convergent validity supported Models 4 and 5 (seven first-order factors and hierarchical eight factors). Comparison of Models 4 and 5 revealed that both models may be acceptable. Model 4 offered the best fit but Model 5 was more parsimonious. The use of a second sample supported the seven first-order measurement model (Model 4) better than the hierarchical model. Previous research (Neill et al., 2003) has also tested a hierarchical model with eight first-order factors and a global "life effectiveness" as a second-order factor, however, the fit was slightly lower than the eight first-order factors model ($\chi^2 = 718.94$, $df = 224$; TLI = .945, RNI = .956, compared to $\chi^2 = 972.55$, $df = 244$; TLI = .926, RNI = .934). The authors suggest that the hierarchical model should be investigated. This study replicated the findings of the previous study.

In conclusion, the present investigation provides evidence of a seven first-order measurement model of the LEQ-H. Furthermore, the measurement models are similar with regard to factor structures and forms for males and females. The findings clearly affirm that the LEQ-H, with the seven first-order measurement model, can be an appropriate measurement tool to assess the effects of PW on students' life skills such as time management, social competence, achievement motivation, task leadership, emotional control, active initiative and self-confidence. This fills an important gap in research on PW. With an appropriate measurement tool in place, researchers can then proceed to examine whether PW helps students develop "life skills" that can assist them in meeting the challenges of the knowledge-based economy. Although the instrument was tested in the PW context, there is no reason to suggest

that it cannot be used to examine Singaporean students' life skills in other contexts.

Future research needs to examine the concurrent and predictive validity of the LEQ-H with other variables, such as metacognition, communication skills and problem-solving skills. Also, tests of longitudinal factor invariance could be conducted to examine the longitudinal score stability at the level of the latent construct (see Conroy, Elliot, & Hofer, 2003). Finally, the LEQ-H is designed in the Western culture and its cross-cultural applicability to Eastern cultures warrants further testing.

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