LOCALIZED REVISION OF THE EPISTEMIC CURIOSITY SCALE FOR CHINESE SENIOR HIGH SCHOOL STUDENTS[1]

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Abstract

Objective: The goal of this research was to revise Litman's Epistemic Curiosity Scale (ECS), so that it can be applied to the evaluation of the developmental characteristics among Chinese senior high school students. **Methods**: 25 senior high school students were first invited to a trial test for confirming the item comprehensibility, after then 602 senior high students were enrolled to the formal testing for the item analysis and exploratory factor analysis. And 533 Chinese high school students responding ECS were submitted to test the construct validity of the localized Chinese-version ECS. Then the scale was applied to 366 subjects to test the internal consistency indices and criteria correlation validity. Finally, 153 senior high school students were used to test test-retest reliability of the ECS. **Results**: All of the 10 items were retained, through exploratory factor analysis and confirmatory factor analysis, the two-factor model which was consistent with the original scale proved to be the most appropriate, its main goodness of fit indices were: x^2/df=2.68, CFI=0.93, NFI=0.93, TLI=0.90, GFI=0.97, AGFI=0.95, and RMSEA=0.06. The study found internal consistency indices (Cronbach's alpha) from 0.73 to 0.78 in the first three samples. In addition, the ECS had a high correlation with Chinese version of Trait Curiosity Scale (r=0.53, p<0.001), test-retest reliability over 2-month interval was 0.54 to 0.56 for each of the 2 sub-scale and 0.64 for the total ECS. **Conclusion**: Findings in these studies support the cross-cultural validity of the ECS in Chinese senior high school students.

Keywords: Epistemic curiosity scale, reliability, validity, senior high school student.

1. Introduction

Curiosity is the innate aspect of human nature, which refers to the motivation to seek new knowledge and experience and better understand the world (Litman & Pezzo, 2005; Loewenstein,1994). Epistemic curiosity (EC) specifically refers to the motivation that motivates individuals to devote themselves to acquiring new information, filling knowledge gaps, solving problems, learning new ideas or concepts (Berlyne,1966; Litman, 2008). Based on the interest-deprivation (I/D) theory of curiosity (Litman, 2005; Litman & Silvia, 2006), EC includes interest type epistemic curiosity (I-type EC) and deprivation type epistemic curiosity (D-type EC) (Litman& Jimerson,2004; Mussel, 2010).

In order to effectively evaluate different types of epistemic curiosity, Litman (2008) developed a 10-item ECS scale (10-item I/D Epistemic Curiosity Scale). The scale has been proved to have a good reliability and validity in multiple test groups such as college students and professional groups. And the scale also has been proved to have cross-cultural consistency (Litman & Mussel,2013; Piotrowski, Litman, Valkenburg, 2014; Piotrowski, Litman, Valkenburg P, 2014; Karandika, Kapoor, Litman, 2020).

Therefore, this study verified the 10-item ECS scale among Chinese senior high school students, and examined whether its measurement indicators can be used to measure the epistemic curiosity level of Chinese senior high school students.

2. Objectives

Using convenient cluster sampling for the participants who were recruited from Gansu Province and Hebei Province. These data were accumulated in 5 waves. Summary information for the participants in each study is reported in Table 1.

Table 1. Summary for data for participants in each study.

Sample	N			Age			Purpose
	Total	Girls	Boys	Range	M	SD	
1	25	12	13	15-16	15.75	0.3	the item comprehensibility
2	602	302	300	14-18	15.63	0.82	the item analysis and exploratory factor analysis
3	533	281	252	13-18	16.03	0.86	confirmatory factor analysis
4	366	197	169	14-18	16.11	0.8	the criteria correlation validity
5	153	104	49	15-18	16.08	0.79	the test-retest reliability

3. Methods

3.1. Scale translation and determination process

The study adopted standard translation and back-translation procedures to develop the Chinese version of the ECS.

3.2. Instruments

I- and D- type ECS (Litman, 2008) includes two dimensions, a 5-item I-type scale ("I enjoy exploring new ideas"), and a 5-item D-type scale ("I can spend hours on a single problem because I just can't rest without knowing the answer"). The scale uses a four-level scoring. Participants use a 4-point scale (1="almost never", 4="almost always") to assess how well each item fits their own situation. The higher the total score, the higher the individual's epistemic curiosity.

Trait Curiosity Inventory: The scale was revised by Chen, Cai, Zhang, etc. (2017) based on Naylor's STCI scale to investigate the characteristics of college students' curiosity. Participants assessed the extent to which each item fits their own conditions on a 4-point scale (1="none or almost no", 4="almost always"). In this study, the trait curiosity inventory was used as an evaluation tool to examine the criteria correlation validity of the ECS.

4. Results

4.1. Item analysis

Sample 2 was used for item analysis using the critical ratio method. The results are shown in Table 2.

Table 2. Item analysis results.

Item	t	r	Item	t	r
1	13.29^{***}	0.55^{***}	6	13.15^{***}	0.54^{***}
2	10.29^{***}	0.45^{***}	7	10.87^{***}	0.47^{***}
3	14.15^{***}	0.56^{***}	8	13.12^{***}	0.55^{***}
4	15.17^{***}	0.58^{***}	9	15.18^{***}	0.57^{***}
5	11.95^{***}	0.49^{***}	10	16.63^{***}	0.64^{***}

4.2. Exploratory Factor Analysis of the ECS

An exploratory factor analysis (EFA) with principal components analysis and a promax oblique rotation were used in sample 2 to examine the structure of the ECS. The Kaiser–Meyer–Olkin (KMO) score for the Chinese version of the ECS was 0.80 and the Bartlett's test for sphericity was significant ($P < 0.001$), suggesting that the ECS was suitable for EFA. As a result, two factors were extracted and 10 items ultimately retained. The results are shown in Table 3.

Table 3. Exploratory factor analysis results.

Items	Factors	
	I-type	D-type
1 Enjoy exploring new ideas.	0.76	
2 Enjoy learning about subjects that are unfamiliar to me.	0.52	
3 Find it fascinating to learn new information.	0.41	
4 Learn something new, like to find out more about it.	0.61	
5 Enjoy discussing abstract concepts.	0.76	
6 Hours on a problem because I can't rest without answer.		0.61
7 Conceptual problems keep me awake thinking.		0.62
8 Frustrated if I can't figure out problem, so I work harder.		0.7
9 Work like a fiend at problems that I feel must be solved.		0.62
10 Brood for a long time to solve problem.		0.63
Eigenvalues	2.99	1.25
Variance explained（%）	29.56%	11.98%

4.3. Confirmatory Factor Analysis of the ECS

Confirmatory factor analyses were then conducted on sample 3. Its main goodness of fit indices were: x^2/df=2.68<3; CFI=0.93, NFI=0.93, TLI=0.90, GFI=0.97, AGFI=0.95, all of them were greater than 0.9; the RMSEA was 0.06. The two-factor model which was consistent with the original scale proved to be the most appropriate.

4.4. Properties of the ECS

Sample 4 was used to test criteria correlation validity of the ECS. The results are shown in Table 4.

The result showed that Cronbach's α of the ECS total scale was 0.75, and Cronbach's α of every sub-scale ranged between 0.65 and 0.66. The 12-week test–retest reliability of total scale was 0.64, and the 12-week test–retest reliabilities of every sub-scale ranged between 0.54 and 0.56.

Table 4. Criteria correlation validity results.

	EC	I-type	D-type
Trait Curiosity	0.53***	0.51***	0.43***

5. Conclusion

In summary, this study developed a complete Chinese version of the ECS and found that it had a good reliability and validity among Chinese senior high school students.

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