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The Chinese Version of the Regulation of Learning Questionnaire (RLQ): A Reliability and Validity Study

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Abstract

The present study aimed to translate, adapt and validate the Chinese version of the Regulation of Learning Questionnaire (RLQ) to assess students' regulation of learning within the Chinese educational context. A total of 600 college students from China participated in the study. The psychometric properties of the Chinese RLQ were examined through experts' evaluation, reliability testing, and confirmatory factor analysis (CFA). The results showed that content validity was observed with S-CVI value of 0.93; the Chinese RLQ had excellent internal consistency, with Cronbach's α coefficients of 0.97 (N=47). CFA supported the hypothesized factor structure, with acceptable model fit indices (χ^2/df = 1.452; RMR = 0.100; GFI = 0.906; NFI = 0.923; CFI = 0.975; RMSEA = 0.028). Evidence for convergent and discriminant validity was also obtained, which indicated the acceptable construct validity. These findings suggested that the Chinese RLQ is a reliable and valid instrument for assessing students' regulation of learning in Chinese higher education. The questionnaire provides researchers and educators with a useful tool for understanding and promoting effective learning strategies. Future studies are encouraged to further explore the RLQ's applicability across different populations.

Keywords: Regulation of Learning, Questionnaire, Reliability, Validity, Confirmatory Factor Analysis (CFA), Chinese College Students

Introduction

Self-regulated learning is recognized as an essential component of learning (Pintrich, 1995). Since a major function of education is the development of lifelong learning skills, self-regulation is an important self-directive process by which students transform their mental abilities into learning skills (Zimmerman, 2002). In addition, the fact that students' skills and abilities cannot fully explain their academic performance (Zimmerman, 2013) indicated the important role of factors like self-regulation in learning (Schunk, 2005). Self-regulated learning involves the active and goal-directed regulation of three general aspects including

motivation, cognition and behaviour for academic tasks by an individual student (Pintrich, 1995).

Self-regulated learning is regarded as a mechanism to explain academic performance differences among students and as an effective way to improve performance (Schunk, 2005). It is generally believed that the most efficient learners are highly self-regulating (Butler & Winne, 1995). Pintrich (2000) suggested that activities in self-regulatory process could mediate the relationship between learners and their environments and influenced learners' learning achievements (Pintrich & Zusho, 2002; Schunk, 2005). Students with high level of self-regulation are not only more likely to achieve academic success but to have a more positive outlook on their futures (Zimmerman, 2002). It is proved that the environment structuring, computer self-efficacy, metacognitive strategies and social dimension of self-regulated learning significantly influence students' academic performance (Ejubovic & Puška, 2019). There is a consensus that self-regulation skills can be taught and effectively used in solving mathematics problems, guiding comprehension in reading, and improving the writing ability (Mevarech et al., 2017; Thiede et al., 2017; Graham et al., 2017).

Self-regulation has very significant implications especially for college students (Pintrich, 1995). Compared to primary and secondary education, tertiary education has a distinctive feature of a reduction in structured class time and less contact with teachers; hence, students' learning greatly rely upon their self-regulation (Broadbent, 2017). At this point, college students may face sever challenges as they adapt to a more independent learning environment, which requires them to develop and apply self-regulated learning strategies to set goals, maintain motivation and manage time (Shi & Yang, 2025). Nowadays, although college students use their digital devices for almost everything, studies showed that students have difficulties with digital learning and they often fail to achieve good learning outcome because they lack the skills of self-regulation (Anthonysamy et al., 2020). Therefore, obtaining the skills of self-regulated learning is especially important in higher education because college students are required to self-organize their studying (Broadbent, 2017; Theobald, 2021) while they often cannot do that.

Given the importance of self-regulation, measuring self-regulation in learning has also become a research focus. There are currently many instruments developed based on different theories and models. The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1993) and the Learning and Study Strategies Inventory (LASSI; Weinstein, Palmer, & Schulte, 1987), which displayed strong psychometric qualities, served to operationalize self-regulation processes, were two commonly used instruments (Schunk & Greene, 2017). For example, the MSLQ is a self-report instrument used by students to rate themselves on motivational and self-regulated learning items with good internal reliability and validity (Schunk, 2005). The motivational items assess students' goals, value beliefs and anxiety for a course, while the self-regulated learning items assesses students' use of different cognitive and metacognitive strategies (Pintrich,1991).

Different theoretical developments have brought about more different instruments to measure self-regulation from different dimensions. The Regulation of Learning Questionnaire (RLQ), which is developed based on Winne and Hadwin's (1998) model of SRL, offers a comprehensive measure on participants' perceptions of their actions and strategies in key

processes and phases of SRL which are task understanding, goal setting and planning, monitoring, evaluating, and adapting (McCardle & Hadwin, 2015). It was designed to be sensitive to time, context, and metacognitive processes (McCardle & Hadwin, 2015). Students were asked to complete RLQ in the first three weeks (Time 1) and the last two weeks (Time 2) of a semester. The Cronbach's alphas at Time 1 (α1) and Time 2 (α2) are all above 0.7 for the five sub-constructs (McCardle & Hadwin, 2015), which indicated an acceptable reliability of the instrument. In addition, exploratory factor analyses (EFA) were run and proved the acceptable construct-related validity, and it resulted in a five-factor model of the RLQ (McCardle & Hadwin, 2015).

Table 1
The Regulation of Learning Questionnaire

Sub-Constructs	Items (Numbers)	α1	α2
Task Understanding	B1-B11 (11)	0.72	0.79
Goal Setting	B12-B20 (9)	0.80	0.79
Monitoring	A1-A9 (9)	0.90	0.86
Evaluating	A10-A19 (10)	0.89	0.86
Adapting	A20-A29 (10)	0.83	0.83

Valid and reliable measurement tools are essential in social science research to ensure that the data collected accurately measures the intended research concept or construct (Bolarinwa, 2015; Gjersing et al., 2010). A psychometrically sound instrument can ensure useful and meaning research results (Landreneau, 2016). In the context of self-regulated learning, using an instrument without confirmed psychometric properties may result in erroneous conclusions about students' self-regulatory behaviours. There is limited evidence regarding its validity within the Chinese higher education system. Cultural and linguistic differences may influence respondents' interpretation of questionnaire items (Dolnicar & Grün, 2007), potentially enhancing the risk of introducing bias into a study if directly adopted without revalidation (Gjersing et al., 2010). Revalidating the RLQ in the Chinese context can enhance its cultural sensitivity and ensure that it captures learning regulation strategies that are contextually relevant. This allows educators and researchers to obtain more accurate data to inform teaching practices and policy. Without proper validation, the use of the questionnaire (RLQ) may yield data that do not truly measure what it aims to do (students' learning regulation behaviours) (Kazi & Khalid, 2012). This can compromise the validity of research findings and hinder the development of effective support programs or interventions. To our knowledge, despite the increasing interest in self-regulated learning among Chinese college students, a validated and culturally adapted Chinese version of the RLQ remains unavailable. Researchers and educators lack a reliable instrument to assess regulatory learning patterns within this population without such a tool.

Therefore, this study aims to adapt the RLQ into Chinese and examine its psychometric properties, including reliability and validity, among college students in China. By providing a validated Chinese version of the RLQ, this study contributes to the cross-cultural assessment of self-regulation in learning and supports educators and policy makers in tailoring interventions based on students' self-regulation

Methods

Participants and Ethical Considerations

Simple random sampling was used to sample three universities in Foshan city, China. As a result, a sample of 600 college students from three universities selected was included with 493 females and 107 males. Among these students, 24.17% are freshmen; 39.83% are sophomores; 35.33% are juniors, and only 0.67% are seniors. Ethics approval was granted by the research ethics committee of the university (UTMREC-2024-53). Before assigning questionnaire, a set of directions concerning how to fill in the questionnaire was introduced to participants. To protect the personal information of participants, this survey was conducted anonymously. They were all informed that the collected data in this study will be kept confidential and only for research purposes. Then teachers assigned the questionnaire and consent forms to participants. Participants have the right to stop or withdraw from the survey at any time during the process of filling out the questionnaire. Finally, a total of 600 questionnaires were collected.

Measuring Instrument

The original version of the Regulation of Learning Questionnaire (RLQ; McCardle & Hadwin, 2015) was adapted, translated and used to collect data in this study. With totally 49 items, the original RLQ consists of 5 subscales: (a) Task Understanding (11 items; e.g., Figured out what I was being asked to know), (b) Goal Setting and Planning (9 items; e.g., Set goals that focused on learning, understanding, or remembering), (c) Monitoring (9 items; e.g., Asked myself if I was understanding what I needed to know), (d) Evaluating (10 items; e.g., Appraised my current understanding of the material), and (e) Regulating (10 items; e.g., Changed my plans for how to study). Items were rated on a seven-point Likert Scale from “1. not at all true of me” to “7. very true of me”. McCardle and Hadwin (2015) proved that the original RLQ has acceptable reliability and validity.

Research Procedure

Expert Opinions and Content Validity

Content validity refers to whether the research instrument can accurately measure all aspects of a construct (Heale & Twycross, 2015). To assess the content validity of the original RLQ, the expert method was applied. Three experts in the field of self-regulation were invited to review and evaluate whether the questionnaire topic is consistent with the original content range. These three experts all work in universities and have rich professional knowledge and teaching experience in their research field, which can greatly improve the reliability of the evaluation results: Expert 1 is a Doctor of Philosophy from Universidad Internacional de La Rioja, specializing in self-regulated learning and educational technology; Expert 2 is an assistant professor from University of Victoria, specializing in social aspects of regulation of learning and computer supported collaborative learning; Expert 3 is a professor emeritus from Simon Fraser University, specializing in self-regulated learning, metacognition, study tactics and learning strategies, motivation and learning analytics.

There are two forms of content validity index (CVI): content validity for item (I-CVI) and content validity for scale (S-CVI). The formula for calculating I-CVI is: I-CVI = (agreed item) / (number of expert); the formula for calculating S-CVI is: S-CVI/Ave = (sum of I-CVI scores) / (number of item) (Yusoff, 2019). This study assessed the content validity mainly based on the value of S-CVI. It is believed that an S-CVI of 0.80 or higher is acceptable (Polit & Beck, 2006).

In addition to scoring, experts also provided their comments on single items. The researchers made modifications on language expression based on expert opinions. In addition, experts suggested that item B12 and B13 are similar, and they should be merged into one item, and there is divergence of two experts' opinions on item B14. Based on the above opinions, the researchers have decided to combine B12 and B13 into one item and delete B14. Finally, the original RLQ changed from 49 items to 47 items. Based on the ratings of experts for each item, the I-CVI was calculated, and then, the S-CVI of the instrument with 47 items was calculated to be 0.93, which is higher than 0.80 indicating that the instrument is valid.

Translation, Proofreading and Back Translation

The original RLQ has 49 items in English. After the evaluation of experts and revision of the scale, we obtained a 47-item RLQ in English. To make it clearer and easier for participants to better understand the items in RLQ and improve the accuracy of measurement, the original RLQ was translated into Chinese by a native translator in China who got a master's degree in translation and interpreting from XX University in China and is also a lecturer of English major at a college. He has ever cooperated with multiple translation companies and has rich experience in translation and solid translation skills. Subsequently, three experts with titles of professor in the field of linguistics were invited to review and proofread the translated RLQ. Among them, two experts are from XX College, and one is from XX University. After revising the translated RLQ based on the comments from three experts, the translator was invited to conduct a back translation of the RLQ. The researchers recorded the entire process of translation, proofreading and back translation.

Data Collection and Analysis

After completing the revision and translation of the original questionnaire, data collection was carried out. As mentioned above, the research objects are college students from three selected universities in Foshan city, China. Firstly, descriptive statistical analysis was conducted by SPSS 26.0 including analysis of mean, standard deviation, maximum and minimum values. Secondly, the internal consistency reliability of the Chinese version of RLQ was assessed by SPSS 26.0. Cronbach's α is one of the formulas for calculating internal consistency reliability. When the value is above 0.70, the reliability of scale is acceptable. The higher the value of Cronbach's α, the higher the reliability, and that means the better the internal consistency of the questionnaire (Chai, 2010). Third, with AMOS 28.0, the confirmatory factor analysis (CFA) was used to analyse the validity of the scale on the data from three aspects: model fit, convergent validity and discriminant validity. (a) To assess the factor structure of the instrument, model fit indices are important and the criteria are as follows: χ^2/df < 5; RMR< 0.1; GFI > 0.9; NFI > 0.9; CFI＞0.9; RMSEA < 0.1. (b) The convergent validity is evaluated based on three indicators: standardized factor loadings which should be higher than 0.50 (Cheung et al., 2024; Hair, 2009); the Average Variance Extracted (AVE) which should be 0.50 or higher (Hair, Howard, & Nitzl, 2020); Composite Reliability (CR) which should exceed the criterion of 0.70 (Rowlands, 2020). (c) One method of evaluating discriminant validity is comparing the square root of the AVE with the correlations among constructs (Fornell & Larcker, 1981). When the square root of AVE for each construct should be greater than its correlations with other constructs, the discriminant validity is observed. Good model fit, acceptable convergent validity and discriminant validity indicate good construct validity of the instrument.

Results

Descriptive Analysis

A total of 600 questionnaires were collected. After data screening, 15 invalid answers were removed, and a total of 585 participants were included in this study. Table 1 shows the descriptive statistics for the Chinese version of the RLQ and its subscales. With respect to the possible full score of 329, the overall mean score for the RLQ was 186.05 (SD = 58.8), indicating a moderate level of self-regulation in learning among the surveyed Chinese college students. In addition, the difference between the values of maximum (277.00) and minimum (77.00) indicates a significant difference in the level of self-regulation among these students. The mean scores for the subscales were as follows: Task Understanding (M =43.42, SD = 17.08) with respect to the possible full score of 77; Goal Setting and Planning (M = 27.57 , SD = 11.07) with respect to the possible full score of 49; Monitoring (M = 35.71, SD = 14.20) with respect to the possible full score of 63; Evaluating (M = 40.02, SD = 15.65) with respect to the possible full score of 70; Regulating (M = 39.32, SD = 15.69) with respect to the possible full score of 70.

Table 2
Descriptive Statistics by SPSS 26.0.

	Statistics			
	Mean	**Std. Deviation**	**Minimum**	**Maximum**
Task Understanding	43.42	17.08	14.00	72.00
Goal Setting and Planning	27.57	11.07	9.00	45.00
Monitoring	35.71	14.20	12.00	59.00
Evaluating	40.02	15.65	13.00	65.00
Regulating	39.32	15.69	15.00	65.00
RLQ	**186.05**	**58.80**	**77.00**	**277.00**

Reliability

The internal consistency of the Chinese version of the RLQ was assessed using Cronbach's α coefficients. As shown is Table 2, the overall scale (RLQ) demonstrated excellent reliability, with a Cronbach's α of 0.97 (N = 47), suggesting satisfactory internal consistency. The Cronbach's α values for the RLQ subscales were as follows: Task Understanding (α = 0.94, N = 11), Goal Setting and Planning (α = 0.91, N = 7), Monitoring (α = 0.93, N = 9), Evaluating (α = 0.94, N = 10), Regulating (α = 0.93, N = 10). In conclusion, the Cronbach's α coefficients of the RLQ and its subscales all exceeded the commonly accepted threshold of 0.70, suggesting that the Chinese version of RLQ and its subscales have acceptable internal consistency (George & Mallery, 2019).

Table 3
Cronbach's α of the Chinese Version of RLQ

Names of the Constructs	Reliability Statistics	
	Cronbach's Alpha (α)	N of Items
Task Understanding	0.94	11
Goal Setting and Planning	0.91	7
Monitoring	0.93	9
Evaluating	0.94	10
Regulating	0.93	10
RLQ	**0.97**	**47**

Confirmatory factor analysis (CFA): model fit, convergent validity, discriminant validity and construct validity

Model Fit

One important step when assessing a model is the evaluation of some fit statistic (Iacobucci, 2010). Table 3 presents the model fit indices of the CFA model of this study: χ^2/df = 1.452, RMR = 0.100, GFI = 0.906, NFI = 0.923, CFI = 0.975, RMSEA = 0.028. All fit indices are within an acceptable range of values indicating that the factor structure is statistically supported and the measurement model is valid for the sample. Figure 1 shows the correlations of the CFA Model done by AMOS 28.0.

Table 4
Model Fit Indices of Confirmatory Factor Analysis (CFA) Model

	Model Fit Indices					
	χ^2/df	RMR	GFI	NFI	CFI	RMSEA
Measured value	1.452	0.100	0.906	0.923	0.975	0.028
Acceptable value	< 5	< 0.1	> 0.9	> 0.9	> 0.9	< 0.1

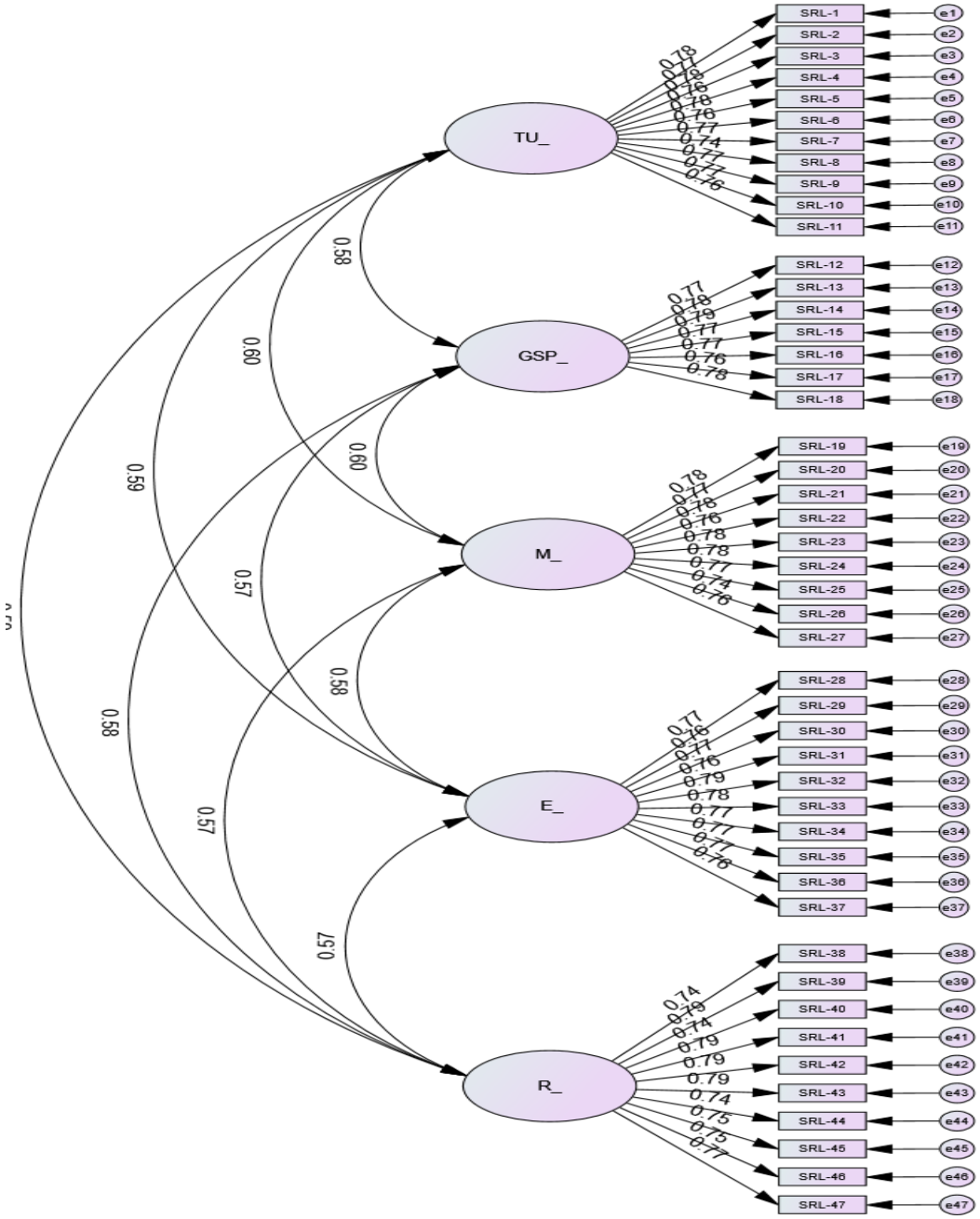

Figure 1 Confirmatory Factor Analysis Model by AMOS 28.0
Note: TU_ = Task Understanding; GSP_ = Goal Setting and Planning; M_ = Monitoring; E_ = Evaluating; R_ = Regulating.

Convergent Validity

Convergent validity of the Chinese version of RLQ was evaluated by examining the standardized factor loadings, AVE, and CR of each construct, following the recommendations of Fornell and Larcker (1981). Table 4 presents the values of standardized factor loadings, AVE, and CR of each construct of the Chinese Version of RLQ: (1) The standardized factor loadings of all items were found to be statistically significant and were above the recommended cutoff of 0.50 (Hair, 2009), reflecting acceptable item convergence. Specifically, the factor loadings ranged from 0.741 to 0.789, demonstrating satisfactory and stable item reliability. (2) The AVE values of each sub-construct are as follows: Task Understanding (AVE = 0.590); Goal Setting and Planning (AVE = 0.596); Monitoring (AVE = 0.592); Evaluating (AVE = 0.593); Regulating (AVE = 0.585). The AVE values for all sub-constructs exceeded the recommended threshold of 0.50 (Hair, Howard, & Nitzl, 2020), suggesting that more than 50% of the variance was captured by the latent constructs. (3) The CR values for all constructs were higher than the acceptable level of 0.70 and even higher than 0.90, indicating good internal consistency. In conclusion, the values of standardized factor loadings, AVE, and CR of each sub-construct have all met the standards and provide evidence for acceptable convergent validity of the Chinese version of the RLQ.

Table 5
Indicators of Convergent Validity on the Chinese Version of RLQ

Path			Standardized Regression Weights (>0.5)	AVE (>0.5)	CR (>0.7)
TU	→	SRL1	0.784		
TU	→	SRL2	0.768		
TU	→	SRL3	0.778		
TU	→	SRL4	0.757		
TU	→	SRL5	0.78		
TU	→	SRL6	0.762	0.590	0.940
TU	→	SRL7	0.771		
TU	→	SRL8	0.745		
TU	→	SRL9	0.769		
TU	→	SRL10	0.773		
TU	→	SRL11	0.764		
GSP	→	SRL12	0.768		
GSP	→	SRL13	0.776		
GSP	→	SRL14	0.79		
GSP	→	SRL15	0.766	0.596	0.912
GSP	→	SRL16	0.765		
GSP	→	SRL17	0.759		
GSP	→	SRL18	0.778		
M	→	SRL19	0.781		
M	→	SRL20	0.768		
M	→	SRL21	0.784		
M	→	SRL22	0.758		
M	→	SRL23	0.778	0.592	0.929
M	→	SRL24	0.775		
M	→	SRL25	0.773		
M	→	SRL26	0.741		
M	→	SRL27	0.763		

E	→	SRL28	0.775	0.593	0.936
E	→	SRL29	0.756		
E	→	SRL30	0.769		
E	→	SRL31	0.765		
E	→	SRL32	0.789		
E	→	SRL33	0.777		
E	→	SRL34	0.766		
E	→	SRL35	0.77		
E	→	SRL36	0.772		
E	→	SRL37	0.758		
R	→	SRL38	0.744	0.585	0.934
R	→	SRL39	0.789		
R	→	SRL40	0.742		
R	→	SRL41	0.786		
R	→	SRL42	0.786		
R	→	SRL43	0.786		
R	→	SRL44	0.741		
R	→	SRL45	0.753		
R	→	SRL46	0.755		
R	→	SRL47	0.767		

Note: TU = Task Understanding; GSP = Goal Setting and Planning; M = Monitoring; E = Evaluating; R = Regulating.

Discriminant Validity

As shown in table 5, there is a significant correlation ($p < 0.001$) between task understanding, goal setting and planning, monitoring, evaluating, and regulating. In addition, the absolute values of the correlation coefficients are all less than 0.5, and they are all less than the values of corresponding square root of AVE, indicating that there is a certain correlation between the latent variables and a certain degree of discrimination between them, which means that the discriminant validity of the scale data is ideal.

Table 6
Correlations among Sub-constructs and Square Root of AVE

	TU	GSP	M	E	R
TU	**0.590**				
GSP	1.338***	**0.596**			
M	1.444***	1.391***	**0.592**		
E	1.402***	1.313***	1.389***	**0.593**	
R	1.309***	1.240***	1.270***	1.255***	**0.585**
Square Root of AVE	**0.768**	**0.772**	**0.769**	**0.770**	**0.765**

*Note：***. P<0.001; The diagonal line represents the AVE value; TU = Task Understanding; GSP = Goal Setting and Planning; M = Monitoring; E = Evaluating; R = Regulating*

Construct Validity

Construct validity is a significant part of construct validation, assessing the adequacy of measures (O'Leary-Kelly & Vokurka, 1998). Construct validity can be evaluated through simultaneous evaluation of convergent and discriminant validity (Strauss & Smith, 2009). In this study, convergent validity and discriminant validity were proved acceptable. Good model

fit, acceptable convergent validity and discriminant validity indicated good construct validity of the Chinese version of RLQ.

Discussion

Summary of Findings

The original RLQ, which is in English, has 5 sub-constructs (task understanding, goal setting and planning, monitoring, evaluating, and regulating) with 49 items. In this study, researchers invited experts to evaluate the content of the scale, translated and back translated the scale, collected data, and conducted reliability and validity assessment. Finally, a valid Chinese version of the RLQ with 5 sub-constructs containing 47 items was developed. The specific findings of each research step are as follows.

Firstly, there is expert evaluation regarding content validity. Three experts in the field of self-regulation were invited to rate each item of the original RLQ and provide comments for further revision. The S-CVI value of the scale was calculated based on expert ratings, and the results showed that the scale has acceptable content validity. At the same time, necessary revisions were made to the number and language expression of the scale items based on expert opinions. After revisions, the total number of scale items was 47, with 5 sub-constructs remaining unchanged.

Next is translation and back translation. One professional and experienced translator was invited to translate and back translate the RLQ after content validity evaluation, and three linguistic experts with title of professor were invited to review the translated content. The Chinese version of the RLQ was obtained.

Finally, the researchers distributed the Chinese version of the RLQ, which had undergone content validity evaluation and translation, to the selected Chinese college students for data collection and analysis. Through confirmatory factor analysis (CFA), the results indicate that the scale has good reliability and factor structure, and the convergent validity, discriminant validity, and construct validity are all acceptable. Therefore, the Chinese version of RLQ is proved effective with validation (see Appendix for the full version the Chinese version of RLQ).

Implications and Limitations

On the one hand, instrument development and validation are foundational to data gathering, subsequent analysis and validity of results based on research objectives of study in social sciences. What's more, appropriate implementation of instrument measures allows researchers to collect reliable data to draw conclusions (Lamm et al., 2020). On the other hand, learners adjust the way they study depending on self, task and context conditions. Therefore, measures of self-regulated learning should be sensitive to the learning task, target population and context (McCardle & Hadwin, 2015). The original RLQ was designed to be sensitive to time, context, and metacognitive processes (McCardle & Hadwin, 2015). However, with the continuous deepening and expansion of research on self-regulation, a Chinese version of the RLQ is necessary for studying the self-regulated learning of Chinese students. The present study provides initial evidence supporting the reliability and validity of the Chinese version of the RLQ, contributing to the growing body of research on self-regulated learning within the Chinese educational context. The validated Chinese version of RLQ offers researchers and educators a practical tool for pertinently assessing students' self-regulation

strategies in learning, which may promote the development of targeted interventions to enhance academic self-regulation and performance of students.

At the same time, there are several limitations of this study. First, the sample consisted of college students from only Foshan city of China, which may limit the generalizability of the findings to other age groups or educational settings. Second, the reliance on self-report data may be subject to social desirability or response biases. Third, the cross-sectional nature of the study does not allow for conclusions about the stability or predictive validity of the Chinese version of the RLQ over time. Future research should aim to validate the Chinese version of the RLQ in more diverse samples, including secondary school students and adult learners. Longitudinal studies are also recommended to examine the stability of the RLQ and its ability to predict relevant academic outcomes.

Conclusion

The present study aimed to translate, adapt, and validate the Chinese version of the RLQ to assess learning regulation among Chinese college students. The findings demonstrated that the Chinese RLQ possesses satisfactory psychometric properties, including acceptable internal consistency, a clear factor structure, content validity, convergent validity, discriminant validity and construct validity, consistent with the original version. These results suggest that the Chinese RLQ is a reliable and valid instrument for measuring students' regulation of learning in Chinese higher education. The availability of this tool can facilitate future research on self-regulated learning and provide practical insights for educators seeking to support students' learning processes.

This study contributes to the field of self-regulation of learning theoretically and contextually. Theoretically, this study provides evidence that the underlying constructs of regulation of learning including task understanding, goal setting, monitoring, evaluating and adapting remain valid across cultural boundaries, further supporting the generalizability of the Winne and Hadwin's (1998) model of SRL. This study also strengthens theoretical confidence in the RLQ as a tool for both research and practice. Contextually, this study provides a culturally and linguistically adapted tool and addresses the limitation that prior research on self-regulated learning among Chinese students has often relied on instruments developed for Western contexts. Nevertheless, future research is suggested to examine the applicability of the RLQ across different populations, such as secondary school students. Overall, this study provides an important foundation for advancing research and practice in the field of learning regulation in China.

Declaration

Ethics Approval

Ethics approval and consent to participate in the research study that underpins this publication including the procedures performed in studies, instruments and methodology used was provided by the UTM Research Ethic Committee of Universiti Teknologi Malaysia (Approval No.: UTMREC-2024-53).

Consent to Participate

Informed consent was obtained from all individual participants included in the study. To participate in the study, the students must read and fill in the consent form.

Consent to Publish
All participants signed informed consent regarding publishing their data.

Competing Interests
In the interest of full disclosure, the authors confirm that there are no potential conflicts of interest related to the research presented in this manuscript. None of the authors have financial or personal relationships with any individuals or organizations that could inappropriately influence or bias the outcomes of this study.

Authors' Contributions
Jieyi Chen: Conceptualization, Methodology, Formal Analysis, Investigation, Writing – Original Draft

Mohd Rustam Mohd Rameli: Supervision, Methodology, Writing – Review & Editing

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Availability of Data and Material
The datasets generated during and/or analysed during the current study are available from the authors on reasonable request.

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