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Development of a Learning Attitude Questionnaire for Middle School Students

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ABSTRACT

This study aims to explore secondary school students' learning attitudes and develop a scientific assessment questionnaire. First, through a systematic review of domestic and international literature on secondary school students' learning attitudes and interviews with 30 students, teachers, and parents, A four-dimensional model framework is proposed. Subsequently, item analysis and exploratory factor analysis were conducted using 497 secondary school students as valid participants, resulting in a retest questionnaire. Furthermore, reliability and validity tests were conducted on the retested questionnaire using a sample of 830 secondary school students, and 50 of these participants were selected for a retest to assess test-retest reliability two months later. Ultimately, a formal questionnaire comprising 20 items was developed, covering the four dimensions of positive affect, negative affect, cognitive characteristics, and behavioral effort. The results indicated that the overall Cronbach's α coefficient for the questionnaire was 0.902, with Cronbach's α coefficients for each dimension ranging from 0.709 to 0.836; the test-retest reliability was 0.819; confirmatory factor analysis results showed that χ^2/df = 2.95, GFI = 0.94, IFI = 0.98, NNFI = 0.98, CFI = 0.98, RMSEA = 0.051, all meeting psychometric standards. This questionnaire comprehensively assesses secondary school students' learning attitudes through multidimensional indicators of positive affect, negative affect, cognitive characteristics, and behavioral effort, thereby objectively reflecting their psychological characteristics regarding learning. This four-dimensional structure not only embodies the multifaceted nature

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ARTICLE INFO

Received: 28 March 2026 | Revised: 15 April 2026 | Accepted: 28 April 2026 | Published Online: 30 April 2026

DOI: https://doi.org/10.30564/jpr.v8i2.13367

CITATION

Cao, B., Liu, S., Yang, J., 2026. Development of a Learning Attitude Questionnaire for Middle School Students. Journal of Psychological Research. 8(2): 1–8. DOI: https://doi.org/10.30564/jpr.v8i2.13367

of learning attitude theory but also aligns with the practical need for precise assessment of secondary school students' learning competencies in the context of current basic education reform, providing an effective tool for the scientific evaluation of learning attitudes.

Keywords: Middle School Students; Attitude toward Learning; Questionnaire Design

1. Introduction

Just as no two leaves are exactly alike, each person's learning experience is unique. Existing research has shown a significant correlation between learning attitudes and academic achievement[1,2]. In other words, a student's academic performance is directly determined by the quality of their learning attitude[3]. A positive learning attitude helps students develop the right mindset for academic life and motivates them to acquire academic knowledge[4].

A learning attitude is defined as the enduring and stable psychological disposition that students exhibit when faced with academic tasks or specific learning situations[5]. This generally refers to a relatively stable psychological disposition regarding one's own learning, comprising affective,cognitive and behavioural components[6,7]. The cognitive component refers to the learner's perceptions and beliefs regarding learning activities. The affective component consists of the affective experiences that accompany these cognitions and is regarded as the core of the learning attitude. The behavioural component manifests as the learner's inclination to engage in learning behaviours and reflects the individual's readiness for learning activities. This behavioural tendency cannot be directly observed and must be inferred through external speech and actions[8]. Generally speaking, the three components of the learning attitude are consistent with one another. Modern cognitive psychology holds that learning is an interactive process between the learner and their environment. Currently, China is emphasising the cultivation of students' core competencies[9]. Accurately assessing secondary students' learning attitudes is crucial for implementing personalised instruction and promoting students' comprehensive and individualised development. At the same time, as social competition intensifies and the concept of lifelong learning becomes more widespread, society, schools and families are paying increasing attention to the learning psychology of secondary school students. The need for scientific assessment tools is therefore becoming increasingly urgent.

Although its importance is self-evident, there is an insufficient number of research tools available to measure students' attitudes towards learning, both domestically and internationally. Most existing standardised scales are general-purpose assessment tools for "general attitudes towards learning". The most frequently cited foreign studies are Attitudes Toward School and Learning (ATSL)[10] and a series of subject-specific attitude scales[11]. However, due to differences in cultural backgrounds and educational systems, while these foreign tests can serve as references, they cannot be adopted directly. In China, the Learning Adaptivity Scale (LAS) was originally developed by the Taiwanese scholar Chen Yinghao and his colleagues. It includes a learning attitude subscale suitable for students from the fourth to the ninth grade[12]. The overall reliability coefficient of the Learning Adaptivity Scale is 0.93. The scale comprises 60 items covering five dimensions:learning methods, learning habits, learning attitudes, the learning environment and physical and mental adaptation. There are 12 items under each dimension. The learning attitude subscale is designed to help participants clarify their attitudes towards learning and covers learning interest, classroom learning attitudes and perceptions of the school's teaching environment. These tools provide a crucial foundation for understanding the learning psychology of students in China.

In summary, while these scales offer a relatively targeted assessment of students' learning attitudes, there are several issues that warrant further exploration. Firstly, there is the question of their applicability across different age groups. Due to the three-dimensional structure of attitudes (affective, cognitive, and behavioural)[13], this study has established specific criteria for measuring learning attitudes. Middle school students are in their adolescence, who encounter an increasing number of challenges and negative affective events in their lives, experiencing greater affective fluctuations[14]. Therefore, in the evaluation system for middle school students' learning attitudes, it is necessary to categorize affective characteristics into positive and negative,

namely positive and negative affective experiences in learning; cognitive characteristics regarding textbook knowledge, namely recognition of the value of textbook knowledge; and behavioral characteristics in learning tendencies, namely self-discipline and level of effort. This comprehensive assessment examines the overall level of positivity for learning lessons among secondary school students across these four dimensions. Secondly, the structure and content of classical scales urgently need to be updated. Many widely used scale items and dimensions fail to adequately reflect the learning patterns in the current educational reform context oriented toward core competencies, exhibiting a certain lag with the times. Therefore, the aim of this study is to develop a practical questionnaire based on the current educational context and guided by scientific measurement theory. The questionnaire is designed to address the specific needs of theoretical research in secondary school educational psychology and the diverse requirements of secondary school students, teachers and parents. This will contribute to the development and improvement of psychological assessment tools for learning in China.

2. Materials and Methods

2.1. Subject

In this study, a total of students from grades 7 to 12 in over 30 middle schools in Beijing were selected as research participants. Sampling took into account a balanced distribution across central urban and remote suburban areas, key and non-key schools, and key and non-key classes.

In the initial testing phase, 540 students were stratified and randomly selected from middle and high school students as research participants. After excluding questionnaires with invalid responses, 497 valid questionnaires were obtained. Among them, there were 238 male students and 259 female students; 201 junior high school students and 296 senior high school students.

In the retesting phase, a total of 830 students were assessed, including 415 male and 415 female students.

2.2. Theoretical Modeling

This study adopts Zheng Richang's "Whole-Person Education Model" as its overarching theoretical framework. According to Zheng Richang, student learning outcomes depend on three key factors: "whether one can learn", "whether one loves to learn", and "whether one knows how to learn". The latter refers to learning attitude, encompassing aspects such as learning interest, concentration, and willingness to exert effort[15]. This perspective provides direct theoretical support and overarching guidance for this study.

The learning model proposed by information processing theory posits that the process of every specific and complete learning activity undertaken by a student can be divided into eight stages: motivation, comprehension, acquisition, retention, recall, generalization, application, and feedback[16]. Wan Xingchen noted that during the "motivation" stage, it is possible to establish proper learning motivation, clarify learning objectives, and cultivate a positive learning attitude in students[17].

Under the overarching framework of the "Whole-Person Education Model" and drawing on information processing theory, this study measured the general learning attitudes of secondary school students and preliminarily constructed a model of learning attitudes comprising four dimensions: positive affect, negative affect, cognitive characteristics, and behavioral effort.

2.3. Development of the Formal Questionnaire

This study was conducted in two phases: an initial test and a subsequent retest. The test items were screened and revised based on the results of the data analysis to ultimately produce the final questionnaire.

Preliminary test: The initial questionnaire consisted of 60 items, and a total of 497 valid responses were collected. Items were rated from 1 to 5 (1 = strongly disagree, 5 = strongly agree). Item screening and exploratory factor analysis were conducted on the preliminary test data. First, items were deleted or revised based on response patterns; missing values in student responses, as well as the proportion of students selecting the "I don't understand the question" option, were examined. If 2% or more of participants either did not answer a question or selected "I don't understand the question", the item was considered for deletion or revision to eliminate ambiguity. Secondly, items were modified based on their correlation with the criterion. Students' final grades in Chinese, mathematics and English were used as the criterion, and the correlation between each item and these three subject

scores was calculated. Items with statistically insignificant correlations to academic performance were deleted. Simultaneously, the correlation between each item and the total score of its assigned sub-dimensions was calculated, and items with insignificant correlations and low discriminative power were removed. Among alternative items with similar content, those with relatively lower correlations to the total score were also eliminated. Finally, exploratory factor analysis (EFA) was conducted to remove items with low or cross-factor loadings. After these adjustments, 20 items were retained to form a four-factor structure.

Retesting phase: The aim of this phase was to finalise and validate the questionnaire on secondary school pupils' learning attitudes. Based on the results of the pilot study, 20 items were selected for incorporation into the questionnaire, which was scored on a scale of 1 to 5. Reliability and validity analyses were conducted on the data. The questionnaire demonstrated good reliability and validity, resulting in a final official questionnaire comprising 20 items. The questionnaire is divided into four dimensions: positive affect, negative affect, cognitive characteristics and behavioural effort.

3. Results

3.1. Discrimination Analysis

To further assess the quality of each item, the correlation coefficients between each item and the total score of its respective dimension were calculated; the results are shown in **Table 1**. The absolute values of the correlation coefficients for all items with their respective dimension totals are above 0.662, with the highest reaching 0.808. This indicates that every item in the questionnaire effectively distinguishes differences among students of varying levels on their corresponding attitude dimensions, demonstrating excellent discrimination.

Table 1. Item-Dimension Correlation Analysis of Learning Attitude Sub-dimensions.

Positive Affect		Negative Affect		Cognitive Characteristics		Behavioural Effort	
Item	***r***	**Item**	***r***	**Item**	***r***	**Item**	***r***
5	0.704	18	−0.784	3	−0.808	12	−0.754
1	0.700	14	−0.756	11	0.752	16	−0.713
17	0.761	6	−0.738	7	−0.757	8	−0.725
13	0.746	10	−0.722	15	−0.752	4	−0.734
19	0.743	20	−0.752				
9	0.662	2	−0.700				

3.2. Reliability Analysis

In the retesting phase,the questionnaire was divided into two halves based on item content and structural equivalence, and the split-half reliability was calculated to be 0.865. After correction using the Spearman-Brown prophecy formula, the split-half reliability of the questionnaire was 0.928. These results indicate that the two halves of the questionnaire measure highly consistent content.

Fifty participants were randomly selected from the initial test group and administered the questionnaire a second time two months later. The correlation coefficient between the total scores of the two tests was calculated to be 0.819. This result indicates that the questionnaire demonstrates good stability across different time points, meeting the measurement requirements for attitudes as a relatively stable psychological trait.

Meanwhile, this study used Cronbach's α to assess the reliability of the questionnaire. The results are presented in **Table 2**, which shows that the Cronbach's α coefficients for the four dimensions were 0.813, 0.836, 0.766, 0.709. The Cronbach's α coefficient for the total questionnaire was 0.902. All reliability coefficients met psychometric standards, indicating good homogeneity among the items within each dimension and within the total questionnaire, and suggesting that the measurement results are reliable.

Table 2. Internal Consistency Analysis for Learning Attitude Sub-dimensions.

Positive Affect	Negative Affect	Cognitive Characteristics	Behavioural Effort	Learning Attitude Total Score
0.813	0.836	0.766	0.709	0.902

3.3. Structural Validity Analysis

During the preliminary testing phase, exploratory factor analysis was conducted on all items to identify the underlying structure of the questionnaire data. Prior to the analysis, suitability tests were performed; the KMO value was 0.90 ($p < 0.01$), indicating that the data were suitable for factor analysis. Principal component analysis was used to extract factors, and the method of maximum variance was applied to select factors with eigenvalues greater than 1, while factor loadings less than 0.3 were omitted. The analysis yielded four factors, which cumulatively explained 54% of the total variance. The loadings of each item on the four factors are shown in **Table 3**.

Table 3. Exploratory Factor Analysis Loadings of Learning Attitude for Each Item.

Item	Loadings on Each Factor			
	Positive Affect	Negative Affect	Cognitive Characteristics	Behavioural Effort
V34	0.784			
V58	0.772			
V26	0.664			
V56	0.589			
V51	0.579			
V15	0.533			
V60		0.729		
V37		0.703		
V53		0.696		
V46		0.692		
V39		0.671		
V1		0.639		
V28			0.742	
V42			0.694	
V48			0.689	
V31			0.676	
V12				0.760
V43				0.631
V29				0.454
V59				0.401

The results of the exploratory factor analysis indicated that the items in the preliminary questionnaire clustered into four factors, a structure that largely aligned with the dimensional framework proposed at the outset of the study based on theoretical constructs. This provided preliminary validation that secondary school students' learning attitudes may encompass multiple dimensions, including affective,cognitive, and behavioural. Based on the analysis results, 20 items with clear loadings on the aforementioned four factors were retained to form the questionnaire for subsequent formal testing.

Subsequently, a fit analysis was conducted for the four-factor structural model (positive affect, negative affect, cognitive characteristics, and behavioral effort). The overall model fit indices are presented in **Table 4**. All key fit indices (χ^2/df = 2.95, GFI = 0.94, IFI = 0.98, NNFI = 0.98, CFI = 0.98, RMSEA = 0.051) met the psychometric criteria for good model fit. This indicates a high degree of consistency between the observed data and the proposed four-factor model, suggesting that the questionnaire possesses ideal construct validity.

Table 4. Overall Fit Indices of the Confirmatory Factor Analysis Model for the Questionnaire on Middle School Students' Attitudes toward Learning.

χ^2/df	GFI	IFI	NNFI	CFI	RMSEA
2.95	0.94	0.98	0.98	0.98	0.051

Note: GFI stands for goodness-of-fit index; IFI stands for Incremental Fit Index; NNFI stands for Non-Normed Fit Index; CFI stands for Comparative Fit Index; RMSEA stands for Root Mean Square Error of Approximation.

Further examination of the relationships between the observed variables (items) and latent variables (factors) in the model reveals that the fully standardized loadings for all 20 items range from 0.56 to 0.73, indicating that each item effectively reflects its respective latent construct. The model path diagram also clearly illustrates the composition

of the four factors (positive affect, negative affect, cognitive characteristics, and behavioral effort),further corroborating the validity of the questionnaire's structure.

3.4. Criterion-Related Validity Analysis

To examine the external validity of the questionnaire, a correlation analysis was conducted between the total learning attitude score and students' final grades in Chinese, mathematics, and English. The results, as shown in **Table 5**, the total learning attitude score is significantly positively correlated with grades in Chinese, mathematics, and English. This result aligns with theoretical expectations, namely that a positive learning attitude is associated with better academic performance, thereby providing strong evidence of criterion-related validity for the questionnaire.

Table 5. Correlation Analysis between Attitude toward Learning Scores and Grades in Three Subjects.

Subjects	Chinese	Mathematics	English
Total score of learning attitude	0.270**	0.447**	0.328**

Note: $^{**}p < 0.01$.

4. Discussion

Learning attitude is a psychological factor that, while not directly participating in any specific activity, plays a significant and indispensable role in all activities. This factor has lifelong implications for students and directly determines their future development[5]. Existing research indicates that an individual's subjective learning attitude is a key factor influencing students' learning autonomy[18,19]. With the promulgation of the Compulsory Education Curriculum Guidelines (2022 Edition), "learning to learn" has been explicitly listed as one of the key competencies students should possess[20]. The completion of this questionnaire provides schools with a practical tool for implementing "formative assessment" and "value-added assessment". Through regular administration of the questionnaire, educators can dynamically track changes in students' learning interests, study habits, and academic anxiety, thereby effectively fostering the development of core competencies. Based on the theoretical framework of the "Whole-Person Education Model," this study systematically developed a questionnaire on secondary students' learning attitudes. The questionnaire comprises four dimensions: positive affect, negative affect, cognitive characteristics, and behavioral effort. Data analysis indicates that the questionnaire possesses good reliability and validity, meeting psychometric standards. Reliability and validity tests show that the internal consistency coefficient for the total scale is 0.902, while coefficients for each sub-dimension range from 0.709 to 0.836, all within acceptable ranges. The results of confirmatory factor analysis strongly support the pre-specified four-factor model, indicating that this structure fits the actual data well. Furthermore, the significant positive correlation between the total questionnaire score and scores in the three subjects—Chinese mathematics and English—provides strong evidence of criterion-related validity for the questionnaire.

5. Conclusions

This study measured secondary school students' attitudes toward learning across four dimensions: positive effect, negative effect, cognitive characteristics, and behavioral effort. The questionnaire features a clear structure, high reliability and validity, and good item discrimination. It provides secondary school educators, researchers, and parents with an objective and scientific assessment tool and holds significant practical value for fostering positive learning attitudes and enhancing learning abilities among secondary school students. Although this study considered a balance of school districts and types within Beijing and is thus representative to a certain extent, significant regional differences exist in China. The learning environments and psychological characteristics of students may vary across different regions; therefore, future research should conduct validation studies in a broader range of regions.

Author Contributions

Conceptualization, S.L. and J.Y.; methodology, B.C. and S.L.; validation, B.C., J.Y. and S.L.; formal analysis, B.C. and J.Y.; investigation, B.C. and S.L.; data curation,

B.C., S.L. and J.Y.; writing—original draft preparation, B.C., S.L. and J.Y.; writing—review and editing, J.Y. and S.L.; supervision, J.Y. and S.L. All authors have read and agreed to the published version of the manuscript.

Funding

The authors declare that financial support was received for the research of this article. This study was sponsored by the Smart Psychology Education Committee of the China Association for Educational Technology, "Research on the graded management model and effectiveness of student mental health based on psychological assessment results" (ZHXLKY2025010).

Institutional Review Board Statement

Ethical review and approval were waived for this study due to the exclusive use of anonymized, non-identifiable human data, no intervention or interaction with participants, no collection of sensitive personal information or involvement of commercial interests, and no foreseeable risk of physical or psychological harm.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

For access to the data of this study, please contact the corresponding author with a reasonable request.

Acknowledgments

The first author is very grateful to her sincere gratitude to her two graduate supervisors for their support. They provided guidance on the direction of the study and helped with the initial data analysis.

Conflicts of Interest

The authors declare no conflict of interest.

AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the preparation of this manuscript.

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