



Youlin, C., Razali, F. and Kamarudin, N. (2026). Dual Mediation Model of Geography Learning Engagement Evidence from Chinese High Schools. *Revista Perspectiva Empresarial*, 13(1-1), x-x.

Dual Mediation Model of Geography Learning Engagement Evidence from Chinese High Schools

CHU YOU LIN*

FAZILAH RAZALI**

NURZATULSHIMA KAMARUDIN***

ABSTRACT

Student engagement is one of the most accepted constructs that determine academic success and learning over the long term. **Objective.** To design a dual-mediation model to investigate the relationship between learning motivation, learning styles, and the ability to solve problems and the engagement in geography learning among high school students in Shandong Province, China. **Methodology.** The proposed model exhibited a high level of theoretical consistency and empirical validation with the help of validated instruments and Structural Equation Modeling. Self-efficacy and critical thinking turned out to be the most significant direct predictors of engagement, and

* Universiti Putra Malaysia, Seri Kembangan, Malaysia. Email: chuyoulin65@gmail.com. ORCID: <https://orcid.org/0009-0002-0261-2943>.

** Universiti Putra Malaysia, Seri Kembangan, Malaysia. Email: fazilahrazali@upm.edu.my. ORCID: <https://orcid.org/0000-0002-1203-1010>.

*** Universiti Putra Malaysia, Seri Kembangan, Malaysia. Email: nzshima@upm.edu.my. ORCID: <https://orcid.org/0000-0002-2496-5275>.



learning motivation, learning styles, and problem-solving ability also played significant direct roles. **Results.** Bootstrap analyses also revealed that both critical thinking and self-efficacy were substantive mediators, which means that these cognitive and psychological functions are central in transforming learner characteristics into engagement. The analysis performed in the multi-group analysis found that urban and rural students differ significantly, a number of the structural relationships indicated stronger associations in urban students. **Conclusion.** Despite being based on cross-sectional evidence, the results contribute to understanding the theoretical mechanisms of participation in the exam-based educational environment, hence have practical implications for learning geography and promoting educational equity.

KEY WORDS: Student engagement, Geography education, Self-efficacy, Critical thinking, Structural Equation Modeling, Mediation analysis.

Introduction

The phenomenon of student engagement has become one of the constructs in the modern educational research and has been noted to have significant impacts on academic success, persistence, and the disposition of lifelong learning (Fredricks, Blumenfeld, and Paris, 2004). This multidimensional construct, which consists of behavioral, emotional, and cognitive aspects, has gained paramount importance with educators all over the world trying to improve the learning outcomes and equip students to deal with complex and interconnected problems of the globalizing world (Reschly and Christenson, 2012). In addition to this, recent studies have also highlighted the fact that student engagement is a dynamic process which can be nurtured by specific educational programs and conducive learning conditions (Wang and Holcombe, 2010).

Geography as a subject of study holds a special status in secondary education as both a transitional science between natural and social sciences and the development of spatial literacy, environmental consciousness, and critical citizenship. Geographic knowledge and skills are more needed than ever in a time when climate change, resource scarcity, and geopolitical tensions are the order of the day (Bednarz, Heffron,



and Huynh, 2013). The importance of creating geographical thinking, which is the skill of analyzing spatial patterns, grasping human-environment relationships and using geographical concepts to solve real world problems, is becoming increasingly popular in contemporary geography education (National Academies Press, 2006). Nevertheless, regardless of its importance, there are great challenges in meaningful education of students in geography especially in the environment where the educational system focuses on performance in examinations rather than meaningful learning.

The Chinese learning environment is the one that makes the study of student engagement in geography of particular interest. The education system in China is deeply influenced by a high-stakes examination known as the Gaokao (National College Entrance Examination), which has had inordinately large impacts on the curriculum, instruction and assessment during secondary education (Zhao, 2014). The Province of Shandong that is especially competitive in its academic setting and has strict standards is an example of such problems and provides a large sample of Chinese students. It is against this backdrop that the subject of geography has a unique role of being compulsory at the arts-track and science-track levels, but classroom instruction also often prioritizes memorizing the material above reasoning about space and critically analyzing it, which are the main characteristics of geographical thinking.

Research Gap and Significance

Although research has been conducted widely on student engagement in different educational settings, there are considerable gaps in the research about engagement in geography education, especially in non-Western settings. Although research has been conducted on general factors that influence engagement and studies conducted on self-efficacy and motivation in STEM subjects (Schunk and DiBenedetto, 2016), there is still a paucity of studies that examine domain specific factors that influence engagement in geography in the Chinese educational environment. The recent meta-analyses have indicated that subject-specific engagement studies are required where the disciplinary features and cultural backgrounds are taken into consideration (Lei, Cui, and Zhou, 2018).

Furthermore, previous studies have tended to consider aspects of engagement affecting engagement by considering factors in the form of a simple direct-effect, and little is known concerning the complex psychological processes in which various learner properties interact to generate engagement. What has been especially under-investigated is the mediating role of critical thinking and self-efficacy in converting foundational factors to actual engagement, which is a major gap considering that the two constructs are flexible psychological variables that may be an effective leveraging point when used in educational intervention (Zimmerman, 2000). The modern view of engagement research has been shifting towards the need to comprehend the processes in between to come up with theoretically-based and practically-tested interventions (Reeve and Tseng, 2011).

Purpose and Research Questions

The objective of this research was to design and confirm a complete predictive model of student engagement in geography among the high school pupils in Shandong Province, China. The hypothesis of the model was that learning motivation, learning styles, and problem-solving ability had a direct and indirect impact on engagement, and critical thinking and self-efficacy would play a pivotal role as the mediators. Namely, five research questions were covered:

RQ1: What are the relationships between learning motivation, learning styles, problem-solving ability, critical thinking, self-efficacy, and student engagement in geography among high school students in Shandong Province, China?

RQ2: How do learning motivation, learning styles, problem-solving ability, critical thinking, and self-efficacy directly influence student engagement in geography?

RQ3: Does critical thinking mediate the relationships between learning motivation, learning styles, problem-solving ability, and student engagement in geography?

RQ4: Does self-efficacy mediate the relationships between learning motivation, learning styles, problem-solving ability, and student engagement in geography?

RQ5: What are the model fit indices of the proposed structural model of student engagement in geography?

Literature Review



Conceptual Framework of Student Engagement

The concept of student engagement as an educational research construct has become multidimensional as opposed to a single-dimensional concept (Lien, 2024). The three dimensional model by Fredricks and colleagues (2004) has taken the centre stage in the field as it describes engagement as a combination of behavioral engagement (participation in learning activities), emotional engagement (affective responses to school and learning), and cognitive engagement (psychological effort and use of learning strategies). Substantial empirical research has been used to support this framework (Appleton, Christenson, and Furlong, 2008; Skinner and Pitzer, 2012).

The conceptualization of engagement in geography has to take into account the nature of the discipline in geography education. Learning geography presupposes spatial thinking, analysis at several levels, and synthetic comprehension; it is necessary to engage students in classroom activities as well as to improve certain mental abilities and emotional relationships (Bednarz et al., 2013). Nonetheless, the current studies have been mainly concerned with general learning engagement and little has been done on geography specific engagement, especially in non-Western educational settings.

Learning Motivation and Engagement

The Self-Determination Theory (SDT) offers a valuable theoretical background to the explanation of the correlation between motivation and engagement (Ryan and Deci, 2000). The theory differentiates between intrinsic motivation (loving and enjoying what is done) and extrinsic motivation (external rewards or pressure). It has always been shown that intrinsic motivation correlates with an increased degree of learning engagement, in-depth learning strategies, and academic success (Ryan and Deci, 2017).

A motivation pattern in Chinese educational setup is characterized in a special way. Since the Gaokao prevails, extrinsic motivation can assume a significant role in the learning process of students (Zhao, 2014). Studies indicate that Chinese students tend to have a multifaceted combination of both intrinsic and extrinsic motivation unlike the intrinsic motivation-based tendencies usually seen in the Western environment (Zhou,



Ma, and Deci, 2009). Nevertheless, there is limited research on the specific ways that the motivational patterns have an effect on engagement in geography learning.

Learning Styles and Engagement

Learning styles are ways in which people would like to process and organize information when learning. The Experiential Learning Theory developed by Kolb (1984) has four types of learning styles, i.e. diverging, assimilating, converging, and accommodating. Even though the idea of learning style is a debatable one (Pashler, McDaniel, Rohrer, and Bjork, 2008), studies indicate that in cases where the learning styles of the students are aligned with the way they are taught, the learning process and its productivity might increase (Cassidy, 2004).

There are various learning activities taught in geography, including reading maps, field work, and case analysis and spatial modeling that allow students with different learning styles to participate (Heffron, 2012). But in the examination-oriented education system the study of geography is frequently restricted to lectures and memory, which may not be effective in satisfying other students who have other learning styles and therefore influence their levels of engagement.

Problem-Solving Ability and Engagement

The development of problem-solving skill is amongst the central goals of geography education. The study of geography is also inherent in the analysis of spatial issues, the relationships between humans and their environment, and the creation of solutions (National Academies Press, 2006). Competent students demonstrate better problem solving skills, thus increasing competence and achievement in geography learning hence increasing engagement (Jonassen, 2000).

Studies have been able to show that the ability to solve problems is positively related to academic engagement (Mayer & Wittrock, 2006). Problem-based learning methods have been found effective in improving student engagement and students' learning in geography education. The majority of these studies have however been done in the west. How problem solving skill affects geography learning involvement in the examination based education system of China needs more research.



The Mediating Role of Critical Thinking

Critical thinking is the skill to examine, evaluate and integrate information to make sensible conclusions (Facione, 1990). Critical thinking is especially relevant when learning geography, as students should be able to evaluate the credibility of geographical data, evaluate several ideas, and draw evidence-based conclusions (Chang and Pascua, 2016).

Critical thinking is regarded as a valuable mediating variable between learning engagement and academic achievement (Phan, 2010). Students who possess high critical thinking skills find it easier to process learning material in a deeper way as well as ask meaningful questions and maintain engagement in learning (Ku and Ho, 2010). Nevertheless, a limited number of studies have been conducted on the mediation effect of critical thinking in relationships between learning motivation, learning styles, problem-solving capacity, and engagement, especially with reference to geography education.

The Mediating Role of Self-Efficacy

Self-efficacy is a concept that defines the beliefs of people in regard to their capacity to accomplish certain tasks (Bandura, 1997). The Social Cognitive Theory places emphasis on the fact that self-efficacy is the core factor in the learning process; students who have high self-efficacy have a higher tendency to set ambitious targets, continue working, and overcome failures (Schunk and DiBenedetto, 2016).

Self-efficacy is a related aspect of learning engagement and achievement in geography education. Studies indicate that self-efficacy in geography is determined by the previous successes, vicarious experiences, verbal persuasion, physiological and emotional conditions (Bandura, 1997). It is thought that the relationship between different learner traits and engagement is mediated by self-efficacy (Zimmerman, 2000), although systematic empirical investigation is yet to be undertaken in the context of geography education.

Urban-Rural Differences

The urban-rural education gap in China is a significant problem in the educational equity studies. There exists a big difference between the quality of teachers, educational resources, and family support for education in urban and rural schools



(Liu, 2013). Studies indicate that urban pupils tend to perform better than rural pupils in terms of academic success, learning drive as well as self-efficacy (Hannum and Park, 2007).

Nonetheless, little is known about the impact of urban-rural disparities on geography learning engagement and relationships among its predictors. The realization of these disparities is important for developing the right educational policies and intervention strategies to facilitate educational equity and reduce urban-rural disparity.

Theoretical Framework

This research incorporated four theoretical frameworks that are complementary to each other in order to develop a full predictive model of geography learning engagement.

Self-Efficacy Theory

Self-Efficacy Theory proposed by Bandura (1997) is one of the central theoretical premises of this research. The theory suggests that the beliefs that people have regarding their capabilities affect how many goals they choose to achieve, the level of effort and perseverance they show in the face of challenges. There are four pillars of self-efficacy, which are mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states.

Self-efficacy conceptualization in this research paper is one of the main psychological processes that transforms the features of learners (motivation, learning styles, problem-solving ability) into real learning activities. Students with high geography self-efficacy will be more inclined to engaging in active geography learning tasks, addressing learning challenges, and maintaining engagement.

Social Cognitive Theory

Social Cognitive Theory (Bandura, 1986) stresses the deterministic two-way interaction among person and behavior and environment. The triadic reciprocal determinism of the theory offers a systematic view of comprehending the engagement in learning: personal (motivation, self-efficacy), behavioral (engagement), and



environmental (teaching methods, school resources) can be mutually affected by one another.

This paper follows the perspective of Social Cognitive Theory that learning engagement is a product of interaction between the individual factors and the environment. Problem-solving ability, learning motivation, and learning styles are individual factors that affect engagement behavior by having an impact on cognitive processes (critical thinking) and beliefs (self-efficacy).

Self-Determination Theory

The Self-Determination Theory by Ryan and Deci (2000) offers a subtle theory on learning motivation. According to the theory, motivation and its various forms and characteristics, including amotivation, extrinsic motivation, and intrinsic motivation, are distinguished by the theory, and the theory suggests that autonomy, competence, and relatedness are primary psychological needs that support intrinsic motivation and the process of internalization.

Learning motivation is considered to be a significant antecedent variable that affects engagement in this study. The Self-Determination Theory can be used to explain why high-quality motivation (especially intrinsic motivation) is more likely to ensure deep engagement and lifelong learning. There is also the theory that helps in thinking about how extrinsic motivation works in the Chinese examination-oriented educational situation.

Experiential Learning Theory

Experience in transforming experience into knowledge is highlighted by the Experiential Learning Theory developed by Kolb (2014). The theory suggests that the learning cycle has four processes, which are concrete experience, reflection and observation, abstract conceptualization and active experimentation. Learners have varied preferences for different stages and this creates various learner styles of learning.

Field work, map analysis and case studies are especially appropriate in geography education as they are experiential in nature. This paper will use Experiential Learning Theory, which embraces styles of learning in the study as students with learning styles vary in developing engagement in various ways.



Theoretical Integration and Research Model

These four theoretical frameworks should be integrated together. All of these theories apply to different sides of the engagement process: Self-Determination Theory describes the motivational forces that trigger the learning process; Experiential Learning Theory explains individual differences in the processing of information; Social Cognitive Theory offers the general framework of understanding the relationship between the personal, behavioral, and environmental factors; and Self-Efficacy Theory specifies the system of beliefs that governs effort and persistence. A combination of the theories gives a very good overview of the multi-layered nature of student interest in geography.

This paper combined the theories mentioned above to come up with the following theoretical model:

Antecedent Variable Layer: the layer of learning motivation (which is grounded on Self-Determination Theory), learning styles (grounded on Experiential Learning Theory), and problem-solving ability (grounded on Social Cognitive Theory) are antecedent characteristics of the learner.

Mediating Variable Layer: based on the Social Cognitive Theory and Self-Efficacy Theory, Mediating Variables, which are critical thinking (cognitive processing mechanism) and self-efficacy (belief system), convert the learner characteristics to actual engagement.

Outcome Variable Layer: Geography learning involvement, which will cover behavioral, emotional, and cognitive aspects.

The model hypothesizes: The model hypothesizes that (1) The antecedent variables have a direct impact on the engagement in learning. (2) The antecedent variables have an indirect effect on engagement via critical thinking and self-efficacy. (3) Engagement is directly dependent on critical thinking and self-efficacy. (4) Both critical thinking and self-efficacy also have an interrelationship but act as parallel mediators.

Methodology

Research Design



The design of the research adopted in this study was a quantitative correlational research design based on Structural Equation Modeling (SEM) to analyze the relationship between variables in the proposed model. The cross-sectional design was employed in which data were gathered at one time point in the 2024-2025 academic year. The choice of the analytical tool was SEM since it can analyze direct and indirect relations between two or more variables and characterize the goodness of measurement and structural models (Kline, 2015).

Participants

High School students of the Shandong Province, Grade 10, were the participants. The selection of Grade 10 students was done on the following considerations: (1) students who had completed the junior high school level of geography learning, and possessed some basic understanding of geography learning; (2) this grade level was chosen due to the large population of students who could be easily recruited as a sample; (3) students were not under direct pressure due to track selection in Grade 11 or due to Gaokao in Grade 12, as this provided a more objective measurement of geography learning status.

The stratified random sample was used so as to provide coverage in both urban and rural schools. The stratification of high schools in Province of Shandong based on the urban-rural location was as follows: four schools in each stratum were picked randomly (four urban, four rural); then, 2-3 Grade 10 classes were picked at random in each school.

The rules of thumb that are generally followed for Structural Equation Modeling are that a satisfactory sample size is 5-10 times the number of free parameters in the model (Kline, 2023). The current structural model had some 60 free parameters, implying a recommended sample size of 300- 600 participants. The last valid sample of 487 students is within this range, giving adequate power to estimate models and estimate multi-group analysis.

The sample size of 487 was sufficient and gave sufficient statistical power (>0.80) to identify medium effect sizes ($f^2 = 0.30$ or more) at the 0.05 level. This was also an adequate sample size based on the minimum requirement of 200 cases when comparing two or more groups (Kline, 2023).



Five hundred questionnaires were sent and 487 valid questionnaires were sent back, give a valid response rate of 97.4%. The number of questionnaires was reduced to thirteen because of large amounts of missing data (>20%), or apparent response bias (i.e. choosing the same option across the questionnaire). Table 1 shows some sample demographic characteristics.

Table 1 Demographic Characteristics of Participants (N = 487)

Characteristic	Category	n / %
Gender	Male	241 / 49.5
	Female	246 / 50.5
School Location	Urban	258 / 53.0
	Rural	229 / 47.0
Age	15 years	87 / 17.9
	16 years	352 / 72.3
	17 years	48 / 9.8
Parental Education	University or above	156 / 32.0
	High school	213 / 43.7
	Middle school or below	118 / 24.2

The sample was balanced in terms of gender and had a proportion of urban and rural of around 1:1, which fulfilled the research design criteria. The age was mostly concentrated at age 16 (72.3%), which coincides with the age distribution of students in Grade 10. The grades in geography followed a normal distribution where most of the students were at the intermediate level.

Research Instruments

This paper used six tools of measurement, which were based on 5-point Likert scales (1 = strongly disagree, 5 = strongly agree). Each of the instruments has been subjected



to the translation-back-translation process and has been pilot tested to confirm that it can be used in the Chinese context.

Geography Learning Engagement Scale

Based on the Student Engagement Scale of Fredricks et al. (2004), adjusted to the geography subject, the tool had 18 items that assessed three dimensions. The assessment of behavioral, emotional, and cognitive engagement consisted of 6 items (e.g., I actively participate in discussions in geography classes, I feel excited about learning geography, and I attempt to relate knowledge gained in geography to real life). Overall Cronbach' s alpha was found to be 0.90 in pilot testing with subscales 0.85-0.88.

Learning Motivation Scale

According to the Self-Determination Theory (Ryan and Deci, 2000), there was a simplified version of the Academic Motivation Scale, which consisted of 14 items that reflected two dimensions. Intrinsic motivation was evaluated using 7 questions (e.g., I study geography because I find it interesting) and extrinsic motivation was evaluated using 7 questions (e.g., I study geography because of the Gaokao). Pilot testing showed $\alpha = 0.87$, subscale $\alpha = 0.84$ and 0.82.

Learning Styles Scale

Based on Kolb's (2014) Learning Style Inventory, the inventory included 12 questions that measured the learning preference of students in the study of geography, this study includes four aspects, namely concrete experience, reflective observation, abstract conceptualization, and active experimentation. Pilot testing showed $\alpha = 0.81$.

Problem-Solving Ability Scale

This study added a revised form of a Problem-Solving Inventory created by Heppner and Petersen (1982), which has 10 questions that measure problem-solving skills in students with regard to geography, e.g., I am able to think systematically when I encounter geography issues. Pilot testing showed $\alpha = 0.84$.

Critical Thinking Scale



This study took up the Chinese simplified version of the California Critical Thinking Disposition Inventory (CCTDI) (Peng et al., 2004), a 15-item scale to assess critical thinking dispositions such as analysis, reasoning, and evaluation. Pilot testing showed $\alpha = 0.86$.

Geography Self-Efficacy Scale

Based on Bandura's (1997) Self-Efficacy Theory, this study developed a geography subject-specific self-efficacy scale containing 12 items, e.g., "I believe I can learn geography well," "I can solve complex geography problems." Pilot testing showed $\alpha = 0.88$.

Data Collection Procedures

Ethical collection of data was conducted. The university ethics board approved the study and a letter of permission was obtained by the researcher through the education bureau and the school administrations. The students and parents signed the informed consent forms that outlined the purpose of the research, the procedures, their rights, and confidentiality of data. There was no need to gather personally identifiable information; thus, anonymity was guaranteed and it was made clear that participation was fully voluntary and could be canceled at any moment.

Data collection was conducted during October-November 2024, and it was administered as a group activity during the class periods by researchers and research assistants who had been trained. Pre-administration instructions were standardized and considered as having no correct or incorrect answers and to promote sincere answers. The time of questionnaire completion was about 25 minutes.

Data Analysis

Data analysis was conducted using SPSS 26.0 and Mplus 8.3 software, including the following steps:

Preliminary Analysis

Early examination involved data cleaning and handling of missing data through the EM algorithm, with the missing rate maintained at less than 5%. The descriptive statistics were calculated and the values of standard deviations, skewness, and



kurtosis were obtained. To determine reliability, Cronbach α coefficient was used, and Pearson correlation coefficient was used to find the relations between variables. The independent samples t-tests were also conducted to compare the urban and rural students.

Confirmatory Factor Analysis (CFA)

Each of the measurement instruments was subjected to confirmatory factor analysis (CFA) to determine factor structure validity. Such indices of evaluation as the χ^2/df ratio (values lower than 3 indicate good fit), the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) values (values greater than 0.95 indicate excellent fit), the root mean square error of approximation (RMSEA) values (values less than 0.06 indicate good fit), and the Standardized root mean square Residual (SRMR) values (values less than 0.08 indicate good fit) were used.

Structural Equation Modeling (SEM)

Maximum Likelihood (ML) estimation with robust standard errors (MLR) was used to take care of the possibility of non-normality in data was used in Structural Equation Modeling (SEM). The identification of the model was conducted by confirming that the model had enough degrees of freedom and that the covariance matrix was positive definite. The analysis involved the estimation of the measurement model, hypothesis testing, and mediation analysis of the hypothesized structural paths by the Bootstrap method (5,000 resamples), with 95 percent confidence intervals that have no zero values, implying significant indirect effects.

Multi-Group Analysis

This study compared differences in structural paths of urban and rural students, using chi-square difference tests ($\Delta\chi^2$) comparing constrained and unconstrained models.

Results

Preliminary Analyses

Descriptive Statistics and Reliability

Table 2 is a description of all study variables. All scales were found to be highly internally consistent and reliable (Cronbach' s alpha 0.82 through 0.91, all above 0.70). According to means, students were reported to have moderate to moderately high levels of all the variables. It is also worth noting that the level of extrinsic

motivation ($M = 3.76$) was much higher than that of intrinsic motivation ($M = 3.48$), $t(486) = 8.14$, $d = 0.37$. This resembled the exam-based academic setting.

Table 2 Descriptive Statistics and Reliability of Study Variables ($N = 487$)

Variable	M	SD	Skewness	Kurtosis	α	Items
Learning Motivation	3.62	0.71	-0.18	-0.35	0.88	14
Learning Styles	3.41	0.68	-0.12	-0.31	0.82	12
Problem-Solving Ability	3.54	0.76	-0.19	-0.38	0.85	10
Critical Thinking	3.47	0.79	-0.16	-0.44	0.87	15
Self-Efficacy	3.59	0.82	-0.22	-0.36	0.89	12
Student Engagement	3.56	0.77	-0.20	-0.39	0.91	18

Note. All variables measured on 5-point Likert scales (1-5). Skewness and kurtosis values within acceptable ranges (± 1.0), indicating approximately normal distributions.

Confirmatory Factor Analysis

Each measurement instrument underwent CFA in order to check its factor structure. Table 3 shows the fit indices of all the measurement models. Measurement models were also found to fit very well, which indicated the validity of the factor structures. Factor loadings were found to be between 0.62 and 0.89, all significant ($p < 0.001$), which means that items have good relationships with their respective latent constructs.

Table 3 Confirmatory Factor Analysis Fit Indices for Measurement Models

Scale	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Geography Self-Efficacy	78.34	51	1.54	0.97	0.96	0.033	0.038
Student Engagement (3-factor)	142.56	132	1.08	0.99	0.99	0.014	0.031
Critical Thinking	124.67	87	1.43	0.97	0.96	0.030	0.035
Problem-Solving Ability	52.18	34	1.53	0.98	0.97	0.033	0.032



Scale	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Learning Motivation (2-factor)	89.45	76	1.18	0.99	0.98	0.020	0.029
Learning Styles	67.23	48	1.40	0.97	0.96	0.029	0.036

e-issn 2389-8194

Note. All models demonstrated excellent fit. CFI and TLI values > 0.95; RMSEA values < 0.05; SRMR values < 0.05 indicate excellent fit.

Correlation Analysis

Table 4 shows the bivariate correlation of all the variables of the study, which answers RQ1. All the variables had significant positive correlations with student engagement, and the correlation coefficients were between 0.43 (learning styles) and 0.74 (self-efficacy). Engagement had the highest correlation with self-efficacy ($r = 0.74$), critical thinking ($r = 0.71$), and learning motivation ($r = 0.64$). The intercorrelation between the mediating variables (critical thinking and self-efficacy) was also strong ($r = 0.67$), which implied that they both had common variance but are distinct constructs.

Table 4 Correlation Matrix for Study Variables (N = 487)

Variable	1	2	3	4	5	6
1. Learning Motivation	1					
2. Learning Styles	0.48**	1				
3. Problem-Solving	0.52**	0.44**	1			
4. Critical Thinking	0.56**	0.41**	0.63**	1		
5. Self-Efficacy	0.61**	0.39**	0.58**	0.67**	1	
6. Student Engagement	0.64**	0.43**	0.59**	0.71**	0.74**	1

Note. ** $p < 0.01$. All correlations significant and positive.

Urban-Rural Comparisons

Independent samples t-tests compared urban and rural students on all study variables (Table 5). Urban students scored significantly higher than rural students on all variables except learning styles, with small to small-medium effect sizes. The largest



differences were observed for student engagement ($d = 0.34$), self-efficacy ($d = 0.32$), and problem-solving ability ($d = 0.29$). These differences suggested contextual factors (e.g., resources, teacher quality, educational opportunities) may influence the development of these constructs.

Table 5 Comparison of Urban and Rural Students on Study Variables

Variable	Urban (n=258)	Rural (n=229)	t	d
	M (SD)	M (SD)		
Learning Motivation	3.71** (0.69)	3.52** (0.72)	2.98	0.27
Learning Styles	3.46 (0.66)	3.35 (0.70)	1.79	0.16
Problem-Solving	3.64*** (0.73)	3.42*** (0.77)	3.25	0.29
Critical Thinking	3.58*** (0.76)	3.35*** (0.81)	3.21	0.29
Self-Efficacy	3.71*** (0.79)	3.45*** (0.83)	3.51	0.32
Student Engagement	3.68*** (0.74)	3.42*** (0.78)	3.74	0.34

Note. Cohen's d : 0.20 = small effect, 0.50 = medium effect, 0.80 = large effect.

Structural Equation Modeling Results

Measurement Model

Before testing the structural model, a detailed measurement model was tested with all the latent variables and the indicators. The fit of the measurement model was very high: $\chi^2(1147) = 2156.78$; $\chi^2/df = 1.88$; CFI = 0.96; TLI = 0.96; RMSEA = 0.042 (90% CI [0.039, 0.045]); SRMR = 0.038. All the factor loadings were significant ($p < 0.001$), and they ranged from 0.64-0.91, which meant that observed variables were sufficient to represent latent constructs.

Structural Model Testing

The entire structural model was also tested using all the hypothesized direct and indirect paths. The model fitted the data (answers RQ5) very well: $\chi^2(1153) = 2467.42$;



$\chi^2/df = 2.14$; CFI = 0.96; TLI = 0.95; RMSEA = 0.048 (90% CF [0.046, 0.051]); SRMR = 0.042. All the fit indices were above the recommended levels, implying that the proposed model fitted the data very well.

e-issn 2389-8194

Table 6 shows the standardized coefficients of the structural model, which answers RQ2. The three predictors had a significant positive effects on critical thinking and self-efficacy. Critical thinking (0.31) and self-efficacy (0.38) were found to have strong and significant positive effects on engagement, making them the most important of the direct predictors.

Table 6 Standardized Path Coefficients in the Structural Model

Path	β	t	95% CI
Paths to Critical Thinking			
Learning Motivation → CT	0.41*** (0.046)	8.91	[0.32, 0.50]
Learning Styles → CT	0.28*** (0.043)	6.51	[0.20, 0.36]
Problem-Solving → CT	0.35*** (0.045)	7.78	[0.26, 0.44]
Paths to Self-Efficacy			
Learning Motivation → SE	0.38*** (0.044)	8.64	[0.29, 0.47]
Learning Styles → SE	0.31*** (0.042)	7.38	[0.23, 0.39]
Problem-Solving → SE	0.42*** (0.043)	9.77	[0.34, 0.50]
Direct Paths to Engagement			
Learning Motivation → Eng	0.08* (0.039)	2.05	[0.00, 0.16]
Learning Styles → Eng	0.06 (0.037)	1.62	[-0.01, 0.13]

Path	β	t	95% CI
Problem-Solving → Eng	0.11** (0.042)	2.62	[0.03, 0.19]
Critical Thinking → Eng	0.31*** (0.044)	7.05	[0.22, 0.40]
Self-Efficacy → Eng	0.38*** (0.048)	7.92	[0.29, 0.47]

Note. CT = Critical Thinking; SE = Self-Efficacy; Eng = Engagement; standardized regression coefficient; SE = standard error; CI = confidence interval. R^2 for Critical Thinking = 0.52; R^2 for Self-Efficacy = 0.57; R^2 for Student Engagement = 0.62.

Predictors of Critical Thinking: The three predictors all had significant positive effects on critical thinking. The greatest impact was found on learning motivation (0.41***), then problem-solving ability (0.35***), and learning styles (0.28**). Critical thinking was explained by these three variables at 52 percent.

Paths to Self-Efficacy: All the three factors had significant positive effects on self-efficacy. The greatest impact was on problem-solving ability (0.42***), then learning motivation (0.38***), and learning styles (0.31). These three variables collectively explained 57 percent of the variation in self-efficacy.

Directs Effects on Engagement: Self-efficacy (0.38***) and critical thinking (0.31***) had highly significant positive effects on engagement, being the strongest direct predictors of engagement. The degree of problem-solving skill directly influenced engagement to a lesser yet significant level (0.11). The direct impact of learning motivation was also not very strong, yet significant (0.08). The direct influence of learning styles was not significant (0.06).

Mediation Analysis

Indirect effects were analyzed using critical thinking and self-efficacy through bootstrap mediation analysis (5,000 resamples) to answer RQ3 and RQ4. Table 7 presents the results.

Table 7 Indirect Effects Through Mediating Variables



Path	Indirect Effect	95% CI
Through Critical Thinking		
Learning Motivation → CT → Eng	0.127*** (0.024)	[0.082, 0.176]
Learning Styles → CT → Eng	0.087*** (0.020)	[0.050, 0.128]
Problem-Solving → CT → Eng	0.109*** (0.022)	[0.068, 0.155]
Through Self-Efficacy		
Learning Motivation → SE → Eng	0.144*** (0.026)	[0.095, 0.198]
Learning Styles → SE → Eng	0.118*** (0.023)	[0.075, 0.165]
Problem-Solving → SE → Eng	0.160*** (0.027)	[0.109, 0.215]
Total Indirect Effects		
Learning Motivation → Eng	0.271*** (0.034)	[0.206, 0.341]
Learning Styles → Eng	0.205*** (0.030)	[0.148, 0.267]
Problem-Solving → Eng	0.269*** (0.035)	[0.202, 0.340]

Note. Bootstrap samples = 5,000. CI = confidence interval. Effects significant when CI excludes zero.

All indirect effects through both mediators were statistically significant, as the 95% confidence intervals did not include zero.



Critical Thinking as Mediator (answering RQ3): Critical thinking played a significant mediating role between each of the three predictors and engagement. The indirect effects were between 0.087 (learning styles) and 0.127 (learning motivation). This implies that students who have more learning motivation, adaptive learning style and abilities to solve problems are more likely to develop critical thinking and this results in more geography learning engagement.

Self-Efficacy as Mediator (responding to RQ4): Self-efficacy was also found to mediate all relations with a more pronounced indirect impact, in most cases, than critical thinking. The indirect effects were found to be 0.118 (learning styles) and 0.160 (problem-solving ability). This implies that self-efficacy is more of a psychological power to transform the characteristics of the learners into real actions.

We analyzed possible multicollinearity issues before interpreting the results of mediation because of the correlation between the critical thinking and self-efficacy ($r = 0.67$). Variance Inflation Factor (VIF) analysis disclosed VIFs of 2.21 and 2.35 for critical thinking and self-efficacy respectively, which were significantly lower than the usually accepted value of 5.0 (and conservativeness 3.0). Although these variables have a high degree of variance, the VIF values do not reflect a severe case of multicollinearity that can disqualify coefficient estimates.

Total Effects

Table 8 shows the total (direct and indirect) effects of predictors on engagement.

Table 8 Total Effects on Student Engagement

Predictor	Direct	Indirect	Total	% Mediated
Learning Motivation	0.08*	0.27***	0.35***	77.4%
Learning Styles	0.06	0.21***	0.27***	77.8%
Problem-Solving Ability	0.11**	0.27***	0.38***	71.1%
Critical Thinking	0.31***		0.31***	
Self-Efficacy	0.38***		0.38***	



Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. R^2 for student engagement = 0.62.



The model had a high level of explanatory power as it explained 62% of the variance in student engagement. The highest overall effect were self-efficacy (0.38), problem-solving ability (0.38) and learning motivation (0.35), critical thinking (0.31), and learning styles (0.27).

In terms of learning motivation, learning styles, and problem-solving ability, most of their effects (71-77%) were mediated as opposed to being direct. This leads to the key contribution of critical thinking and self-efficacy as psychological processes through which underlying characteristics of learners are converted into actual engagement.

Multi-Group Analysis: Urban-Rural Differences

Since there were considerable differences in the means between urban and rural students, multi-group SEM was used to determine whether the structural relationships were different across contexts. Table 9 shows the most important path comparisons.

Table 9 Comparison of Key Paths Between Urban and Rural Students

Path	Urban (n=258)	Rural (n=229)	$\Delta\chi^2$
	β (SE)	β (SE)	
Self-Efficacy → Engagement	0.43*** (0.06)	0.31*** (0.07)	6.82
Critical Thinking → Engagement	0.35*** (0.06)	0.25*** (0.06)	4.21
Problem-Solving → SE	0.48*** (0.06)	0.34*** (0.06)	7.94
Motivation → CT	0.46*** (0.06)	0.34*** (0.07)	5.38
Learning Styles → Engagement	0.08 (0.05)	0.03 (0.05)	1.43

Note. SE = self-efficacy; CT = critical thinking. $\Delta\chi^2$ tests equality constraint across groups ($df = 1$).

Revista Perspectiva Empresarial, Vol. xx, No. x, enero-junio de 2025

DOI:

A number of paths were quite different in the city and countryside settings. The correlation between self-efficacy and engagement was greater among urban students (0.43*** instead of 0.31**, $\Delta \times 2 = 6.82$) than among rural students. Engagement and critical thinking were also more related in the case of urban students (0.35*** vs. 0.25***, $\Delta \times 2 = 4.21$). Also, problem-solving ability had a stronger effect on self-efficacy (0.48 vs. 0.34) and learning motivation (0.46 vs. 0.34) among urban students. These results indicate that although the general model framework is applicable in different settings, the relationship strength differs, and the stronger relationship is observed in urban schools, which can be attributed to the differences in educational settings, quality of teaching, and student readiness.

Discussion

Overview of Major Findings

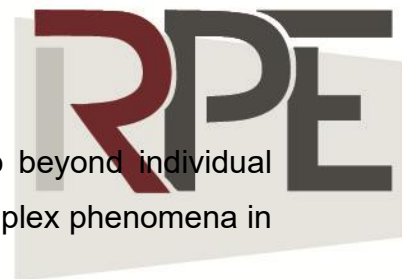
This study formulated and confirmed a complex predictive model of learning geography in the framework of examination-based education in China. The findings of the research were empirical evidence for RQ1-RQ5 and were significant for the theoretical knowledge and practical facilitating learning involvement.

Among the key findings, it is possible to mention: (1) The proposed dual-mediation model fitted the data perfectly, explaining 62 percent of the variance in learning engagement; (2) Self-efficacy and critical thinking were the strongest direct predictors of learning engagement; (3) Both mediators showed significant mediated relationships between learning motivation, learning styles, problem-solving ability, and engagement; (4) 71-77 percent of the effects of foundational predictors were mediated by both mediators; (5) Urban and rural students differed significantly in the strengths of the paths.

Theoretical Contributions

Integration of Multiple Theoretical Frameworks

The main theoretical outcome of the research is that it merges Self-Efficacy Theory, Social Cognitive Theory, Self-Determination Theory and Experiential Learning Theory to develop a comprehensive model of geography learning engagement. This



integration is a response to educational psychology calls to go beyond individual theoretical lenses in order to have a holistic understanding of complex phenomena in learning (Pintrich, 2003).

The validity of these models was tested by ensuring that the theoretical frameworks are not in conflict with each other. Motivation for learning (Self-Determination Theory), styles for learning (Experiential Learning Theory), and ability to solve problems (Social Cognitive Theory) are intertwined to have an effect on engagement in terms of critical thinking and self-efficacy (Social Cognitive Theory and Self-Efficacy Theory). This integration offers a more complex, in-depth framework for the interpretation of learning engagement.

Clarification of Mediating Mechanisms

The theoretical research contribution is the clarity of the psychological processes that make foundational learner characteristics translate into actual engagement. The research went beyond direct-effect models by showing the critical role of critical thinking and self-efficacy as mediating factors in order to determine how and why some factors affect engagement.

The observation that self-efficacy is the more powerful mediator (indirect effects 0.118 – 0.160) is in agreement with the theoretical expectation of Bandura (1997) that self-efficacy beliefs are the most prominent determinants of behavior. This implies that although students might have high levels of learning motivation, adaptive learning styles, and problem-solving skills, when they do not believe in their geography learning capabilities, their engagement might still be poor.

The intermediate position of critical thinking (indirect effects 0.087 – 0.127) adds to the existing theory, which raises it a level higher and turns it into a learning outcome as a critical mechanism in the engagement process. This is reminiscent of the central role of critical thinking in geography teaching that Chang and Pascua (2016) discuss^{**},^{**} and empowers the approach with empirical evidence as to what the specific mechanism of critical thinking entails when it comes to facilitating engagement in learning.

Subject-Specific Engagement Model



This research made a distinct contribution to the development of theories in the area of geography education. Although general models of student engagement are widely investigated (Fredricks et al., 2004), more specific models are quite limited. Through geography learning, the study found that due to the distinct nature of the subject, e.g., spatial thinking, multi-scale analysis, human – environment comprehension, predictors and mechanisms of engagement are shaped.

Geography, in the form of problem-solving ability (significant indirect effect 0.160***), is reflected in the central position of this ability. Learning geography intrinsically entails the analysis of complex problems in space, integration of a variety of information, and offering solutions, and therefore problem-solving capacity is a very pertinent predictor.

Unique Findings in Chinese Educational Context

Role of Extrinsic Motivation

The research established extremely high extrinsic motivation ($M = 3.76$), as compared to intrinsic motivation ($M = 3.48$), which is not common in Western schools (Ryan and Deci, 2017). This is an indication of the significant effect of the Gaokao orientation on the learning motivation of Chinese students. Interestingly, however, overall learning motivation (intrinsic and extrinsic) continued to make significant predictions of engagement (total effect 0.35), indicating that despite examination pressure, motivation is still an important predictor of engagement.

This result implies the cultural universality of Self-Determination Theory^{**},^{**} but also emphasizes the role of cultural context in the motivational expressions (Zhou et al., 2009). Extrinsic motivation in the Chinese environment cannot be considered merely negative but rather as having a valid role in arousing learning effort, with the aim of encouraging long-term learning engagement, intrinsic motivation should still be nurtured.

Complexity of Urban-Rural Differences

Multi-group analysis showed urban-rural disparities that can offer significant information on educational equity. Urban students not only reported significantly higher scores in all variable means compared to rural students, but also their structural path



scores were stronger on the whole. To take an example, the influence of self-efficacy on engagement was 0.43 in urban students and 0.31 in rural students.

Such disparities can be indicative of various things. In most cases, urban schools possess superior educational resources, facilities, teaching materials, and technology that may offer more possibilities to develop students' self-efficacy and critical thinking. Moreover, urban teachers have higher qualifications and experience in teaching and can provide more effective assistance to the cognitive development of students. It can also be related to family support, where urban parents are likely to be more educated (32% have university degrees as opposed to about 20% in the country overall), which would provide students with more academic advice and support.

Practical Implications

Strategies for Cultivating Self-Efficacy

Since the role of self-efficacy is central (the strongest mediating effect is -0.38), improvement of the geography self-efficacy of students should be a priority of educational practice. According to the theory of Bandura (1997), there are a number of strategies suggested. To begin with, mastery experiences can be offered by offering students rather challenging, but not too difficult, geography activities which will enable them to build confidence, say, starting with easy map reading and moving to more complicated spatial analysis. Second, the use of vicarious experiences through showing peer success cases, especially of students having similar backgrounds, can reinforce the belief of the students in their abilities. Third, providing verbal persuasion by giving specific and heartfelt positive feedback can support effort and good strategies as opposed to inborn talent. Last but not least, emotional control through the creation of a supportive learning environment with low levels of anxiety can assist students in interpreting physiological arousal as excitement and not anxiety.

Teaching Methods for Developing Critical Thinking

The important role of critical thinking (direct effect 0.31, significant mediating effects) shows the importance of the development of critical thinking in teaching geography. Problem-based learning has been recommended as one of the approaches that involve coming up with realistic and complicated problems in geography where



students are expected to interpret information, analyze evidence, and come up with reasonable judgments. Deep thinking may also be encouraged by using Socratic questioning that entails systematic inquiries along the lines of “What is the evidence that this claim is true?” and “Are there alternative explanations?” Besides this, a multi-perspective analysis stimulates students to study the problems in geography while considering the perspectives of various stakeholders, such as participants in environmental policy and urban planning. Lastly, metacognitive training assists students in being mindful of their cognition as they come to know their assumptions, biases, and logical fallacies.

Balancing Intrinsic and Extrinsic Motivation

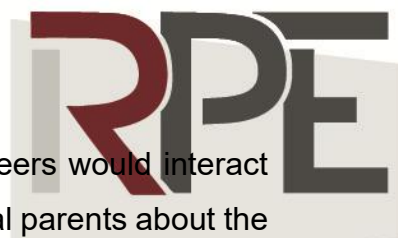
Although extrinsic motivation cannot be avoided in Chinese society, teachers must make efforts to foster intrinsic motivation to facilitate profound and prolonged involvement. The first one is to make geography relevant by relating it to the real life of students, with local settings and their professional careers, so that learning has more personal importance. Also important is that they should be given a sense of autonomy by giving them the liberty to select research topics or a format of presentation in curricular structures. Interest can be further aroused by cultivating it through various teaching techniques such as virtual field trips, GIS activities, role-playing and so on. Furthermore, the emphasis on process value and the need to stress the long-term relevance of the thinking skills mastered in the process of geography study, rather than on the final results of the examinations, can make students view the learning process in the wider context.

Interventions for Rural Schools

The differences between urban and rural areas emphasize the fact that rural education is something that should be given specific consideration. The professional growth of teachers is necessary, especially with specific training that can help rural geography teachers develop the critical thinking and self-efficacy of students. The allocation of resources should also be enhanced by making more resources available in terms of teaching materials on geography such as maps, globes, and geographic information technologies. Learning gaps can be bridged by setting up peer tutoring or school



exchange programs between urban and rural schools whereby peers would interact and exchange teaching practices. Moreover, the knowledge of rural parents about the value of studying geography can become stronger and help achieve better results among students.



Research Limitations

This research has a number of limitations, which can be taken into account when interpreting the findings:

Cross-Sectional Design

The causal inference is limited by the cross-sectional nature of the study. Though directional hypotheses that were tested using structural equation modeling were theoretically based, it is possible that there are bidirectional or circular relationships between variables. Notably, self-efficacy and critical thinking can also be increased due to learning engagement. Longitudinal or experimental studies should be used in future research in order to determine more definite causal relationships.

Self-Report Data

The data were all self-reports from students, and were both vulnerable to social desirability bias and common method bias. Although construct validity was demonstrated using confirmatory factor analysis, the research methodology ought to be adjusted to include several data sources (teacher assessments, objective scores, behavioral observations) to be more robust in the conclusions.

Geographic Limitation

In addition, the study was carried out in Shandong only, which does not allow generalization of the results. As a region with high intensity of competition in education, Shandong might not be representative of all parts of China. Future research should be done in various provinces and regions with varying educational development levels to prove a universal model.

Unexamined Factors



Other factors that may have been important in influencing engagement were not incorporated in the model, including the quality of teachers, pedagogy, peer interactions, and family support. The interaction of these contextual factors with the individual ones in impacting engagement should be studied in future research.

Future Research Directions

In the findings and limitations of the study, there are a number of recommendations on the future directions of research. Future research should aim to trace the longitudinal involvement of the students during Grade 10 through Grade 12 to analyze the progress of the predictors and mediators through time and to determine the possible cause – effect linkage. Intervention studies can also be carried out in order to develop and test certain programs focused on self-efficacy and critical thinking development to test their causal impact on engagement. A comparative study of the models of cross-cultural research would assist in defining the universality and cultural specificity of the model used in various educational systems. Moreover, cross-level interactions could be examined with the help of multilevel modeling that would allow for integrating individual, classroom, and school-level variables. Qualitative research, including interviews and classroom observations, may be useful in obtaining a better understanding of the mechanisms of quantitative results, especially the causes of urban-rural disparities. Future studies can also consider the impact of geographic information technology such as GIS on engagement and predictors. Lastly, a modeling test on other subjects like history and biology would be useful in determining both subject-general and subject-specific mechanisms of student engagement.

7. Conclusion

The research formulated and confirmed a holistic predictive model of geography learning activity in the examination-based education system in China, which addressed both the gaps in theory and in data. The application of the Self-Efficacy Theory and Social Cognitive Theory, Self-Determination Theory, and Experiential Learning Theory allowed the research to develop a multidimensional approach to learning engagement and to identify critical thinking and self-efficacy as important mediating variables.



The main findings with 62% variance accounted, strong performance of self-efficacy and critical thinking, and important mediating effects contributed significantly to theoretical advancement and offered practical implications for the educational practice.

The study highlights the fact that to improve the levels of geography learning, it is necessary not only to pay attention to the surface behaviors but also to develop deeper psychological variables that facilitate long-term learning: the belief in geography learning skills and the ability to think critically about geographical phenomena.

The results of the urban-rural distinctions prompt us to remember that even within the same macro-levels of school policies, there exist differences in the educational context of the micro-level which have a great impact on students' development. This requires finer and fairer distributions, and consolidation of educational resources, and supporting teacher development to make sure that all students irrespective of geographic location are given the provision required to become engaged and develop. In an era when issues such as climate change, sustainable development, and globalization are gaining more and more importance, geographic literacy and thinking are essential for growing responsible global citizens. Knowledge of proper ways of fostering engagement in geography learning is not just an academic endeavor but a long-term investment in the future well-being of any society. This study has given preliminary insights and avenues of practice for this mission, with the hope that more researchers and teachers are inspired to devote themselves to the quality of geography education and a new breed of geography students who can respond to challenging issues in the world.

References

- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, 45(5), 369-386.
- Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ*, 1986(23-28), 2.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.



Bednarz, S. W., Heffron, S., & Huynh, N. T. (Eds.). (2013). *A road map for 21st century geography education: Geography education research*. Association of American Geographers.

Cassidy, S. (2004). Learning styles: An overview of theories, models, and measures. *Educational Psychology, 24*(4), 419-444.

Chang, C. H., & Pascua, L. (2016). Singapore students' misconceptions of climate change. *International Research in Geographical and Environmental Education, 25*(1), 84-96.

Facione, P. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi Report).

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109.

Hannum, E., & Park, A. (2007). *Education and reform in China*. Routledge.

Heffron, S. G. (2012). GFL2! The updated geography for life: National geography standards. *The Geography Teacher, 9*(2), 43-48.

Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem-solving inventory. *Journal of Counseling Psychology, 29*(1), 66-75.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63-85.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT press.

Ku, K. Y., & Ho, I. T. (2010). Metacognitive strategies that enhance critical thinking. *Metacognition and Learning, 5*(3), 251-267.



Lei, H., Cui, Y., & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality*, 46(3), 517-528.

Lien, T. T, N. (2024). Stakeholder Perception of Extracurricular Activities at the Tertiary Level in Vietnam. *Studies in Educational Management*, 15, 35-59. <https://doi.org/10.32038/sem.2024.15.03>

Mayer, R. E., & Wittrock, M. C. (2006). Problem solving. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 287-303). Mahwah, NJ: Lawrence Erlbaum Associates.

National Academies Press. (2006). *Learning to think spatially: GIS as a support system in the K-12 curriculum*. National Academies Press.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105-119.

Peng, M., Wang, G., & Chen, J. (2004). Validity and reliability of the Chinese critical thinking disposition inventory. *Chinese Journal of Nursing*, 39(9), 644-647.

Phan, H. P. (2010). Critical thinking as a self-regulatory process component in teaching and learning. *Psicothema*, 22(2), 284-292.

Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95(4), 667-686.

Reeve, J., & Tseng, C. M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, 36(4), 257-267.

Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3-19). Springer.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.



- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press. New York, NY.
- Schunk, D. H., & DiBenedetto, M. K. (2016). Self-efficacy theory in education. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 34-54). Routledge.
- Skinner, E. A., & Pitzer, J. R. (2012). Developmental dynamics of student engagement, coping, and everyday resilience. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 21-44). Springer.
- Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal*, 47(3), 633-662.
- Zhou, M., Ma, W. J., & Deci, E. L. (2009). The importance of autonomy for rural Chinese children's motivation for learning. *Learning and Individual Differences*, 19(4), 492-498.
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), 82-91.
- Zhao, Y. (2014). *Who's afraid of the big bad dragon? Why China has the best (and worst) education system in the world*. Jossey-Bass.