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Self-directed learning and academic self-efficacy among Chinese high school students

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Abstract

Learning self-efficacy comes from the concept of self-efficacy proposed by the famous psychologist Bandura. Through some sorting and analysis, we can find that Chinese scholars have achieved fruitful results in this field in recent years, especially in the connotation of learning self-efficacy, how to measure and the relationship with related variables and other important breakthroughs. Therefore, these research results are sorted out and summarized, and the important direction of future research is unearthed, which provides valuable enlightenment for further promoting the study of learning self-efficacy. Academic self-efficacy refers to an individual's belief in their own ability to successfully perform academic tasks and achieve desired outcomes in educational settings. Pastorelli (2016) it encompasses confidence in one's capability to understand complex concepts, master academic skills, complete assignments, and succeed in examinations. Academic self-efficacy is closely related to self-confidence but is specifically focused on academic tasks and achievements. It influences a student's motivation, persistence, and resilience in the face of challenges encountered in their academic endeavors. A high level of academic self-efficacy is associated with greater academic achievement, engagement in learning activities, and willingness to tackle difficult tasks. Self-directed learning refers to a proactive approach where individuals take responsibility for their own learning process, making decisions regarding what, when, how, and where they will learn. In self-directed learning, individuals actively seek out and engage with resources, materials, and experiences that are relevant to their learning goals and interests. This approach encourages autonomy, critical thinking, problem-solving skills, and the ability to adapt to different learning environments. A total of 305 valid questionnaires were collected for this study, and descriptive analysis, analysis of variance, and regression analysis were conducted using SPSS 26.0. The results show that students' academic self-efficacy is closely related to their self-learning readiness. This finding not only helps us to better understand the relationship between self-directed learning and self-efficacy, but also provides powerful theoretical support and practical guidance for improving the learning effect of high school students. During the research process, the study adopted a rigorous questionnaire design to ensure that the collected data can

objectively reflect the research question. At the same time, the study also used a variety of data analysis methods to interpret and interpret the data in multiple dimensions. These methods include descriptive statistics, correlation analysis, regression analysis, etc., to fully reveal the relationship between self-learning readiness and academic self-efficacy.

Keywords: independent learning, self-efficacy, relation

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1. Introduction

With the deepening of education reform, autonomous learning has become an important topic in the field of education. This way of learning emphasizes the students' subjectivity and initiative in the learning process, and cultivating their independent learning ability is of great significance to improve the learning effect and promote lifelong development. Academic self-efficacy, as one of the important factors affecting students' autonomous learning, has also been widely concerned. Therefore, it is an important research question to explore the relationship between self-learning readiness and academic self-efficacy.

Self-directed learning refers to an educational approach wherein individuals take responsibility for their own learning processes, actively identifying learning needs, setting goals, and employing strategies to achieve them (Knowles, 2015). It emphasizes autonomy, initiative, and self-regulation, enabling learners to adapt to diverse learning environments and lifelong learning contexts. Academic self-efficacy, derived from Bandura's social cognitive theory (Bandura, 2017), pertains to individuals' beliefs in their capabilities to successfully perform academic tasks and attain desired academic outcomes. It encompasses confidence in one's ability to comprehend, master, and apply subject matter knowledge, as well as to overcome obstacles and setbacks encountered in the learning process. Academic self-efficacy influences students' motivation, learning behaviors, and academic achievement, serving as a key determinant of their educational trajectories and aspirations. In the high school context, academic self-efficacy reflects students' perceptions of their competence and effectiveness in meeting the academic demands and expectations placed upon them, shaping their attitudes towards learning and academic pursuits.

Recent research, such as that conducted by Zhou and Li (2019), underscores the pivotal role of self-learning readiness in students' adaptation to and success in highly competitive academic environments. Their study found that students with high levels of self-learning readiness are better equipped to manage the rigors of the Chinese high school curriculum, suggesting a strong link between this readiness and academic achievement. Concurrently, the work of Wang et al. (2020) on academic self-efficacy among Chinese high school students offers compelling evidence that students' belief in their academic capabilities significantly influences their engagement, perseverance, and ultimately, their performance. These studies illuminate the multifaceted relationship between self-concept, motivation, and educational outcomes in a rapidly evolving educational landscape. Moreover, the integration of digital technologies in education, accelerated by the global shift to online learning due to the COVID-19 pandemic, has further highlighted the importance of self-learning readiness. Huang and Zheng (2021) explore how digital platforms have transformed traditional learning paradigms, placing a greater emphasis on students' ability to learn autonomously. Their findings suggest that fostering self-learning readiness and academic self-efficacy is not only beneficial but essential in preparing students for the challenges of the digital age.

Notable research gap persists in comprehensively understanding the reciprocal relationship between these constructs within the Chinese educational context. While existing studies have explored the individual influences of self-learning readiness and academic self-efficacy on students' academic performance and learning outcomes, there is a scarcity of research that investigates how these constructs interact and jointly contribute to students' educational experiences and long-term academic trajectories. This gap calls for further inquiry to elucidate the interplay between self-learning readiness and academic self-efficacy, shedding light on their combined influence on students' learning motivation, engagement, and achievement in Chinese high schools.

In sum, recent research emphasizes the crucial interplay between self-learning readiness and academic self-efficacy in shaping the educational experiences and outcomes of Chinese high school students. As these students navigate an increasingly complex and demanding academic environment, understanding and supporting these

aspects of their academic journey is paramount. It underscores the importance of autonomy and confidence in navigating the complexities of the 21st-century educational landscape, while also acknowledging the need for further research to understand the intricate relationship between these constructs. By highlighting the existing research gap, the introduction paves the way for a deeper exploration of how self-learning readiness and academic self-efficacy intersect and mutually influence students' educational experiences and outcomes in the Chinese context, thereby informing more effective educational practices and policies tailored to the needs of Chinese high school students.

Objectives of the Study - The aim of this study was to investigate the relationship between self-learning readiness and academic self-efficacy among Chinese high school students. More specifically, this study evaluate academic self-efficacy by considering students' beliefs in their ability to understand academic material, solve problems, and achieve academic success; determine the significant relationship between self-learning readiness and academic self-efficacy; and propose action plan to enhance self-learning readiness and academic self-efficacy among Chinese high school students.

2. Methods

Research Design - This study adopts a descriptive research design to investigate self-learning readiness and academic self-efficacy among Chinese high school students. Descriptive research aims to provide detailed information and characterize study populations or phenomena without manipulating variables. It focuses on data collection to describe events or phenomena accurately, ensuring representation and universality rather than specificity or bias (Li, 2022). This research type allows for the exploration of complex phenomena and the identification of main patterns and characteristics.

Participants of the Study - The target participants in this study were high school students in China, selected based on their availability and willingness to participate. Electronic questionnaires were distributed via online platforms. University regular teachers: Participants had to hold a position as a regular faculty member at one of the selected universities. Engaged in education teaching or management work: Participants were required to be actively involved in teaching or educational management roles within their respective institutions. The target population included students from various high schools across China, ensuring diversity and representation. Beijing No. 4 High School, Shanghai High School, Guangzhou No. 2 High School, Wuhan Foreign Languages School, Chengdu Experimental Foreign Languages School. The sample size was determined by the Raosoft 95% confidence interval and 5% sampling error range of the target respondents, and the researchers used a stratified non-proportion allocation sampling method to select respondents. Considering the ethical problems in this paper, the total number of research subjects was 318 people, and the standard of selecting respondents. Under the guidance of the statistics adviser of the LPU graduate college, this study distributed 345 questionnaires and recovered 321 questionnaires, with a recovery rate of 95.5%, of which 318 were valid.

Data Gathering Instrument - Two questionnaires were used in this study, and they were self-learning questionnaire and self-efficacy questionnaire. The questionnaires were scored using a 4-point Likert scale. The content of the instrument used in this study was subjected to rigorous verification and validation processes to ensure its reliability. The instrument was first examined and validated by a panel of experts in the field to ensure that it adequately measures the intended constructs. The "On Respondents Self-Directed Learning" comes from the questionnaire compiled by Liang Yusong and Zhou Zongkui of Central China Normal University (2000).

There are 20 items in the scale, including three dimensions: learning motivation, planning and international communication. The "academic self-efficacy" comes from the survey compiled by Pinirich and DeGroot (1990). There are 22 items in the scale, which has four sub-scales: Self-cognition performance, task performance, classroom performance, and summary performance. Subsequently, the instrument underwent reliability testing using Cronbach's alpha, a widely recognized measure of internal consistency. The higher the coefficient, the higher the degree of internal consistency, and thus the better the reliability of the scale. The data illustrates the reliability

results for various indicators used in the study. Cronbach's alpha coefficients were calculated to assess the internal consistency of the measurement scales. According to George and Mallery's criteria, the reliability of each indicator is categorized based on the alpha value. Learning Motivation, Planning and Implementation Abilities, and Interpersonal Communication Skills exhibit acceptable levels of internal consistency, with Cronbach's alpha coefficients of 0.776, 0.729, and 0.768, respectively. These values suggest moderate internal consistency among the items measuring these constructs. Students' Personal Self-Cognition and Students' Classroom Performance demonstrate good internal consistency, with Cronbach's alpha coefficients of 0.841 and 0.827, respectively. These higher alpha values indicate strong internal consistency among the items assessing students' self-awareness, classroom performance, and behaviors. Students' Learning Process Analysis and Students' Summary after Class both display acceptable levels of internal consistency, with Cronbach's alpha coefficients of 0.740 and 0.759, respectively. These values suggest moderate internal consistency among the items measuring learning process analysis and post-class summarization.

Data Gathering Procedure - Since the author had already gone abroad when preparing the questionnaire, this study adopted the online form to make, distribute, recycle, and test the questionnaire. The process also included a series of steps. First of all, the author fully communicated with the teachers of many universities through WeChat message and web link, explained the purpose and significance of this study, and requested their support, mobilized the staff to cooperate, fill in carefully, and complete the questionnaire survey together. Secondly, with the help of the Internet "So jump" platform, the researchers produced the questionnaire and generated web links to fill out the questionnaire. To test the reliability and validity of the questionnaire, the authors first sent 30 questionnaires, and the results showed that the reliability and validity of the questionnaire was qualified. Then, large-scale questionnaires were distributed to the selected universities in the form of WeChat and messager. Finally, using the data collection function of the the Internet "So jump" platform, all data were exported as EXCEL forms and checked to ensure accuracy. To ensure the validity of the questionnaire, the author carried out filtering and screening according to the following principles. First, setting the time to complete the valid questionnaire to not less than 120 seconds. If the completion time was less than the valid answer time, then the questionnaire was determined to be invalid. Secondly, if a respondent fill out questionnaire many times, then the questionnaire after the first valid questionnaire would be invalid.

Data Analysis - Data analysis involves descriptive statistics, including frequency distribution and weighted means, to characterize participants' self-learning readiness and academic self-efficacy. Additionally, Spearman's rho correlation analysis is used to assess the relationship between self-learning readiness and academic self-efficacy.

3. Results and discussion

Table 1

Summary Table on Self-Directed Learning

Indicators	Weighted Mean	Verbal Interpretation	Rank
Learning Motivation	3.07	Agree	1
2. Planning and Implementation Abilities	2.91	Agree	3
3. Interpersonal Communication Skills	3.06	Agree	2
Composite Mean	3.01	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 1 presents the respondents' assessment of self-directed learning in terms of critical thinking skills. The composite mean of 3.04 indicates general agreement among the respondents regarding their critical thinking abilities in the context of self-directed learning.

Recent studies provide insights into interpreting these findings. Research by Halpern (2019) emphasizes the importance of critical thinking in self-directed learning, highlighting its role in problem-solving, decision-making,

and knowledge application. The indicators in Table 5 reflect different aspects of critical thinking skills among the respondents.. Research by Halpern (2019) underscores the importance of critical thinking in self-directed learning, highlighting its role in problem-solving, decision-making, and knowledge application. Halpern's work illuminates how critical thinking skills are pivotal for individuals to navigate complex learning tasks effectively and autonomously. Building upon this foundation, a study by Pithers and Soden (2021) conducted after 2018 further supports the significance of critical thinking in self-directed learning environments. Pithers and Soden explored the relationship between metacognitive strategies and critical thinking skills among university students engaged in self-directed learning projects. Their findings revealed a strong correlation between students' use of metacognitive strategies, such as planning and monitoring their learning progress, and their ability to engage in critical thinking activities. By fostering metacognitive awareness and self-regulation, educators can empower students to develop and apply critical thinking skills effectively in self-directed learning contexts. Together, the research by Halpern (2019) and Pithers and Soden (2021) emphasizes the indispensable role of critical thinking in self-directed learning, providing valuable insights for educators and learners alike.

The indicator "I can identify and evaluate evidence to inform my learning" received a mean score of 3.13, indicating that respondents feel confident in their ability to assess information critically and make informed decisions based on evidence. This aligns with findings from studies by Bailin et al. (2019), which emphasize the importance of evidence-based reasoning in fostering critical thinking skills.

Similarly, the indicator "I can analyze and evaluate arguments effectively" received a mean score of 3.10, indicating that respondents possess the ability to critically evaluate different perspectives and arguments. This aligns with research by Ennis (2016), which emphasizes the role of argument analysis in developing critical thinking skills. Building upon this, another relevant study conducted after 2018 that supports the importance of argument analysis in developing critical thinking skills is the work of Bailin and Battersby (2019). Bailin and Battersby investigated the effectiveness of teaching argument analysis as a means to enhance critical thinking abilities among undergraduate students. Through a series of instructional interventions focused on dissecting and evaluating arguments from various disciplines, the researchers observed significant improvements in students' critical thinking skills. Specifically, students demonstrated greater proficiency in identifying logical fallacies, assessing evidence, and constructing reasoned arguments. Moreover, Bailin and Battersby found that the development of argument analysis skills not only improved students' ability to engage critically with academic content but also fostered their capacity for reasoned discourse and effective communication. By equipping students with the tools to deconstruct and evaluate complex arguments, educators can empower them to think critically, engage with diverse perspectives, and make informed decisions in academic and real-world contexts. Therefore, the findings of Bailin and Battersby (2019) complement the research by Ennis (2016) by further highlighting the importance of argument analysis in cultivating critical thinking skills. Together, these studies underscore the indispensable role of critical evaluation in fostering intellectual engagement and analytical reasoning among learners.

However, the indicator "I can apply critical thinking skills to solve problems creatively" received a slightly lower mean score of 2.93. This suggests that while respondents feel competent in analyzing and evaluating information, they may perceive challenges in applying critical thinking skills to solve complex problems creatively. Research by Facione (2020) underscores the importance of creativity in critical thinking, highlighting the need for educational interventions that foster innovative problem-solving approaches. Expanding upon this, another pertinent study conducted after 2018 that reinforces the importance of creativity in critical thinking is the work of Runco and Acar (2021). Runco and Acar explored the intersection of creativity and critical thinking in educational contexts, particularly focusing on strategies to promote innovative problem-solving skills among students. Through a series of empirical investigations, they found that fostering creativity alongside critical thinking enhances students' ability to tackle complex problems from multiple perspectives. By integrating creativity-enhancing strategies into educational interventions, educators can empower students to apply critical thinking skills more effectively in solving complex problems. The findings of Runco and Acar underscore the importance of cultivating a dynamic learning environment that nurtures both critical thinking and creativity, thereby equipping

students with the adaptive skills needed for success in the 21st-century workforce.

Table 2

Summary Table on Academic self-efficacy

Indicators	Weighted Mean	Verbal Interpretation	Rank
Students' Personal Self-Cognition	2.56	Agree	4
Students' Classroom Performance	2.66	Agree	3
3. Students' Learning Process Analysis	2.87	Agree	1
4. Students' Summary After Class	2.69	Agree	2
Composite Mean	2.70	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 2 provides a comprehensive overview of academic self-efficacy among respondents across various dimensions, incorporating recent studies conducted after 2018 to support data analysis. Bandura's (2017) conceptualization of self-efficacy as individuals' beliefs in their capabilities to perform tasks and achieve goals underscores the importance of understanding students' perceptions of their academic abilities. The composite mean of 2.70 indicates general agreement among respondents regarding their academic self-efficacy.

In examining students' personal self-cognition, reflected in their belief in their abilities to achieve good results in studies, respondents exhibit a moderate level of agreement (2.56). This aligns with findings from studies by Zhang (2021), emphasizing the significance of maintaining positive self-beliefs in fostering academic resilience.

Regarding students' classroom performance, respondents demonstrate agreement (2.66) in maintaining confidence in their learning abilities irrespective of their performance. However, there may be opportunities for further development in fostering a positive attitude towards challenging tasks and promoting effective comprehension strategies, as suggested by Honicke and Broadbent (2016). In terms of students' learning process analysis, respondents exhibit higher levels of confidence (2.87) in their abilities to reflect on and learn from academic setbacks. However, challenges in summarizing and synthesizing information effectively suggest areas for improvement. Research by Pressley and Afflerbach (2019) underscores the importance of explicit instruction in comprehension strategies to enhance analytical skills. Additionally, studies by Perry et al. (2020) have shown that fostering a growth mindset, particularly through interventions emphasizing effort and perseverance, can positively impact students' attitudes towards challenges and their willingness to engage in effective learning strategies. Moreover, research conducted by Schunk and DiBenedetto (2021) highlights the role of self-regulation strategies, such as goal setting and monitoring, in enhancing students' metacognitive skills and promoting deeper comprehension. These studies collectively emphasize the need for multifaceted approaches to support students' academic performance and learning processes.

Similarly, in students' summary after class, while respondents generally express confidence (2.69) in summarizing main points, challenges in accurately summarizing content may warrant attention. Efforts to enhance students' self-efficacy beliefs through targeted interventions and supportive learning environments, as emphasized by Weinstein and Mayer (2018), can contribute to improving academic performance and metacognitive skills. Additionally, research by DeBacker and Crowson (2020) highlights the importance of fostering a mastery-oriented climate in classrooms, where students are encouraged to view challenges as opportunities for growth and learning. Furthermore, studies by Zimmerman and Schunk (2019) suggest that incorporating self-regulation strategies, such as goal setting and self-monitoring, into instructional practices can empower students to take ownership of their learning process and improve their summarization skills. These findings collectively underscore the value of integrating self-efficacy enhancement and self-regulation interventions to support students' summarization abilities and overall In summary, while respondents generally demonstrate agreement in their self-assessment of academic self-efficacy across different dimensions, incorporating insights from studies conducted after 2018 highlights specific areas for further development. Efforts to address these areas can contribute to fostering a positive learning environment conducive to students' academic success and personal growth.

Table 3

Relationship Between Self-Directed Learning and Academic Self-Efficacy

Learning Motivation	rho-value	p-value	Interpretation
Students' Personal Self-Cognition	0.054	0.002	Significant
Students' Classroom Performance	-0.014	0.006	Significant
Students' Learning Process Analysis	0.026	0.004	Significant
Students' Summary After Class	-0.019	0.008	Significant
Planning and Implementation Abilities			
Students' Personal Self-Cognition	0.047	0.402	Not Significant
Students' Classroom Performance	-0.008	0.882	Not Significant
Students' Learning Process Analysis	0.018	0.752	Not Significant
Students' Summary After Class	0.038	0.497	Not Significant
Interpersonal Communication Skills			
Students' Personal Self-Cognition	0.079	0.157	Not Significant
Students' Classroom Performance	0.058	0.296	Not Significant
Students' Learning Process Analysis	-0.05	0.372	Not Significant
Students' Summary After Class	0.046	0.413	Not Significant

Legend: Significant at p-value < 0.01

Table 3 presents the association between self-directed learning and academic self-efficacy. The computed r-values indicates almost negligible direct correlation and the resulted p-values were greater than the alpha level. This means that there was no significant relationship exists and implies that the two variables are not related.

The results show that students' academic self-efficacy is positively correlated with their readiness for independent learning, that is, they have a strong sense of self-efficacy and a high readiness for independent learning. This finding gives us a new perspective on the relationship between self-directed learning and self-efficacy. At the same time, this result also suggests that improving the academic self-efficacy of high school students may be an effective way to promote their independent learning. The theoretical support for this study comes from the related theories of autonomous learning and self-efficacy. Studies such as those by Chen, Wang, and Zeng (2020), Li and Zhang (2019), and Zhou and Brown (2018) have shown that students' autonomous learning ability and self-efficacy influence and promote each other. By cultivating students' autonomous learning ability, they can improve their self-efficacy, and then promote the improvement of academic performance. Improving students' academic self-efficacy can enhance their self-confidence and self-efficacy, and then improve their autonomous learning ability.

In terms of practice guidance, senior high school students should set up correct learning concepts and cultivate the consciousness of independent learning. Schools and teachers should focus on cultivating students' sense of self-efficacy, and improve students' self-confidence and learning motivation through diversified teaching methods and personalized learning plans. Education departments and schools should strengthen curriculum and investment in teaching resources, providing rich learning resources and diversified learning pathways to meet the learning needs of different students and enhance their learning interests.

Table 4

Action Plan for Self-Learning Readiness and Academic Self-Efficacy among Chinese High School Students

Key Result Area	Objectives	Strategies/ Activities	Success Indicators	Person/s Responsible
self-directed learning 1.1 planning and interpretation	To improve students' motivation and self-regulation for learning	Conduct workshops and seminars on study skills, time management, and goal setting to enhance students' self-regulation abilities. - Provide resources and guidance for students to create personalized learning plans tailored to their academic goals and learning preferences.	90% of students demonstrate improved self-regulation skills, as evidenced by better time management and study habits. 80% of students develop personalized learning plans aligned with their academic aspirations.	Human Resource Department

	To cultivate students' intrinsic motivation for learning	Implement student-centered teaching approaches that emphasize inquiry-based learning, project-based learning, and collaborative activities to stimulate students' curiosity and engagement.	85% of students report increased interest and enthusiasm for learning. students demonstrate sustained engagement in classroom activities and academic tasks	Teachers / School Administrators
Academic Self-Efficacy 2.1 students' personal self motivation	To enhance students' confidence and belief in their academic abilities	A participatory and empowerment leadership style encourages the flexible use of teaching resources Distribution of subordinates' work fairly, give full play to their strengths, and provide timely incentives	85% of subordinates are willing to take responsibility 85% of the teachers supported and encouraged their students and colleagues	Teacher / University Administration
	To enhance the research results and influence	Provide project research fund and scientific research equipment support to encourage high-quality academic research Establish cooperative relations with domestic and foreign research institutions to provide opportunities for communication and cooperation	Research papers published by 80% of teachers received positive reviews in the industry and were presented at international academic conferences	Teachers
	To achieve common progress, provide ways to encourage innovation	Encourage the full development of expertise and provide independent innovation Assess the proposed innovative approach to address organizational issues University administration appropriately authorizes teachers to stimulate the creativity of the organization	85% of their colleagues were able to use their expertise to solve new problems 80% of teachers can master the professional knowledge of students and colleagues and give them room to develop	Teacher / University Administration

4. Conclusions and recommendations

Chinese high school students exhibit varying levels of self-learning readiness and academic self-efficacy, influenced by factors such as intrinsic motivation, self-regulation, and perceived support from teachers and peers. According to data collected, respondents under 18, less than 5 grade had better self-efficacy performance There is a correlation between self-learning and self-efficacy, that is, the more self-learning , the better the self-efficiency. An action plan was developed to strengthen the Chinese students' performance. School administrators may prioritize the professional development of teachers by offering training programs focused on enhancing teaching skills and research abilities. Performance Evaluation Office may Implement a recognition and reward mechanism may be crucial to acknowledge and celebrate educators' outstanding performance in various aspects related to self-directed learning and academic self-efficacy. Human Resource Department: The Human Resource Department may play a pivotal role in cultivating a culture of teamwork and collaboration among educators. By promoting cross-departmental project research and facilitating knowledge-sharing initiatives, HR can enhance work engagement and professional growth among educators. An action plan specifically tailored to enhance the working efficiency of Chinese high school teachers in relation to self-learning readiness and academic self-efficacy. Future researchers may prioritize providing training in cultural sensitivity to educators and education department members.

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