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Problems and Improvement Strategies of Self-Regulated Learning of Professional Degree Graduate Students from the Perspective of Integration between Industry and Education

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Abstract: ***The integration between industry and education plays an increasingly important role in the training of professional degree graduate students, and at the same time puts forward higher requirements for the self-regulated of post-graduate learning. Based on the theory of Self-Regulated Learning, this paper investigates and analyzes the learning self-regulated of professional degree graduate students from the perspective of the integration between industry and education from two dimensions of learning motivation and learning strategy, and finds that the self-regulated learning level of professional degree graduate students is low, the self-regulated learning ability of doctoral candidates is weaker than that of master graduate students, and the self-regulated learning level of universities is different. Therefore, we should strengthen the subject consciousness of self-study, self-drive learning motivation and self-regulate learning strategies. We should improve the self-efficacy of doctoral candidates, pay attention to career development planning, and optimize the process of doctoral training. We should attach importance to the improvement of self-regulated learning ability of graduate students, strengthen the construction of academic culture, and strengthen the construction of basic resources.***

Keywords: Integration between Industry and Education, Professional Degree Graduate Students, Self-Regulated Learning**.**

1. Introduction

Practicality and professionalism are essential qualities for cultivating professional degree graduate students. Thus, integration between industry and education is becoming increasingly necessary for their development. In the integrated industry and education cultivation mode, there has been a significant increase in off-campus practice for professional degree graduate students. This poses a more significant challenge for on-campus supervisors in effectively controlling graduate students' learning and places higher demands on the self-regulated learning of graduate students. As a form of disconfirming evidence, the Notice on Further Standardizing and Strengthening the Management of Graduate Student Cultivation announced by the General Office of the Ministry of Education in 2019 observes that graduate students in China still lack the initiative for learning and self-management at this level (General Office of the Ministry of Education, 2019). Therefore, a thorough examination of self-regulated learning among graduate students in professional degree programs operating under the industry-education fusion cultivation model and identifying related issues holds significant practical value.

2. Connotation and Development of "Integration between Industry and Education"

The prototype for the "integration between industry and education" originated in Germany through apprenticeship training within the guild system. This system evolved into the "dual system" in 1948, and it remains in practice today. The "dual system" model, which entails joint vocational training provided by both enterprises and schools, was established in 1948 and has persisted until now. In the 19th century, influenced by the German apprenticeship system, the United States College of Engineering in Cincinnati proposed a kind of industry-academia cooperation in human education, emphasizing that the academic year is divided into "theoretical semester" and "work semester" so that students learn in "school learning" and "work semester." Integration between industry and education has fostered a classic method of talent cultivation known as "alternating work and study." Students engage in "school learning" and "business internships" during their work semesters. This approach is highly effective in producing skilled professionals (Hu Wanshan & Ye Lin, 2022). Currently, the academic community has various definitions for the concept of integration between industry and education. From a narrow perspective, it relates to the collaboration between colleges, universities, and industries to train students (known as school-enterprise cooperation). From a broader viewpoint, it pertains to establishing an optimal educational environment by integrating information, systems, resources, and other elements among multiple governing bodies (including government, colleges, universities, industries, and social organizations) to enhance student capabilities (Ma Yonghong, Liu Runze & Yu Miaomiao, 2021).

China places significant emphasis on integration between industry and education in talent development. This concept dates back to the early twentieth century when combining education and production labor and practicing half-work-half-study highlighted the core of industry-education integration. In the 21st century, a national talent strategy was proposed in the Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning the Comprehensive Deepening of Reform (2013), which emphasized the significance of integration between industry and education and fostering cooperation between schools and enterprises (Wang Hui, 2022). The State Council issued Several Opinions on

Deepening the Integration of Industry and Education (2017), which specializes in systematically planning to comprehensively deepen the integration of industry and education at a national level. This document clarifies policy support and institutional arrangements for the integration of industry and education, marking the development of industry and education in China to a new stage (Hu Wanshan & Ye Lin, 2022). The Program for the Development of Graduate Professional Degrees (2020-2025) additionally suggests instituting a mode of cultivating professional degrees with Chinese attributes that prioritize practical training and the integration of industry and education. The strategic significance of integration between industry and education as an essential path to train high-level applied talents is becoming increasingly prominent.

3. The Concept of Self-Regulated Learning (SRL) Theory Initially Emerged

The theory of self-regulated learning originated in Western educational psychology during the 1980s. Zimmerman, an American scholar, synthesized and clarified the views of various schools of thought, culminating in developing a systematic theoretical framework for self-regulated learning. This contribution positioned him as one of the founders of this field of research. According to Zimmerman, self-regulated learning refers to how students actively participate in the learning process, incorporating metacognitive, motivational, and behavioral strategies (Zimmerman B J, 1989). According to him, a student's learning is self-regulated learning when he or she actively participates in all three aspects: metacognition, motivation, and behavior (Zimmerman, & Risemberg, 1997).

Since the 1990s, self-regulated learning has become a hot topic in research in educational psychology, and countries around the world have taken the cultivation of students' self-regulated learning ability as an important educational goal. In recent years, the research on self-regulated learning has been deepened in China. Zhu Zude has absorbed Zimmerman's theory of self-regulated learning and made an in-depth study of college students' self-regulated learning. Zhu Zude explores college students' self-regulated learning from the dimensions of motivation and strategy. Although the relevant research focuses on the group of undergraduate students, graduate students and undergraduate students have a certain degree of similarity in learning autonomy. From the perspective of personal behavior, graduate and undergraduate students are independent enough in their thinking and doing. They have a certain degree of knowledge reserve and problem-solving ability. From the view of learning background, they both lack teacher supervision and systematic plan arrangement in the learning process and emphasize self-confidence and self-discipline.

Given the commonality of learning styles between graduate and undergraduate students, this study intends to investigate the self-regulated learning of professional graduate students in the context of industry-education integration based on the theory of self-regulated learning using empirical methods.

4. Research Methodology

In order to investigate the current status of learning self-regulated of professional degree graduate students in China, this paper adopts the Self-regulated Learning Scale for Undergraduates compiled by Zhu Zude and Wang Jingqiong of South China Normal University, which is based on Zimmerman's theory of self-regulated learning and has good reliability and validity. Since the original scale was designed for undergraduate students, this study made appropriate deletions and modifications for graduate students to form the final scale. The modified scale has two parts.

(1) Basic information: gender, grade, and school.

(2) Measurement of self-regulated learning ability: It includes learning motivation and strategy. Learning motivation includes learning self-efficacy, internal target, learning controls, learning significance, external target, and learning anxiety; learning strategies include general approach, learning requests, learning programs, learning summaries, evaluation of learning, and learning management.

A small-scale questionnaire test was conducted in this study to verify the validity of the modified questionnaire. A total of 50 questionnaires were distributed in this test, and 40 were retrieved, with a retrieval rate of 80%. Ten invalid questionnaires were excluded, and 30 valid questionnaires were obtained, with a validity rate of 75%. After reliability verification of the returned questionnaires, Cronbach's alpha coefficients of all dimensions of the scale were more significant than 0.6. The Cronbach's alpha coefficient of the learning motivation subscale was 0.914. The Cronbach's alpha coefficient of the learning strategy subscale was 0.895, and the total Cronbach's alpha coefficient was 0.937, with good internal consistency (Table 1). The pre-test results indicated that the modified questionnaire could better measure the self-regulated learning ability of professional students and provide an effective tool for the subsequent formal study.

Table 1: Results of the Reliability Test of The Dimensions of The Factors Affecting Self-regulated Learning

Form	Cronbach's Alpha	Number of items
Self-efficacy	0.765	3
Internal Target	0.736	3
Learning Controls	0.807	4
External Target	0.821	3
Learning Significance	0.663	2
Learning Anxiety	0.727	3
General Approach	0.816	4
Learning Requests	0.761	3
Learning Programs	0.842	3
Learning Summaries	0.814	3
Evaluation of Learning	0.782	3
Learning Management	0.703	3
Motivation Scale	0.914	18
Strategy Scale	0.895	19
Total Scale	0.937	37

5. Results

5.1 Reliability and Validity Test

This paper adopts a random sampling method to select ten universities in Zhejiang Province, with engineering, medical, and management professional degree graduate students as sampling objects. A total of 365 questionnaires were distributed, and 365 questionnaires were recovered, with a recovery rate of 100%. Excluding 99 questionnaires, such as related question answer sheets and answer sheets that took

less than 60 seconds, 266 valid questionnaires were obtained, with an effective rate of 72.88%. SPSS 26 was used to analyze the valid samples statistically, and the results showed that except for the learning significance dimension, whose Cronbach's Alpha coefficient was 0.542, the coefficients of the other dimensions were in the range of 0.6-0.8; the Cronbach's Alpha coefficients of the two subscales of learning motivation and learning strategy were 0.860 and 0.806, respectively; the overall Scale Alpha reached 0.895. this indicates that the modified scale still has good internal consistency and reliability after the extensive sample test (Table 2). The KMO value of the questionnaire was 0.891, and the difference was considered statistically significant at P < 0.01 by Bartlett's spherical test, indicating that the questionnaire had good validity.

5.2 Model Fit Test

In this study, we utilized AMOS 26.0 software to perform a validation factor analysis to determine the overall model fit. We found that all met the fit standard by comparing the test values of the model fit indicators CFI, IFI, NFI, RMSEA, and others (refer to Table 3). We also present the path coefficient diagram of the standardized model in Figure 1. The correlation coefficients between learning motivation and learning strategies indicate a high correlation, according to the standardized model, with a medium-high correlation. The validation factor analysis demonstrates that the scale maintains a good structure after object changes and deletions.

Table 2: Results of the Reliability Test of the Dimensions of the Factors Affecting Self-regulated Learning

Form	Cronbach's Alpha	Number of Item
Self-efficacy	0.720	3
Internal Target	0.603	3
Learning Controls	0.674	4
External Target	0.617	3
Learning Significance	0.542	2
Learning Anxiety	0.649	3
General Approach	0.765	4
Learning Requests	0.610	3
Learning Programs	0.667	3
Learning Summaries	0.707	3
Evaluation of Learning	0.705	3
Learning Management	0.613	3
Motivation Scale	0.860	18
Strategy Scale	0.806	19
Total Scale	0.895	37

Table 3: Validated Factor Analysis Model Overall Fitness Test Table for the Scale

Fitting index	CMIN	CMIN\DF	GFI	IFI	CFI	NFI	RMSEA
Standard Value of Adaptability	Minimization is preferred	<3	>0.90	>0.90	>0.90	>0.90	<0.08
Statistical Value	114.183	2.482	0.935	0.963	0.963	0.94	0.075
Model Adaptability	desirable	desirable	desirable	desirable	desirable	desirable	desirable

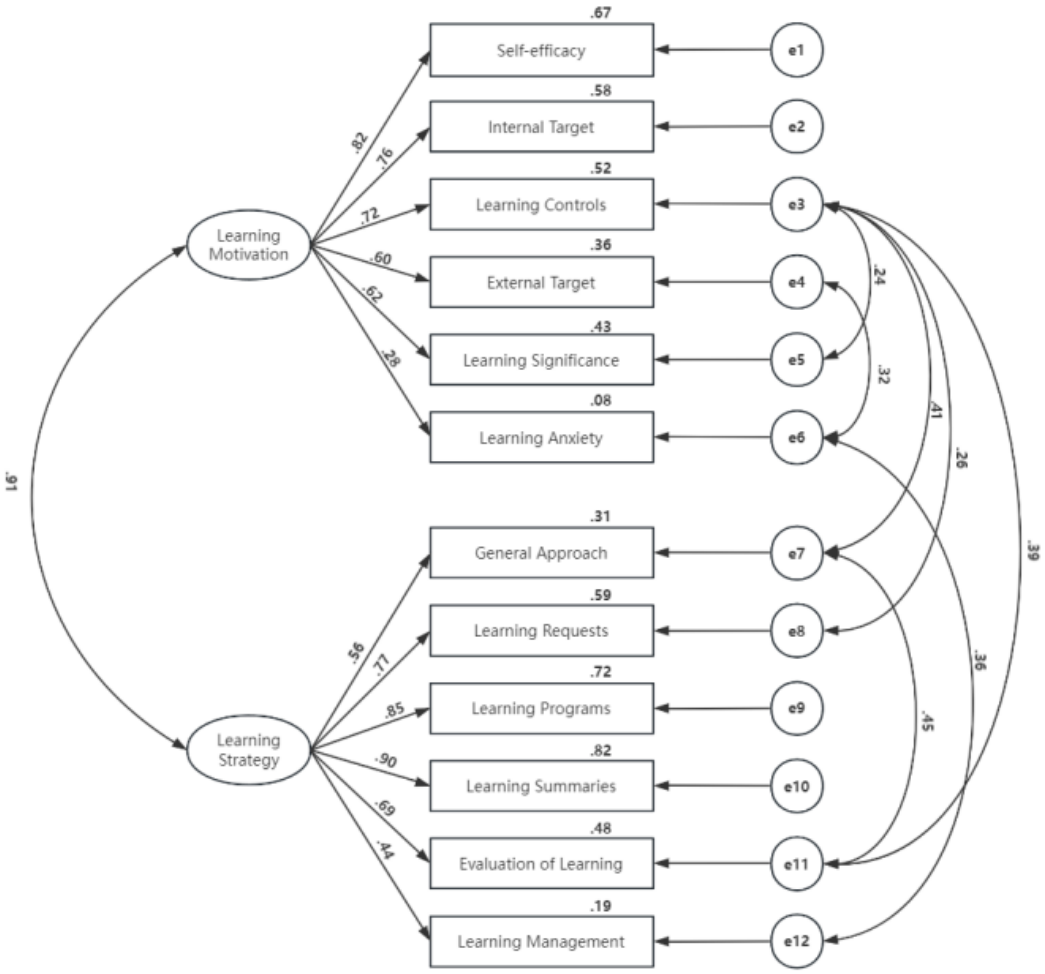

Figure 1: Standardized Model diagram

6. Data Analysis

6.1 Descriptive Analysis of Sample Information

Table 4: Descriptive Statistics of Sample Information

Category	Category of Respondents	Number	Percentage
Sex	Male	181	68.05%
	Female	85	31.95%
Major	Engineering	97	36.47%
	Management	85	31.95%
	Medicine	77	28.95%
	Others	7	2.63%
Grade	Master	251	94.36%
	Doctor	15	5.64%
Colleges	Ministry Universities	29	10.90%
	Provincial Universities	183	68.80%
	Municipal Universities	54	20.30%

Among the 266 graduate students in the sample, 181 male and 85 female students are 68.05% and 31.95% of the total, respectively. Of those, 97 majoring in engineering, 85 of management major, and 77 of medical major, accounting for 36.47%, 31.95%, and 28.95% of the sample, respectively. Regarding degree level, 252 were graduate students, and 15 students were pursuing a doctoral degree, amounting to 94.36% and 5.64%, respectively. Additionally, 29 students were from ministry-affiliated universities, 183 students were from provincial-affiliated universities, and 54 students were from city-affiliated universities, comprising 10.90%, 68.80%, and 20.30%, respectively (Table 4).

6.2 Overall Status of Learning Self-regulated

After analyzing the self-regulated learning status of 266 graduate students holding professional degrees (Table 5), overall, the mean value of each dimension is lower than 5, indicating a moderate and slightly inferior level of self-regulated learning among professional degree graduate students in the industry-teaching fusion cultivation mode. Among them, the average scores for the learning management and learning anxiety dimensions are merely 4.21 and 4.32, respectively. The learning management dimension reflects the capacity of graduate students to regulate their learning behaviors and time. Lower scores signify insufficient learning management ability. The learning anxiety dimension represents graduate students' worry over learning and assessment. Lower scores indicate higher levels of learning anxiety among graduate students.

Table 5: Descriptive Statistics of the Current Status of Self-regulated Learning

Category	Minimum value	Maximum value	Mean value	Standard deviation	Number
Self-efficacy	3.00	6.00	4.76	0.75	266
Internal Target	2.67	6.00	4.89	0.69	266
Learning Controls	2.00	6.00	4.69	0.68	266
External Target	2.00	6.00	4.55	0.83	266
Learning Significance	2.00	6.00	4.88	0.77	266
Learning Anxiety	1.00	6.00	4.32	0.95	266
General Approach	2.25	6.00	4.78	0.80	266
Learning Requests	1.67	6.00	4.89	0.68	266
Learning Programs	1.67	6.00	4.62	0.86	266
Learning Summaries	1.33	6.00	4.75	0.73	266
Evaluation of Learning	1.33	6.00	4.72	0.76	266
Learning Management	1.00	6.00	4.21	0.98	266
Motivation Scale	3.00	6.00	4.68	0.56	266
Strategy Scale	2.10	5.85	4.66	0.61	266
Learning Autonomy	2.99	5.58	4.67	0.55	266

6.3 Analysis of Gender Differences

The study utilized an independent samples T-test to investigate the variances in self-regulated learning dimensions amongst professional degree graduate students of different genders, utilizing gender as the independent variable (refer to Table 6). The study found significant gender differences in learning motivation and strategies in the context of integration between industry and education. Specifically, male students scored higher than female students in the dimensions of sense of learning controls and content ($P < 0.05$). Additionally, females showed more lavish use of learning strategies such as asking for help, making learning plans, summarizing, and managing learning ($P < 0.05$). Male students scored higher than their female peers in both study planning and summarization, suggesting more excellent proficiency in forming study plans and condensing information. In contrast, female students demonstrated higher scores in learning requests and learning management, displaying a greater willingness to seek guidance and manage their own learning proactively.

Table 6: Comparison of Scores on Self-regulated Learning Scale of Professional Degree Graduate Students of Different Genders

Form	Male	Female	T	P
Self-efficacy	4.82±0.76	4.64±0.70	1.827	0.069
Internal Target	4.94±0.69	4.78±0.68	1.732	0.084
Learning Controls	4.77±0.66	4.51±0.69	2.990*	0.003
External Target	4.59±0.88	4.45±0.73	1.415	0.159
Learning Significance	4.98±0.76	4.66±0.75	3.258*	0.001
Learning Anxiety	4.32±0.98	4.30±0.89	0.162	0.871
General Approach	4.74±0.83	4.87±0.74	-1.210	0.227
Learning Requests	4.32±0.98	4.87±0.74	3.121*	0.002
Learning Programs	4.98±0.65	4.43±0.85	2.470*	0.014
Learning Summaries	4.83±0.66	4.57±0.84	2.530*	0.013
Evaluation of Learning	4.73±0.75	4.69±0.78	0.406	0.685
Learning Management	4.32±0.96	3.97±0.99	2.783*	0.006
Motivation Scale	4.74±0.57	4.56±0.51	2.567*	0.011
Strategy Scale	4.72±0.57	4.54±0.67	2.256*	0.025
Learning Autonomy	4.73±0.54	4.54±0.55	2.563*	0.011

6.4 Analysis of Differences in Degree Level

The results revealed a significant difference in self-efficacy

between master's and doctoral degrees regarding autonomy under the integration between industry and education training model (Table 7). The independent samples T-test method was used with degree level as the dependent variable, and the mean scores for Master's self-efficacy (4.78±0.75) were significantly higher than those for doctoral degrees (4.38±0.68). This dimension encompasses the sense of accomplishment that postgraduate students experience in their academic pursuits and their proficiency in learning practices. The phenomenon mentioned above could be attributed to Master's students, who are newly enrolled in graduate school, exhibiting greater confidence in their learning abilities. In contrast, doctoral candidates, with their extended period in graduate school, may demonstrate a higher degree of self-doubt regarding their capacity for self-regulated learning due to the mounting difficulties and setbacks they have encountered.

Table 7: Comparison of Scores on Self-regulated Learning Scale between Master's and Doctoral candidates

Form	Master	Doctor	T	P
Self-efficacy	4.78±0.75	4.38±0.68	2.058*	0.041
Internal Target	4.90±0.69	4.76±0.66	0.758	0.449
Learning Controls	4.68±0.68	4.82±0.58	-0.764	0.446
External Target	4.55±0.83	4.42±0.92	0.588	0.557
Learning Significance	4.89±0.78	4.70±0.70	0.929	0.354
Learning Anxiety	4.31±0.95	4.38±1.03	-0.259	0.796
General Approach	4.79±0.80	4.55±0.83	1.15	0.251
Learning Requests	4.88±0.69	5.04±0.53	-0.916	0.361
Learning Programs	4.62±0.87	4.62±0.80	-0.026	0.979
Learning Summaries	4.76±0.73	4.60±0.83	0.800	0.425
Learning Evaluation	4.72±0.75	4.73±0.96	-0.06	0.952
Learning Management	4.20±0.98	4.33±1.13	-0.500	0.617
Motivation Scale	4.70±0.56	4.59±0.48	0.682	0.496
Strategy Scale	4.66±0.61	4.64±0.63	0.080	0.936
Learning Autonomy	4.68±0.56	4.62±0.49	0.393	0.695

6.5 Discipline Variability Analysis

Using the single factor ANOVA test method, the differences of engineering, medicine and management degree graduates were analyzed by taking subjects as independent variables (Table 8). The findings indicated that no significant differences were observed in the 12 dimensions, both in the learning motivation subscale and the learning strategy subscale. Therefore, the study suggests that there is no significant variation in the learning self-regulated of professional degree students across diverse disciplines.

6.6 Analysis of Difference on University Level

Using the single factor ANOVA test method, the university level is taken as the independent variable, and the difference of different university levels is analyzed. Results from Table 9 indicated significant differences based on the independent variable of college and university level, with ministry-affiliated and provincial universities performing better than city-affiliated universities in terms of learning significance. A post hoc test comparing the learning significance of students at different university levels indicates a significant difference in the perceptions of the usefulness of learning between graduate students of ministry-affiliated and province-affiliated universities. The study reveals a significant divergence in the learning significance of professional degree graduate students in municipal and provincial universities.

6.7 Correlation Analysis

Correlation analysis showed (Tables 10 and 11) that there was a significant relationship ($P < 0.05$), except that there was no significant relationship between learning anxiety and the general approach, and all of them showed a significant positive correlation. In terms of learning motivation and learning strategy as a whole, there is a significant positive correlation between learning motivation and learning strategy ($P < 0.001$) and a significant positive correlation between learning motivation and learning strategy and learning self-regulated ($P < 0.001$). The correlation analysis proves that there is an intrinsic mismatch between learning motivation and learning strategy and that positive learning motivation and good learning strategy can promote each other and stimulate the desire for self-regulated learning of professional degree graduate students.

Table 8: Comparison of Scores of Self-regulated Learning Scales of Professional Degree Graduate Students in Different Professional Categories

Form	Engineering	Management	Medical	F	P
Self-efficacy	4.79 ±0.72	4.79 ±0.69	4.73 ±0.80	0.222	0.881
Internal Target	5.03 ±0.72	4.83 ±0.69	4.79 ±0.62	2.070	0.105
Learning Controls	4.67 ±0.53	4.75 ±0.73	4.63 ±0.77	0.521	0.668
External Target	4.48 ±0.85	4.57 ±0.85	4.59 ±0.80	0.276	0.843
Learning Significance	4.96 ±0.62	4.78 ±0.90	4.88 ±0.79	1.042	0.374
Learning Anxiety	4.22 ±0.91	4.28 ±1.00	4.45 ±0.96	0.856	0.464
General Approach	4.82 ±0.91	4.75 ±0.72	4.76 ±0.77	0.245	0.865
Learning Requests	4.96 ±0.59	4.89 ±0.69	4.80 ±0.77	0.857	0.464
Learning Programs	4.65 ±0.86	4.66 ±0.81	4.53 ±0.94	0.453	0.716
Learning Summaries	4.85 ±0.67	4.68 ±0.68	4.70 ±0.85	1.225	0.301
Evaluation of Learning	4.77 ±0.69	4.73 ±0.77	4.65 ±0.84	0.604	0.613
Learning Management	4.18 ±0.97	4.25 ±0.95	4.24 ±1.04	0.581	0.628
Motivation Scale	4.71 ±0.50	4.67 ±0.57	4.67 ±0.60	0.090	0.966
Strategy Scale	4.70 ±0.56	4.66 ±0.57	4.61 ±0.71	0.346	0.792
Learning Autonomy	4.71 ±0.49	4.66 ±0.54	4.64 ±0.62	0.206	0.892

Table 9: Comparison of Scores of Self-regulated Learning Scale of Professional Degree Graduate Students at Different University Levels

Category	Ministry Universities	Provincial Universities	Municipal Universities	F	P
Self-efficacy	4.89 ±0.61	4.72 ±0.79	4.76 ±0.68	1.029	0.359
Internal Target	4.98 ±0.74	4.89 ±0.68	4.70 ±0.66	1.494	0.226
Learning Controls	4.70 ±0.64	4.69 ±0.68	4.66 ±0.72	0.048	0.953
External Target	4.59 ±0.89	4.55 ±0.83	4.44 ±0.77	0.314	0.731
Learning Significance	4.77 ±0.82	4.96 ±0.71	4.59 ±0.94	3.702*	0.026
Learning Anxiety	4.29 ±0.96	4.34 ±0.95	4.20 ±1.00	0.322	0.725
General Approach	4.91 ±0.84	4.77 ±0.79	4.59 ±0.76	1.542	0.216
Learning Requests	4.99 ±0.57	4.90 ±0.72	4.64 ±0.57	2.578	0.078
Learning Programs	4.69 ±0.82	4.61 ±0.90	4.51 ±0.74	0.442	0.643
Learning Summaries	4.68 ±0.64	4.76 ±0.78	4.61 ±0.56	0.601	0.549
Evaluation of Learning	4.80 ±0.78	4.73 ±0.77	4.53 ±0.68	1.206	0.301
Learning Management	4.23 ±1.07	4.21 ±0.99	4.18 ±0.84	0.020	0.981
Motivation Scale	4.72 ±0.53	4.70 ±0.55	4.54 ±0.63	1.045	0.353
Strategy Scale	4.73 ±0.52	4.66 ±0.65	4.51 ±0.52	1.274	0.281
Learning Autonomy	4.73 ±0.49	4.68 ±0.57	4.53 ±0.55	1.273	0.282

Table 10: Results of Correlation Analysis of Each Dimension

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Self-efficacy	1											
Internal Target	0.67**	1										
Learning Controls	0.58**	0.51**	1									
External Target	0.53**	0.43**	0.38**	1								
Learning Significance	0.56**	0.50**	0.60**	0.39**	1							
Learning Anxiety	0.26**	0.16**	0.25**	0.47**	0.19**	1						
General Approach	0.38**	0.40**	0.62**	0.15*	0.33**	0.09	1					
Learning Requests	0.55**	0.54**	0.67**	0.46**	0.48**	0.19**	0.47**	1				
Learning Programs	0.62**	0.56**	0.58**	0.49**	0.48**	0.23**	0.46**	0.66**	1			
Learning Summaries	0.61**	0.61**	0.66**	0.45**	0.53**	0.21**	0.56**	0.70**	0.78**	1		
Learning Evaluation	0.54**	0.51**	0.67**	0.30**	0.38**	0.21**	0.66**	0.55**	0.55**	0.67**	1	
Learning Management	0.35**	0.29**	0.33**	0.40**	0.24**	0.48**	0.24**	0.22**	0.43**	0.40**	0.27**	1

Footnotes: In Table 10, (1) represents "Self-efficacy" and (2) represents Internal Target. (3) represents Learning Controls, (4) represents External Target, (5) represents Learning Significance, (6) represents Learning Anxiety, (7) represents General Approach, (8) represents Learning Requests, (9) represents Learning Programs, (10) represents Learning Summaries, (11) represents Learning Evaluation, (12) represents Learning Management.

Table 11: Results of Correlation Analysis between Learning Strategies and Learning Motivation

Category	1	2	3
Learning Motivation	1		
Learning Strategies	0.78**	1	
Learning Autonomy	0.94**	0.95**	1

7. Research Conclusions and Improvement Strategies

7.1 Conclusions

7.1.1 The Overall Level of Self-regulated Learning among Professional Degree Graduate Students is Low

Obviously, the learning self-regulated of professional degree graduate students under the integration between industry and education cultivation mode has not yet reached the ideal level and needs to be improved urgently. This study found that the overall self-regulated learning ability of professional degree graduate students under the integration between industry and education training mode is only at a medium level, especially the scores in the learning anxiety and learning management dimensions are relatively low, which reflects that the professional degree graduate students have a high degree of anxiety about the learning process and results, and their ability to control learning behavior and time is poor. As the main body of learning, graduate students should consciously enhance their self-regulated learning consciousness, constantly stimulate and improve their self-regulated learning ability, and lay a solid foundation for their overall development. One of the major differences between the training mode of professional graduate students and academic graduate students is the "double tutor system." Due to this training characteristic, professional degree students are unable to communicate with instructors in time and ask for advice, and this kind of training mode places higher demands on self-regulated learning ability, which requires students to stimulate learning motivation and adjust learning strategies to strengthen self-regulated learning.

7.1.2 The Self-regulated Learning Ability of Doctoral candidates is Weaker than that of Master Students

According to the analysis of the difference of self-regulated learning of graduate students in different degree levels, there are differences in the level of independent learning between master and doctor. It is noteworthy that doctoral candidates scored lower than master students in most dimensions and were significantly weaker than master students in self-efficacy, which reflects that doctoral candidate gained a lower sense of achievement in the process of research than master students. It was found that the research self-efficacy of doctoral candidates significantly predicts the research input and output of doctoral candidates and even influences their research interests and their determination and career aspirations to engage in scientific research in the future (Liu Chengke & Kong Yan,2017). Therefore, training units must pay great attention to the lack of self-regulated learning ability of doctoral candidates. Analyzing the reasons, may be related to the lack of achievement of doctoral candidates, the phenomenon of "identity foreclosure," and the insufficient attention of training units. From the lack of achievement, doctoral candidates generally have more scientific research results, but most of the results do not have enough application, coupled with doctoral candidates' own and society's

expectation of their social contribution is higher than that of master students, which will easily lead to the weakening of doctoral candidates' sense of self-efficacy, and even to the situation of avoiding scientific research and passive learning. Second, the degree of attention paid by training units is insufficient. From the phenomenon of "homogeneity early closure," compared with a Master degree or doctoral degree, with the continuous focus of the research field, to a certain extent, there is also the problem of narrowing the cognitive scope; at the same time, at the present stage, obtaining a doctor degree often need to experience a longer education path, which is bound to form a highly professional identity and the persistence of identity, so they are more prone to occur career troubles, and form a relatively clear but externally conferred and uninternalized career goal, which is not easy to drive learning motivation and has a reverse effect on the independent learning enthusiasm.

7.1.3 Differences in Levels of Self-regulated Learning Among Universities

According to the analysis of the differences in self-regulated learning of professional degree graduate students in universities of different levels, it is found that there are differences in the level of self-regulated learning of graduate students in universities of different levels, and the students of municipal universities are less self-regulated in learning than those of ministry and provincial universities. Analyzing the reasons for this, it is possible that among these three types of schools, municipal universities are naturally disadvantaged in terms of the quality of student sources, learning atmosphere, and resource endowment. In contrast, the quality of municipal universities is not as good as the other two types of universities; the current municipal universities are still mainly dependent on the transfer of the source of students, and the proportion of students admitted to the first volunteer is low. Because ministry and provincial universities have a longer time to obtain graduate training qualifications and a longer time to set up academic places, they have more accumulation from the allocation of teaching faculty, the construction of academic and research platforms, and the creation of academic atmosphere. It is much easy to create mutual positive incentives to stimulate graduate students' interest in learning and self-regulated learning consciousness. From the current government investment in higher education resources restrictions, per capita investment, for example, the ministry universities are often higher than the provincial and municipal universities; therefore, the opportunities for graduate students to receive scholarships and scientific research funds are also increasing, and universities are also making greater efforts to invest in the construction of hardware facilities and teacher faculties, which are important guarantees to stimulate graduate students' self-regulated learning ability.

7.2 Improvement Strategies

7.2.1 Strengthen Graduate Students' Self-regulated Learning Awareness, Self-directed Learning Motivation, and Self-regulated Learning Strategy.

Highly self-regulated learning is the key for graduate students to develop into highly innovative talents. Graduate students need to train the subject consciousness of self-regulated learning, improve their independent learning ability, and make more decisions about what and how to study and research, so as to constantly form their own personality, ideas and creativity (Wang Xia, 2018). Graduate students with strong self-regulated learning ability should both "eager to learn" and "able to learn," which means they can self-motivate their learning motivation and self-regulate their learning strategies in the learning process.

Self-regulated learning must be based on the promotion of learning motivation. Graduate students can enhance learning self-regulated by improving self-efficacy, understanding the meaning of learning, clarifying learning goals, adjusting learning anxiety, and other learning motivations. Firstly, in the study of theory and practice, graduate students should take the initiative to fully grasp the subject knowledge, strengthen their self-confidence through mastering the skills of study, research and practice faster, and constantly improve their self-efficacy. Second, since clear learning goals are more effective in promoting self-regulated learning, graduate students should clearly define practical and quantifiable research and practice goals, and at the same time, they should be able to set feasible goals based on their own resources, strengths in their disciplines, and time planning. Third, the consideration of graduate students' learning motivation should be based on the understanding of the significance of learning. Graduate students should actively learn about the demand trends of their majors and industries through on-campus and off-campus learning practices, understand the practical significance and application value of learning, and realize the value-added effect of learning on their future careers. Fourth, since excessive learning anxiety will discourage learning motivation and negatively affect learning self-regulated, graduate students should know how to regulate their learning status in time and alleviate unnecessary learning anxiety through various ways such as counseling and confiding.

Self-regulated learning must be ensured by mastering learning strategies. Graduate students can improve their self-regulated learning ability by mastering research methods, making study plans, summarizing and evaluating in time, and other learning strategies. First, graduate students should know how to use the Internet to obtain learning resources, master scientific research tools, and methods as early as possible, lay a solid foundation for learning and research, and provide a good basic guarantee for self-regulated learning. Second, graduate students should take the initiative to refine the study plan to the academic year, semester, and even quarter and month according to the requirements of graduation and degree awarding, and the specific learning content of each period should be scientifically planned under the guidance of the tutor; so as to avoid excessive pressure and unrealistic expectations that reduce the autonomy of learning. Thirdly, the timely summarization and learning evaluation can prevent deviation from the learning goals. After a period of study, postgraduate students should consolidate and summarize the research and practice content in time, take the initiative to carry out learning evaluation, independently combine theoretical learning with practical experience, check the gaps, and make up for the shortcomings at the same time, summarize the learning gains and achievements, evaluate whether the learning plan is reasonable, whether the plan is completed on time, whether the strategy is adjusted in time,

etc., so as to better promote learning autonomy and improve the efficiency of self-regulated learning.

7.2.2 Enhancing Doctoral Candidates' Self-efficacy, Optimizing the Training Process, and Focusing on Career Development Planning

Doctoral education is the highest level of higher education in China and the main way to train first-class innovative talents (Liu Chengke & Kong Yan, 2017). The low self-efficacy of doctoral candidates found in this study should be enhanced by relevant training units in the following three aspects. First, enhances the self-efficacy of professional doctoral candidates. Improve the mechanism of mental health services for doctoral candidates, conduct regular surveys on the psychological status of doctoral candidates, provide psychological counseling and stress management, and help doctoral candidates cope with the academic pressure caused by graduation and technical conflicts, as well as the psychological pressure caused by the environment. Based on the cooperation foundation of industry-education integration, training units should strive to establish closer cooperation with various kinds of off-campus units, which can not only provide more diversified practice opportunities for doctoral candidates but also help doctoral candidates make use of the industry, industry, and apply and transform the scientific research results that meet the market demand as much as possible, in order to achieve the purpose of improving doctoral candidates' self-efficacy. Second, the focus is on incorporating the enhancement of self-regulated learning awareness into the doctoral training process. We should guide doctoral candidates to have a deeper understanding of the limits of their abilities and cognitive limitations through the guidance of their supervisors so as to stimulate their desire for knowledge and enthusiasm for learning from the reverse incentive. Third, we should pay attention to the career development planning of doctoral candidates to overcome the influence of "identity foreclosure" on doctoral candidates' self-regulated learning. Our universities have a long history of carrying out career planning education for undergraduates, but there is a relative lack of awareness of carrying out career planning education for graduates, and it is even less necessary to carry out career planning education for doctors. From the perspective of self-regulated learning, we believe that training institutions should strengthen career planning education and guidance for doctoral candidates so as to encourage doctoral candidates to internalize career planning through their own practical experience or the guidance of others, promote learning motivation, and stimulate enthusiasm for self-regulated learning.

7.2.3 Emphasize the Improvement of Graduate Students' Self-regulated Learning Ability, Strengthen the Construction of Academic Culture, and Promote the Construction of Basic Resources.

In order to ensure educational fairness, efforts should be made to narrow the gap between students' self-regulated learning abilities at different levels of higher education so that graduate students all have the opportunity to engage in self-regulated learning and development. This study argues that universities can narrow this gap by emphasizing the cultivation of graduate students' self-regulated learning ability, strengthening the construction of academic culture, and enhancing the construction of basic resources. First, universities should pay more attention to the cultivation of graduate students' self-regulated learning ability. For example, the assessment of self-regulated learning ability should be integrated into the enrollment of municipal universities to examine the comprehensive ability of students; targeted measures should be taken to carry out the cultivation of self-regulated learning ability in the cultivation process, such as strengthening the provision of systematic method courses to help students quickly improve their thinking, reading, writing and researching ability, so as to improve the self-regulated learning ability of graduate students and catch up with other universities. Second, the construction of academic culture should be strengthened. For example, municipal universities should pay more attention to the creation of an academic atmosphere and stimulate the academic enthusiasm of postgraduates by building a platform for cooperation in scientific research and practice, deepening the construction of practice bases, and promoting the development of academic horizons, so as to enhance their learning autonomy. Third, comprehensively improve the level of basic resource construction. For example, municipal universities should pay special attention to the construction of learning resources; in the case of both geographical (most municipal universities do not run schools in provincial central cities) and resource endowment are at disadvantages, they should pay more attention to the creation of a high-quality learning environment and the building of hardware facilities; making every effort to ensure to create conditions for self-regulated learning. They should also pay attention to the investment of material incentive resources, try their best to expand the investment of external resources, and attract enterprises and institutions to sponsoring education, and optimize the mechanism of graduate student academic incentives and scholarships. Through these external strong stimuli, to stimulate the motivation of graduate students, so as to enhance the awareness and ability of independent learning.

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