

중국 대학생의 그릿과 학업성취도의 관계에서 자기주도학습과 직업정체성의 이중 매개효과

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Dual Mediating Effects of Self-directed Learning and Professional Identity in the Relationship between Grit and Academic

Achievement of Chinese College Students

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요약 본 연구는 대학생의 그릿이 학업 성취에 미치는 영향에서 자기주도학습과 직업 정체성의 이중 매개효과를 확인하고 학업성취 증진을 위한 기초자료를 제공하는데 목적이 있다. 이 연구는 광저우에 있는 한 대학의 학생 310명을 표본으로 선정했다. 자료 분석은 SPSS PC+ ver. 25.0과 PROCESS macro ver. 4.2를 활용하였다. 빈도분석, 신뢰도분석, 상관분석, 이중 매개효과분석을 실시했다. 통계적 추론의 견고성을 높이기 위해 부트스트랩 방법을 사용했다. 연구의 결과는 다음과 같다. 첫째, 그릿, 자기주도학습, 직업정체성, 학업성취는 모두 유의미한 정적 상관관계를 보였다. 둘째, 자기주도학습과 직업 정체성은 그릿과 학업성취의 관계에서 이중 매개 역할을 하였다. 이러한 결과는 학업 성취와 관련하여 그릿, 자기주도학습, 직업정체성의 중요성을 확인했으며, 교육자들이 학생들의 학업적 성공을 촉진하기 위한 실질적인 지침을 제공했다.

주제어 : 그릿, 자기주도학습, 직업정체성, 학업성취도, 대학생, 이중 매개효과

Abstract This study aims to examine the dual mediating effects of self-directed learning and professional identity in the impact of grit on the academic achievement of college students. The study selected 310 students from a college in Guangzhou as a sample. For data analysis, this study utilized SPSS PC+ ver. 25.0 and PROCESS macro ver. 4.2. Frequency analysis, reliability analysis, correlation analysis and dual mediating effect analysis were performed. The Bootstrap method was used to enhance the robustness of statistical inference. First, the results showed that grit, self-directed learning, professional identity and academic achievement all showed a significant positive correlation. Second, self-directed learning and professional identity played a dual mediating role in the relationship between grit and academic achievement. The results confirmed the importance of grit, self-directed learning and professional identity in academic achievement, and provided practical guidance for educators to promote students' academic success.

Key Words : Grit, Self-directed learning, Professional identity, Academic achievement, College student, Double mediation effect

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1. Introduction

The academic level of students in higher vocational colleges has a significant influence on the progression and expansion of local small and medium-sized enterprises. Hence, there is a pressing need to delve deeper into the factors that influence academic achievement and strive for a consistent enhancement of students' academic standing. The factors affecting academic achievement can be roughly divided into two categories, namely external environmental factors such as school environment, campus atmosphere, and family socioeconomic status, and internal factors such as psychological capital, learning motivation, and autonomous learning. Among them, internal factors are more critical [1], and grit is an important internal factor. In addition, it is found that grit has a positive impact on self-directed learning [2], and self-directed learning plays a mediating role between academic self-efficacy and academic achievement [3]. Therefore, it is necessary to study the impact of grit on academic achievement by taking self-directed learning as a mediating variable.

Professional identity can be predicted as another mediating variable affecting academic achievement. Multiple studies have shown that professional identity has a significant positive effect in enhancing college students' learning motivation, improving their learning participation, and optimizing their academic performance [4, 5]. In addition, grit can also positively predict professional identity [6]. However, although many studies have been conducted on the effect of grit on academic achievement, there are virtually no studies on how self-directed learning and professional identity mediate the relationship between these two variables and how this mediating effect strengthens the effect of grit on academic achievement. Therefore, we sought to study this.

Therefore, this study aims to investigate the role

of self-directed learning and professional identity in the relationship between grit and academic achievement. To this end, the following research questions were set. First, what are the correlations between grit, self-directed learning, professional identity, and academic achievement? Secondly, do self-directed learning and professional identity play a dual mediating role in the relationship between grit and academic achievement?

2. Theoretical background

2.1 Grit and academic achievement

Grit is defined as a kind of continuous passion and endurance for long-term goals [7]. It includes not only the characteristics of not forgetting the original intention, concentration and perseverance, but also the character traits of self-motivation, self-discipline and self-adjustment. And compared with intelligence factors, grit is more accurate in predicting academic achievement [7]. From the dimension of grit, the dimension of continuous effort has a greater impact on academic performance than the dimension of consistent interest [8]. In addition, the dimension of perseverance was also found to be significantly related to demographic information [9].

Academic achievement in a broad sense refers to the dual achievements of cognitive and non-cognitive levels that are considered to be achieved by students through learning, including positive changes at the psychological and behavioral levels [10]. By delving deeply into the dual correlations between the core mission of colleges and universities, student engagement, and academic outcomes, the research reveals a key finding: students' individual characteristics play a dominant role in shaping their academic achievement [1], and among the many personality factors that affect academic achievement, grit was found to have a significant positive impact on the education level of adult individuals, the

academic GPA level of college students, and the performance of primary school students in word spelling contests [11]. In addition, grit influences academic achievement through academic engagement [12]. Therefore, there is a need to study the relationship between grit and academic achievement more deeply.

2.2 Mediating effect of self-directed learning

With the advent of a lifelong learning society, education is no longer limited to traditional learning environments and specific age groups, but has become a lifelong process. Therefore, autonomous learning ability has become a vital ability. Based on Bandura's social learning theory, Zimmerman proposed a three-dimensional model of self-regulated learning, arguing that self-directed learning is a comprehensive regulation of learning goals, processes, and results by learners [13]. Existing studies have verified the mediating role of self-directed learning strategies in the relationship between grit and academic achievement [14]. Especially in the current massive open online courses, when learning forms are more flexible and diverse, self-directed learning has become a key factor in students' academic achievement [15]. Based on the above research results, this study proposes a hypothesis to verify the mediating role of self-directed learning in the relationship between grit and academic achievement.

2.3 Mediating effect of professional identity

Professional identity is defined as the internalized values, beliefs, and norms of a profession, developed through education, training, and experiences within a particular field [16]. It reflects how individuals see themselves and are seen by others as members of their profession, often integrating personal identity with professional roles. This identity evolves over time and is crucial in shaping how professionals

perceive their work and engage with their communities [16]. Multiple studies have shown that positive psychology, including grit, can positively predict professional identity or professional attitude [17, 18, 19]. Many studies have also found that professional identity significantly affects academic achievement [20, 21, 22]. Therefore, this study aims to verify the mediating role of Chinese college students' professional identity in the relationship between grit and academic achievement.

2.4 Relationship between self-directed learning and professional Identity

There have been few studies on the effect of self-directed learning on professional identity. Hao et al. [23] reported that there was the self-directed learning abilities of nursing students and their correlation with professional identity in a study targeting nursing students, and Zhang et al. [24] reported how psychological factors, such as stress and psychological capital, influence self-directed learning and, in turn, affect the development of professional identity among nursing students. Another study reported that medical students' self-directed learning abilities during online education had a significant correlation with professional identity and that professional identity was a key predictor of self-directed learning levels among students [25]. Clark, & Parikh [26] discussed how self-directed learning enhanced professional identity by fostering autonomy and motivation in learning and indicated key factors in the formation of a strong professional identity among healthcare students. These results predicted that self-directed learning had a positive effect on professional identity, and this study was to confirm whether self-directed learning and professional Identity dually mediated the relationship between grit and academic achievement.

3. Methods

3.1 Research model

To verify the dual mediating effect of grit → self-directed learning → professional identity → academic achievement, this study utilized model 6, a serial dual mediation effect analysis method of PROCESS macro, and the research model established based on previous studies is shown in [Fig. 1].

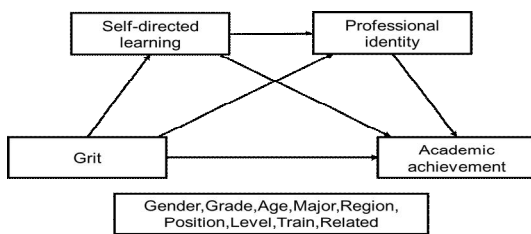


Fig. 1. Research Model

3.2 Research subjects and data collection methods

The data were collected through a questionnaire survey. From March to April 2023, 371 questionnaires were distributed to Guangzhou Nanyang Polytechnic College. After collecting and removing invalid questionnaires, a total of 310 questionnaires were used for analysis (with an effective rate of 83.6%). Among the survey participants, 47.1% were male and 52.9% were female. In terms of grades, there were 22.9% students in first grade, 56.1% students in second grade, and 21.0% students in third grade. In terms of age, there were 17.4% students under the age of 18, 34.8% students under the age of 19, 30.3% students under the age of 20, and 17.4% students over the age of 20. In terms of major, there were 55.8% students majoring in e-commerce, 27.1% students majoring in business management, and 17.1% students majoring in computer science. In terms of region, 64.5% students live in rural areas, and 35.5% students live in urban areas. In terms of positions, 27.1% students served as student leaders,

and 72.9% students had no position. In terms of academic level, 14.5% students had low academic level, 47.1% students had medium academic level, and 38.4% students had high academic level. Of the students, 71% students participated in professional skills training, while 29% students did not. In addition, 54.8% students had relatives or friends engaged in related work, and 45.2% students did not.

3.3 Measurement tools

3.3.1 Grit

Grit was measured using the Short Grit Scale (Grit-S) developed by Duckworth and Quinn [27]. Li et al. verified that Grit-S has good reliability and validity among Chinese adolescent students [28]. The questionnaire consists of 8 items, divided into two dimensions: effort persistence (e.g., difficulties and setbacks will not discourage me) and interest consistency (e.g., I will be interested in something and concentrate on it for a short period of time, but will soon lose interest in it). Each dimension has 4 items. Employing a Likert scale of 5 points, with scores ranging from 1 to 5 from "very inconsistent" to "very consistent". Among them, the items in the interest consistency dimension are all reverse scored. The instrument's reliability was measured as a Cronbach's α of .824.

3.3.2 Academic achievement

This study used academic performance as an independent variable. The academic performance of college students was measured using the Academic Achievement Scale for College Students compiled by Wang [29] and modified by Chen [30]. The scale consists of two parts, behavioral performance and objective performance. Among them, behavioral performance includes three dimensions, learning performance, interpersonal promotion, and learning ability. The scale has 17 items, using Likert 5 rating,

"very inconsistent", "relatively inconsistent", "average", "relatively consistent", "very consistent", the higher the total score, the better the academic achievement. The Cronbach's α of academic achievement is .956.

3.3.3 Self-directed learning

Adopting the "Self-Directed Learning Questionnaire for College Students in Ubiquitous Environment" that was compiled by Fang et al. [31], this scale has 17 items and encompassed four dimensions: learning content, learning monitoring, learning assessment, and learning attitude. It employs a Likert 5-point rating system, with scores ranging from "very inconsistent" to "very consistent", assigned as "1", "2", "3", "4", and "5" respectively. The 3rd, 8th, and 16th items are scored in reverse. The higher the total score achieved, the stronger the ability for self-directed learning is demonstrated. The Cronbach's alpha for self-directed learning was .928.

3.3.4 Professional identity

Adopting the "College Student Professional Identity Questionnaire" developed by Qin [32] and modified by Chen [26] was adopted. This scale has 20 items, including four dimensions: professional cognitive identity, emotional identity, behavioral identity, and appropriate identity. It uses a Likert 5-point rating system, with scores ranging from "very inconsistent" to "very consistent", calculated as "1", "2", "3", "4", and "5" respectively. The professionally recognized Cronbach's alpha was .961.

3.3.5 General characteristics of participants and covariates

In the general characteristics of this study subjects, gender is male=1, female=2, grade is freshman to junior year, age is $\leq 18=1$, $19=2$, $20=3$, \geq

$21=4$, major is e-commerce=1, business management=2, computer=3, region is township=1, urban=2, position is student leader=1, not student leader=2, level is low=1, medium=2, high=3, train is having training experience=1, no training experience=2, related is having relatives or friends engaged in related work=1, not having relatives or friends engaged in related work=2.

3.4 Data analysis

For data analysis, SPSS PC+ Win. version 25.0 and the SPSS PROCESS macro version 4.2 were utilized. A frequency analysis was performed as the basis, and Cronbach's α was calculated to determine reliability. Pearson's bivariate correlation analysis was then conducted to assess the correlation between major variables, while Model 6 of the SPSS PROCESS macro was employed to analyze the serial and dual mediating effects.

4. Results

4.1 Correlation between main variables

Pearson correlation analysis was used to determine the relation between variables, and the results are shown in Table 1. There was a significant positive correlation between grit, academic achievement, self-directed learning, and professional identity. Among them, the correlation coefficient between professional identity and academic achievement was the highest ($r=.778$, $p<.01$), followed by the correlation coefficient between self-directed learning and professional identity ($r=.661$, $p<.01$), and the correlation coefficient between self-directed learning and academic achievement ($r=.557$, $p<.01$). The diagnosis of multicollinearity showed that there is no multicollinearity because there is no correlation coefficient greater than .7 between independent variables.

The descriptive statistical analysis results showed that the average value of academic achievement was the highest, at 3.8939, followed by the average value of professional identity, at 3.7613, the average value of self-directed learning, at 3.4926, and the average value of grit was the lowest, at 3.45.

Table 1. Correlation between main variables

	1	2	3	4
1. Grit	1			
2. Self-directed learning	.504**	1		
3. Professional identity	.517**	.661**	1	
4. Academic achievement	.553**	.557**	.778**	1
M	3.4500	3.4926	3.7613	3.8939
SD	.56934	.56052	.60481	.57358

**p<.01

4.2 Dual mediating effects of self-directed learning and professional identity between grit and academic achievement

To verify the dual mediating effect of self-directed learning and professional identity on the relationship between grit and academic achievement, the SPSS PROCESS macro model 6 proposed by Hayes [17] was adopted for analysis. The bootstrap sampling was configured to include 5,000 samples, with a confidence interval set at 95% to ensure the robustness and reliability of the statistical inferences. The analysis results are shown in Fig. 2 and Table 2.

First, in the mediating variable model, grit was significantly related to self-directed learning(.4345, p<.001) and professional identity (.2535, p<.001), respectively, and self-directed learning also had a significant positive effect on professional identity (.5487, p<.001).

Second, in the dependent variable model, grit (.2147, p<.001) and professional identity (.6006, p<.001) each had a positive and significant effect on academic achievement. Self-directed learning did not

have a significant effect on academic achievement (.0170, p>.05).

Third, the total effect of grit on academic achievement was .5176 (p<.001), and the direct effect of grit on academic achievement was reduced to .2147 (p<.001) with the addition of self-directed learning and professional identity.

It was found that M1 (X → M1 → Y) was .0074 (-.0321~.0536), with a 95% confidence interval including “0”, indicating that self-directed learning did not have a simple mediating effect on the relationship between grit and academic achievement. M2 (X → M2 → Y) was .1523 (.0651~.2408), with a 95% confidence interval that did not include “0”, validating that professional identity played a mediating role in the relationship between grit and academic performance. The magnitude of the double mediation effect M1 & M2 (X → M1 → M2 → Y) was .1432 (.0938~.2039), and there was no “0” value between the upper and lower limits of the confidence interval, confirming the double mediation effect.

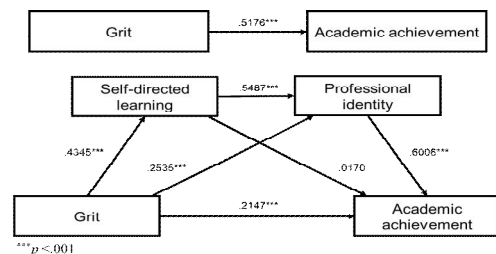


Fig. 2. Effect size for each path

Table 2. Dual mediating effects of Self-directed learning and Professional identity

Variables	Mediating variable model 1 (DV: Self-directed learning)			Mediating variable model 2 (DV: Professional identity)			Dependent variable model (DV: Academic achievement)			
	Coefficient	SE	t value	Coefficient	SE	t value	Coefficient	SE	t value	
Constan	2.6541	.6652	3.9899**	1.8837	.6232	3.0228*	.3847	.4860	.7916	
ID	Grit	.4345	.0509	8.5434***	.2535	.0518	4.8967***	.2147	.0413	5.1923***
M1	Self-dire			.5487	.0528	10.3945***	.0170	.0473	.3599	

	Self-directed learning						
M2	Professional identity				.6006	.0445	13.4962**
Control variables	Gender	-.1237	.0622	-1.9904*	-.0615	.0571	-1.0766
	Grade	.0134	.0597	.2240	-.0062	.0545	-1.1333
	Age	.0031	.0343	.0909	-.0318	.0314	-1.0142
	Major	-.0227	.0174	-1.3080	.0049	.0159	.3062
	Region	-.0032	.0576	-.0559	-.0865	.0526	-1.6462
	Position	-.1734	.0651	-2.6647*	-.0022	.0601	-.0368
	Level	.0099	.0295	.3360	.0451	.0269	1.6761*
	Train	-.1101	.0689	-1.5996	-.0964	.0631	-1.5233
	Related	-.0637	.0558	-1.1419	-.0721	.0510	-1.4146
Model Summary	R ²	.3074		.5060		.6770	
	F	13.2732**		27.7535**		51.8763**	
Effects		Effect	SE	Confidence interval			
				LLCI*	ULCI*		
Total effect		.5176	.0485	.4222	.6129		
Direct effect		.2147	.0413	.1333	.2961		
Total indirect effect		.3029	.0485	.2114	.4004		
Indirect effect	Grit → Self-directed learning → Academic achievement	.0074	.0216	-.0321	.0536		
	Grit → Professional identity → Academic achievement	.1523	.0451	.0651	.2408		
	Grit → Self-directed learning → Professional identity → Academic achievement	.1432	.0278	.0938	.2039		

*p<.05, **p<.01, ***p<.001, ID: Independent variable, DV: Dependent variable, M: Mediating variable

5. Discussion and Conclusion

This study was conducted for college students, aiming to determine the dual mediating effects of self-directed learning and professional identity on grit's impact on academic achievement. The research discussion and conclusion are as follows.

Firstly, Pearson correlation analysis showed a significant positive correlation between grit, self-directed learning, professional identity, and academic achievement. This was consistent with previous research findings [11], once again confirming the significant positive correlation that existed between grit and academic achievement. These results indicate that increased grit, self-directed learning, and professional identity lead to increased academic achievement.

Secondly, the dual mediating effects of self-directed learning and professional identity in the relationship between grit and academic achievement were verified. It is consistent with previous research results, grit has a positive impact on professional identity and self-directed learning [15, 17], self-directed learning and professional identity mediate between grit and academic achievement [14, 18]. In order to promote academic achievement, it is possible to utilize both self-directed learning and professional identity.

In summary, the interplay between grit and academic achievement is doubly mediated by self-directed learning and professional identity, underscoring the paramount significance of both these factors. The self-directed learning experience should be enhanced through optimizing self-directed learning scenarios, as well as through setting up professional knowledge competitions or hosting industry lectures to enhance professional identity.

The limitation of this study is that the sample was drawn from students in three majors at one university. In future studies, it is necessary to select the subjects of the survey by drawing samples from students in other majors at three universities to ensure representativeness.

References

- [1] Pike, G. R., Kuh, G. D., & Gonyea, R. M. (2003). The relationship between institutional mission and students' involvement and educational outcomes. *Research in Higher Education*, 44, 241-261.
- [2] Lee, C. S., & Jang, H. Y. (2018). The roles of growth mindset and grit in relation to hope and self-directed learning. *Journal of the Korea Convergence Society*, 9(1), 95-102.
- [3] Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement:

- Mediating and additive effects. *Learning and individual differences*, 20(6), 644–653.
- [4] Chen, X.H., Wang, X.L., Li, J., Li, Q.H., & Cao, J. (2014). Study on learning motivation and differences between medical students with orientation and non-orientation. *Journal of Gannan Medical College*, 34(5), 3.
- [5] Yu, Q., Du, E.Q., Bi, Y., Zhang, H.G., Zhou, J.Y., & Ouyang, X. et al. (2019). Study on the professional identity and influencing factors of targeted medical students in Shandong Province. *Chinese Journal of Health Care Management*, 36(10), 5.
- [6] Bai, J. Q.. (2023). The impact of psychological resilience on learning adaptation: the mediating role of professional identity – a case study of undergraduate students majoring in early childhood education. *Journal of Jinzhong University*, 40(6), 80–85.
- [7] Duckworth, A. L., & Seligman, M. E. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological science*, 16(12), 939–944.
- [8] Bowman, N. A., Hill, P. L., Denson, N., & Bronkema, R. (2015). Keep on truckin' or stay the course? Exploring grit dimensions as differential predictors of educational achievement, satisfaction, and intentions. *Social Psychological and Personality Science*, 6(6), 639–645.
- [9] Zhang, S., Wang, X., Wang, Z.M., Xie, Z.Y., & Qi, Y.. (2021). The impact of grit on the academic performance of primary and secondary school students: inspiration from the perspective of inclusive education. *Chinese Journal of Special Education* (11), 7.
- [10] Astin, A. W. (1974). Measuring the Outcomes of Higher Education. *New directions for institutional research*.
- [11] Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology*, 92(6), 1087.
- [12] Jiang, W., Jiang, J., Du, X.P., Gu, D. & Sun, Y.. (2018). The relationship between grit and academic achievement: the mediating role of academic engagement. *Chinese Journal of Special Education* (04), 91–96.
- [13] Zimmerman, B. J. (1986). Becoming a self-regulated learner: Which are the key subprocesses?. *Contemporary educational psychology*, 11(4), 307–313.
- [14] Wolters, C. A., & Hussain, M. (2015). Investigating grit and its relations with college students' self-regulated learning and academic achievement. *Metacognition and Learning*, 10, 293–311.
- [15] Lee, D., Watson, S. L., & Watson, W. R. (2019). Systematic literature review on self-regulated learning in massive open online courses. *Australasian Journal of Educational Technology*, 35(1).
- [16] Fuller, A., & Unwin, L. (2017). Job crafting and identity in low-grade work: How hospital porters redefine the value of their work and expertise. *Vocations and Learning*, 10(3), 307 - 324.
- [17] Lee, S., & Sohn, Y. W. (2017). Effects of grit on academic achievement and career-related attitudes of college students in Korea. *Social Behavior and Personality: an international journal*, 45(10), 1629–1642.
- [18] Datu, J. A. D., Yuen, M., & Chen, G. (2017). Development and validation of the Triarchic Model of Grit Scale (TMGS): Evidence from Filipino undergraduate students. *Personality and Individual Differences*, 114, 198–205.
- [19] Lee, S., & Sohn, Y. W. (2017). Effects of grit on academic achievement and career-related attitudes of college students in Korea. *Social Behavior and Personality: an international journal*, 45(10), 1629–1642.
- [20] Zhang, P. G., & Tu, C. C. (2023). Impact of Chinese College Students' Professional Identity on Their Academic Achievement: Career Maturity as

- a Mediator. *International Journal of Educational Methodology*, 9(2), 397-408.
- [21] He, Z., Liang, Q., & Wu, H. (2023). The influence of professional identity on academic achievement among university students: The mediating role of academic self-efficacy. *Journal of Education, Humanities and Social Sciences*, 8, 1555-1561.
- [22] Lin, Y., & Li, X. (2024). The impact of vocational college students' professional identity on academic achievement: Self-efficacy as a mediator. *International Journal of Innovative Research and Scientific Studies*, 7(1), 1-8.
- [23] Hao, Y., Niu, H., Li, L., Yan, X., Zhao, X., & Wang, Q. (2022). Subgroups of self-directed learning ability and their differences in professional identity among nursing undergraduates during the COVID-19 pandemic: A latent profile analysis. *BMC Nursing*, 21(1), 187.
- [24] Zhang, L., Li, F., Sun, X., Zhang, Y., & Wang, J. (2022). The mediating role of psychological capital on the relationship between perceived stress and self-directed learning ability in nursing students. *BMC Nursing*, 21(1), 61.
- [25] Li, J., Zhang, Y., Wei, Y., Yang, W., Li, X., & Jia, Y. (2022). The state of health professions students' self-directed learning ability during online study and the factors that influence it. *BMC Medical Education*, 22, 43.
- [26] Clark, R. J., & Parikh, R. K. (2007). The self-directed learning process and its relationship to professional identity development in medical students. *Postgraduate Medical Journal*, 83(982), 518-522.
- [27] Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT - S). *Journal of personality assessment*, 91(2), 166-174.
- [28] Li, J., Zhao, Y., Kong, F., Du, S., Yang, S., & Wang, S. (2018). Psychometric assessment of the short grit scale among Chinese adolescents. *Journal of Psychoeducational Assessment*, 36(3), 291-296.
- [29] Wang, Y.F., Li, Y.J. & Huang, Y.X.. (2011). Research on the relationship between college students' psychological capital, achievement goal orientation and academic achievement. *Exploration of Higher Education* (06), 128-136+148.
- [30] Chen, K.. (2018). Research on the impact of professional identity on the academic achievement of private higher vocational students. (Doctoral dissertation, Changsha University of Science and Technology).
- [31] Fang, B.J., Liu, C.X. & Xue, P.P.. (2018). Compilation of a questionnaire on college students' autonomous learning in a ubiquitous learning environment. *Journal of Gannan Medical College* (03), 301-305.
- [32] Qin, P.B.. Characteristics of college students' professional identity and related research. (Doctoral dissertation, Southwest University).

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