

RESEARCH ARTICLE

Impact of football coach teaching style on youth learning engagement: The mediating role of academic self-efficacy

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ABSTRACT

Objective: To explore the connection and action mechanism between football coach teaching style and students' learning input, and to investigate the mediating role of academic self-efficacy. **Methods:** This study surveyed 900 students from four different schools using the teaching style questionnaire, study input questionnaire and academic self-efficacy questionnaire. During the data analysis phase, the collected data were systematically processed and analyzed by using the SPSS27.0 software. In order to deeply explore the mediation effect of academic self-efficacy in the teaching style of football coaches and students' learning input, the structural equation model was further constructed using AMOS28.0 software, and the Bootstrap method was used to carefully analyze the path mechanism between variables. **Results:** There were all significant correlations among teaching style, learning input, and academic self-efficacy. Direct effects analysis showed that teaching style had a significant direct predictive effect on students' learning input ($\beta = 0.500$, $P < 0.001$). The mediation effect analysis indicated that academic self-efficacy played a partial mediator in the influence of teaching style on students' learning input, with a mediation effect value of 0.212 and 95% confidence interval of [0.144, 0.239]. Conclusion: Teaching style not only directly affects students' learning input, but also indirectly through academic self-efficacy.

Keywords: Student; learning input; teaching style; academic self-efficacy

In recent years, the research focus in the field of positive psychology has gradually converged on the positive psychological trait of learning investment, which has become an important topic for many scholars to explore deeply. Learning input, in short, is a continuous, positive and fulfilling psychological state shown by students in the process of learning, and its core characteristics are vitality, dedication and concentration. This state not only reflects students' enthusiasm and devotion to learning, but also is an important indicator to measure students' learning attitude and effort. In the field of education, academic performance has long been seen as a key measure of educational effectiveness. Numerous empirical studies have established that there is a close and direct link between learning engagement and academic performance. The level of learning investment often determines the quality of academic performance to a large extent^[1]. In other words, if students want to achieve ideal results in their studies, they must pay more efforts in their study and maintain a high degree of learning investment^[2]. It is worth noting that learning investment is not an isolated phenomenon, but is jointly influenced by a variety of external factors. For students, it is of great significance

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to deeply explore the influencing factors and internal mechanisms of their learning investment. These factors may include family environment, school education mode, social support, etc., which act on students' learning investment level in different ways, and then affect students' academic performance and all-round development. Therefore, the targeted enhancement of students' learning investment level is not only crucial for improving students' academic performance, but also has a profound significance for improving the overall quality of higher education in China. We should start from many aspects to create a good learning environment for students, stimulate their enthusiasm for learning, cultivate their spirit of learning input, and lay a solid foundation for their all-round development.

Scholars at home and abroad have made extensive and in-depth discussions on the relationship between football coaches' teaching style and students' learning investment. This research field is not only related to the quality of education and teaching, but also directly affects the growth and development of students. The research mainly focuses on two core dimensions: one is to explore the influence of teaching style on students' learning investment, that is, how different teaching styles shape the level of students' learning investment; the second is to analyze the internal mechanism of teaching style on learning input, that is, how teaching style specifically acts on students' learning psychology and behavior, so as to promote their learning input. Exploring the influence of teaching style on students' learning investment. Through a series of empirical studies, he revealed the significant role of independent teaching style in improving students' learning investment. The independent teaching style emphasizes giving students full support and autonomy in terms of interpersonal and behavior, and making students more actively participate in the learning process by stimulating their internal motivation. This teaching style focuses not only on students' learning outcomes, but also on their learning process and emotional experience. Reeve's research found that when teachers adopt an independent teaching style in the classroom, students can feel more autonomy and control, thus being more actively engaged in learning and showing higher enthusiasm and interest in learning. Concontrast, the controlled teaching style often leads to problems of undermotivation, lack of positive emotion, and lack of personal engagement. Under this teaching style, teachers have high control of students, which limits their autonomy and creativity, and thus suppresses their behavioral input, namely, effort and attention^[3]. However, it is interesting that the influence of controlled teaching style on cognitive and emotional input is not as obvious as behavioral input, perhaps because students still retain some independence and self-regulation at the cognitive and emotional levels. In addition to the direct influence of teaching style itself on students' learning input, scholars also focus on the close connection between teaching style and the teacher-student relationship. Some studies have shown that teaching style indirectly affects students' learning input through the teacher-student relationship. Mutual trust and support between teachers and students is an important cornerstone for establishing close contact between teachers and students, and is also the key motivation to stimulate students' enthusiasm for learning. When teachers treat students with an open and inclusive attitude and give them full attention and support, students are more likely to have positive feelings and attitudes towards learning, so as to devote more devoted to learning. On the contrary, if the relationship between teachers and students is tense or estranged, students may become resistant to learning, leading to a decline in learning investment. Domestic scholar Lu Kairong has also carried out in-depth research in this field. Through empirical investigation and analysis, she found that different teachers' teaching styles had a significant impact on students' learning attitude. Lu Kairong pointed out that teachers' teaching style not only affects students' learning behavior, but also affects students' learning emotion and cognition at a deep level. Active and open teaching style can create a relaxed and pleasant learning atmosphere, so that students can feel more happiness and satisfaction in the learning process, so as to enhance their interest and enthusiasm for learning. This positive learning emotion and attitude will further promote students' investment in learning,

so that they are more active and active in learning. On the contrary, the negative and closed teaching style may make students feel depressed and anxious, leading to their resistance and escape to learning, and thus reduce their degree of learning investment^[4]. Based on the research results of domestic and foreign scholars, we can draw a clear conclusion: the teaching style of football coaches has a significant impact on students' learning investment. Independent teaching style can improve students' learning investment, while controlled teaching style may inhibit students' learning investment. At the same time, the teaching style also indirectly affects students' learning input through the teacher-student relationship, and the mutual trust and support between teachers and students is an important power to stimulate students' enthusiasm for learning^[5]. Therefore, this paper proposes that hypothesis H1: teaching style can positively predict students' learning input.

Although the teacher teaching style is widely recognized that it may directly influence students' learning engagement, this relationship is not simply direct, but may be influenced by multiple mediating variables. In the research field of pedagogy and psychology, the literature discusses the relationship between football coaches' teaching style and students' academic self-efficacy, especially for specific subjects such as English academic self-efficacy. Exploration of this field is important for understanding the complex interactions in the teaching process and how to optimize the teaching effect. Reviewing past studies, scholar He Wen conducted a survey of 213 high school students and 36 English teachers, and revealed a significant positive relationship between football coaches' teaching style and students' academic English self-efficacy. This finding shows that teachers' teaching methods not only affect the transmission of knowledge, but also virtually shape students' belief in their own learning ability^[6]. It provides a valuable empirical foundation for the latecomers, and emphasizes the important role of the football coach's teaching style in cultivating students' academic self-efficacy. Further, some studies have shown that teachers can use intermediary tools, such as multimedia teaching, interactive teaching, which can more effectively improve students' academic self-efficacy^[7]. These tools not only enrich the teaching methods, but also provide students with more opportunities to participate and practice, thus enhancing their confidence in their own learning abilities. Scholar Li Xuelong took the primary school students in the Guangxi Zhuang community as an example to discuss the relationship between classroom environment, academic self-efficacy and academic performance. Their study found that an excellent classroom environment was closely associated with a higher academic self-efficacy, further confirming the important influence of environmental factors on students' academic self-efficacy. Scholar Chen Yihua paid close attention to the influence of teachers' evaluation on students' academic self-efficacy. Through empirical analysis, he pointed out that positive teacher evaluation can significantly improve students' academic self-efficacy, while negative evaluation may lead to the reduction of students' self-efficacy, and even lead to the behavior of avoiding learning^[8]. This finding emphasizes the key role of teacher evaluation in the formation of students' academic self-efficacy, and reminds teachers to use evaluation language carefully in daily teaching, and give positive encouragement to avoid negative effects on students. In addition to teacher evaluation, teaching methods are also an important factor affecting students' classroom participation and academic self-efficacy^[9]. FAST et al, 2010, explored the relationship between perceived classroom environment, mathematical self-efficacy, and standardized math test performance through empirical analysis. They found that math self-efficacy played an intermediary role between perceiving the classroom environment and math test scores, that is, a good classroom environment improves students' math test scores by improving their math self-efficacy. This finding provides theoretical support for the optimization of teaching methods and emphasizes the importance of creating a good classroom environment. In terms of the relationship between academic self-efficacy and learning investment, scholar Bao Xuefeng discussed the relationship between junior high school students' perception of campus

atmosphere, academic self-efficacy and online game addiction. They found that students with lower academic self-efficacy were less interested in learning and reluctant to invest time in learning, while those with higher academic self-efficacy were more interested and willing to invest more time. This finding reveals the important influence of academic self-efficacy on learning input and provides new ideas for improving students' learning engagement^[10]. Liao's research focuses on the relationship between students' learning values, academic self-efficacy and learning input. Through empirical research, he found that academic self-efficacy, as a mediating variable, can predict students' learning investment. This finding further confirms the important role of academic self-efficacy in the learning process and provides strong support for teaching practice. Wang's research leads to a similar conclusion that students' academic self-efficacy has a positive impact on learning input. The research of Gan Liangmei and Jia Xuji on higher vocational students found that there is a positive relationship between their self-efficacy, professional commitment and learning investment. This finding suggests that enhancing self-efficacy and professional commitment are effective ways to improve learning engagement for higher vocational students^[11]. In his study, Yan Weihua focused on the influence of students' positive emotions on learning investment and academic self-efficacy. He found that positive emotions could drive students' academic self-efficacy, which in turn had a positive effect on learning engagement. This finding emphasizes the importance of emotional factors in the teaching process, reminds teachers to pay attention to students' emotional state, and create a positive learning atmosphere. To sum up, teachers' teaching style has an impact on students' academic self-efficacy through various ways, and then acts on students' learning investment. As a mediating variable between football coach teaching style and learning input, academic self-efficacy plays a vital role. Therefore, this paper proposes that hypothesis H2: the teaching style of football coaches has a positive impact on learning input through the mediation of academic self-efficacy.

To sum up, there may be a close relationship between teaching style, students' investment in learning, and academic self-efficacy. In this study, by establishing the mediation variable model, we can deeply explore the mediation effect of academic self-efficacy between teacher style and students' learning input, and provide a theoretical basis for the intervention of teaching style on students' mental health.

1. Study subjects and methods

1.1. Study subjects

The main respondents were Suzhou Youth Amateur Sports School, Huili Youth Football Club and Xishan District Youth Amateur Sports School, with a total of 950 students. The questionnaire was distributed in the form of questionnaire star, and the corresponding data were obtained. There were a total of 950 questionnaires in this survey. According to the screening principle, some invalid questionnaires were deleted. After the statistical recovery of valid questionnaires, a total of 900 valid questionnaires were obtained, with a recovery rate of 94%.

1.2. Measurement tools

1.2.1. Teaching style scale

The Teaching Style Scale used in this study by He Wen^[12] et al. The scale cleverly adopts the method of "students' other comments" to investigate teachers' teaching style from an objective perspective, and effectively avoids the measurement error caused by teachers' subjective bias in self-assessment. The scale is well-structured and comprehensive, containing 18 questions, which are divided into four dimensions to fully reflect the characteristics of teachers' teaching style. Specifically, the humorous and lively dimension evaluates the teachers' sense of humor and activity in teaching through 6 questions; the rigorous logical

dimension contains 5 questions to investigate the logic and rigor of the coaches in teaching; the caring and sharing dimension sets 4 questions to measure the teachers' concern for students and their willingness to share knowledge and experience with students; and the innovative and exploratory dimension explores the teachers' innovative spirit and exploration consciousness in teaching through 3 questions. During the measurement process, the scale adopts the Likert level 5 scoring standard, which can accurately quantify the evaluation of teachers' teaching style. Through the students' grading, we can intuitively understand the performance of teachers in various dimensions, so as to provide a strong basis for the subsequent teaching improvement. In this study, the Cronbach's alpha coefficient of this scale was as high as 0.961, and this data fully demonstrates the reliability and reliability of the scale.

1.2.2. Learning investment scale

This study uses the Chinese version of the learning investment scale (UWES-S). The original version of the scale was carefully compiled by Schaufeli et al. and then translated by literary scholars^[13], Shi Kan and Zhang Fenghua. This scale aims to comprehensively and accurately assess students' learning engagement, with three core dimensions: vitality, dedication, and focus. This questionnaire uses the Likert five-point scoring method to make the scoring process both concise and accurate. The higher the students score in all dimensions and total scores, the more devoted they are to learning, and the more enthusiastic and focus on learning. In this study, the Cronbach's alpha value of this scale reached 0.966. Therefore, the scale is currently widely used and recognized in the measurement of learning input in groups such as students, providing a powerful assessment tool for educational researchers and practitioners.

1.2.3. Scale of academic self-efficacy

In this study, we used the academic self-efficacy scale developed by Liang Yusong^[14] as an assessment tool. The scale contains 22 questions and takes the form of the Likert Level 5 scale to comprehensively and carefully examine students' level of academic self-efficacy. The scale deeply explores the subjects' self-efficacy from two dimensions, namely, learning ability self-efficacy and learning behavior self-efficacy. Each question has five options, from "completely nonconforming" to "fully fit", corresponding to a score of 1 to 5, so that the subjects can make accurate choices according to their actual situation. Questions 14,16,17, and 20 of the scale used the rule of reverse scoring. Typically, higher subject scores on the scale indicate a higher level of academic self-efficacy, or greater confidence in their ability and behavior to complete academic tasks. In this study, the Cronbach's alpha value of this scale was up to 0.967, fully demonstrating its reliability and reliability. Currently, this scale has been widely used in the measurement of academic self-efficacy for students and other groups, and it has become an important evaluation tool in research and practice in the field of education.

1.3. Common method deviation test

In this study, the Harman univariate test method was used to perform the common method bias test. The results show that there are 9 factors with characteristic root greater than 1, and the first factor explained the cumulative variation of 39.331%. As long as the critical value is below 40%, there is no serious common method bias problem.

2. The results of the study

2.1. Correlation coefficient of each variable

Table 1. The correlation coefficient matrix for each variable.

	1	2	3	4	5	6	7	8	9
Humor and lively	1								
Rigorous logic	0.564**	1							
Care to share	0.614**	0.562**	1						
Innovation exploration	0.583**	0.631**	0.543**	1					
vigour	0.331**	0.250**	0.319**	0.295**	1				
offer as a tribute	0.286**	0.331**	0.303**	0.308**	0.638**	1			
follow with interest	0.323**	0.305**	0.331**	0.320**	0.617**	0.661**	1		
Learning ability and self-efficacy	0.458**	0.467**	0.471**	0.498**	0.373**	0.394**	0.373**	1	
Learning behavior for self-efficacy	0.421**	0.426**	0.420**	0.450**	0.299**	0.317**	0.355**	0.582**	1

Note: * represents $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

After the correlation analysis of the average scores of each variables, we came to the following conclusion: there is a significant positive relationship between the teaching style of football coaches and the student's learning input; similarly, the teaching style and students' academic self-efficacy, and a significant positive relationship was observed between academic self-efficacy and learning investment.

2.2. Direct effect analysis

Using AMOS 28.0 software, we construct a structural equation model designed to explore the direct influence of football coach teaching style on learning input. In the model, the correlation between the individual variables and their respective residual terms are set. After rigorous operation and analysis, the final model results have been intuitively presented in the figure below. This figure not only shows the direct path relationship between teaching style and learning input, but also may include other potential variable influences or path coefficients, and the results, as shown in the figure below:

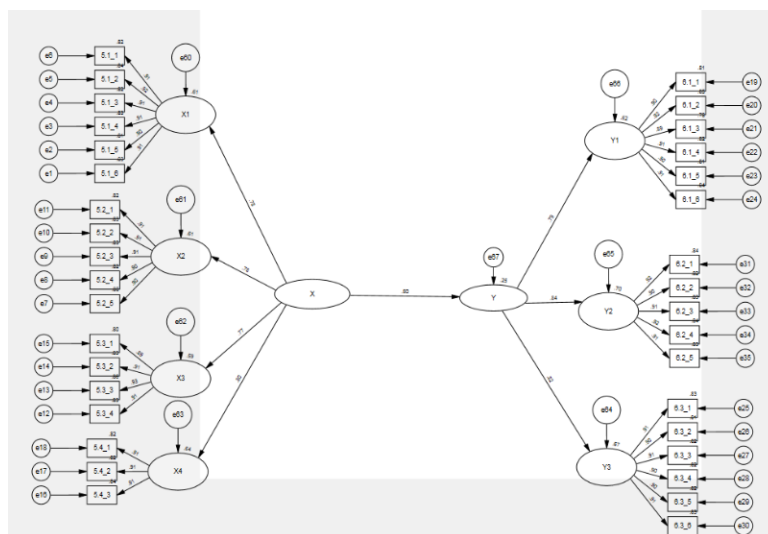


Figure 1. The direct influence model of teaching style on learning input.

The direct effect model was constructed to test the model fit and its fit. For details, refer to the following table:

Table 2. Direct effects structural equation model fit index.

Adaptation index	χ^2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
actual value	2.142	0.040	0.975	0.973	0.986	0.987	0.979

According to the data in **Table 2**, the specific value of the chi-square degree of freedom ratio χ^2/df is 2.142, and the approximation error root mean square (RMSEA) value is 0.040, which is much lower than the ideal standard of 0.1. In addition, the relative fit index of the model, including the relative fit index (RFI), the canonical fit index (NFI), the Tucker-Lewis index (TLI), the incremental fit index (IFI), and the comparative fit index (CFFI), all exceeded the threshold of 0.9. The combination of these data shows that the constructed structural equation model shows good fit and fit in the study of the influence of teaching style on learning input.

Table 3. Table of path coefficient estimates.

way	Non-standardized coefficients	Standardization coefficient	S.E	t	p
Teaching style learning input	0.448	0.425	0.032	14.174	0.000

According to the information shown in the above table, the standardized regression coefficient is 0.425, and the corresponding p-value is less than 0.001, indicating that the teaching style has a significant positive promotion effect on the learning input.

2.3. Mediation effect test

This study used the structural equation model to explore the correlation between the variables. Specifically, we draw on the mediation effect model test method proposed by Wen Zhonglin^[15], which is widely used in the field of psychological science. We used Amos 28.0 software to construct the mediation effect model of academic self-efficacy, applied the deviation-corrected percentile Bootstrap method, calculated 95% confidence intervals through 5000 repeated sampling, and established the mediation model, as shown in **Figure 2**.

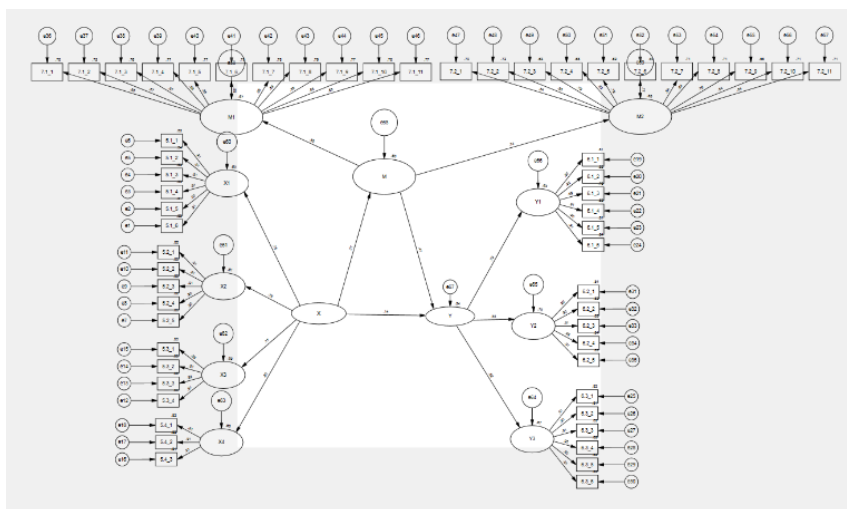


Figure 2. Mediation mechanism model of teaching style on learning input.

Table 4. Model effect of model model model model model exponeffects.

Adaptation index	χ^2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
actual value	2.134	0.041	0.952	0.947	0.974	0.972	0.974

Based on the data in **Table 4**, the chi-square ratio χ^2/df is 2.134 and the approximation error (RMSEA) is 0.041, which is below the generally considered acceptable upper limit of 0.08. In addition, the values of the normative fit index (NFI), the Tucker-Lewis index (TLI), the incremental fit index (IFI), and the comparative fit index (CFI) all exceeded the threshold of 0.9. Together, these indicators show that the constructed model has a good fit.

Table 5. Table of pathway coefficient estimates of mediation effects.

way	Non-standardized coefficients	Standardization coefficient	S.E	t	p
Teaching style and academic self-efficacy	0.580	0.610	0.025	23.033	0.000
Teaching style learning input	0.251	0.241	0.038	6.493	0.000
Academic self-efficacy of learning engagement	0.349	0.321	0.040	8.601	0.000

Note: * * * stands for $p < 0.001$

According to the data in **Table 5**, we found that the path standardization coefficient of "teaching style" to "academic self-efficacy" reached 0.610 ($p < 0.001$), which revealed a significant positive promotion effect on academic self-efficacy. At the same time, the path standardization coefficient of "teaching style" to "learning input" was 0.241 ($p < 0.001$), indicating that teaching style also had a significant positive impact on learning input. Moreover, the path standardization coefficient of "academic self-efficacy" to "learning engagement" was 0.321 ($p < 0.001$), which further proves that academic self-efficacy has a significant positive promotion effect on learning input.

Table 6. Test of the mediation effect of academic self-efficacy.

way	point estimate	Coefficient product multiplication		Bootstrap 5000 times			
		standard error	Z price	Bias-Corrected 95%CI		Percentile 95%CI	
				lower limit	superior limit	lower limit	superior limit
The total effect of teaching style on learning input	0.451	0.032	14.174	0.388	0.512	0.388	0.512
Teaching style Inindirect effect of academic self-efficacy	0.212	0.025	7.956	0.144	0.239	0.144	0.239
The direct effect of teaching style on learning input	0.251	0.038	6.493	0.175	0.326	0.175	0.326

According to the data analysis in **Table 6**, the direct effect of teaching style on learning input was 0.251, and its Bias-Corrected 95% and Percentile 95% confidence intervals were both [0.175,0.326], and neither included 0, indicating that this direct effect is significant. At the same time, the teaching style had an indirect effect on learning input through academic self-efficacy, with an effect value of 0.212. The mediation effect test by the Bootstrap method showed that the Bias-Corrected 95% and Percentile 95% confidence intervals were both [0.144,0.239], also excluding 0, indicating that the mediation effect was also significant. Overall, the total effect value of teaching style on learning input was 0.451, with Bias-Corrected 95% and Percentile 95% confidence intervals were [0.388,0.512], and excluding 0, the total effect was significant. Thus, it can

be concluded that academic self-efficacy plays a partially mediating role between teaching style and learning engagement.

According to the above results, the H1 and H2 hypotheses proposed the direct role and mediation role of teaching style on learning input in this study, which were tested and shown in the table below:

Table 7. Results of hypothesis validation of direct effects and mediation mechanisms.

Suppose the number	Suppose the content	result
H1	Teaching style has a positive impact on learning input	support
H2	Teaching styles have a positive influence on learning engagement through the mediating role of academic self-efficacy	support

3. Discussion

3.1. The direct effect of teaching style on learning input

This study deeply explored the influence of teaching style on students' learning engagement, and found a significant positive association between teaching style and students' participation in learning. Specifically, the overall teaching style of teachers, as well as the four subdivided dimensions of humor and liveliness, rigorous logic, caring and sharing, and innovation and exploration, all have a profound impact on students' learning investment. This finding coincides with the research results of many scholars at home and abroad, and further verifies the importance of football coach teaching style in the learning process of students^[16].

In the field of physical education, the systematic review study by Guo et al also revealed the key role of teacher support in teacher-student interaction^[17]. The study noted that student participation in learning increases significantly when teachers provide comprehensive autonomy, ability, and emotional support. This finding applies not only to physical education, but also to the teaching practice in other disciplines. In the actual teaching process, teachers use various teaching methods and innovate to create a dynamic and attractive learning environment. They are well aware that a single teaching method is difficult to meet the needs of all students. Therefore, they flexibly adjust their teaching strategies according to students' interests, characteristics and learning style to make the classroom more vivid and interesting. This diversified teaching method not only stimulates students' interest in learning, but also encourages them to devote themselves more wholeheartedly to learning. A humorous and lively teaching style is one of the effective strategies. Through humorous language, vivid expression and action, the boring knowledge points become interesting, so that students can master the knowledge in a relaxed and happy atmosphere. This style of football coaches not only improves students' learning enthusiasm, but also enhances their participation in the classroom. The rigorous and logical teaching style focuses on cultivating students' logical thinking ability and critical thinking ability. Through clear explanation, rigorous reasoning and logical presentation, the teachers guide the students to gradually and deeply understand the knowledge points, and cultivate their ability to analyze and solve problems. This teaching style helps to improve students' learning efficiency and performance, as well as cultivate their academic literacy and scientific research ability. The caring-sharing teaching style emphasizes the emotional communication and interaction between teachers and students. Teachers are concerned about the growth and development of students, are willing to listen to their voices and confusion, and give them emotional support and encouragement. This teaching style not only enhances the trust and affinity between teachers and students, but also stimulates students' motivation and confidence in learning. The innovative and exploratory teaching style encourages students to try and explore the unknown territory. Teachers guide students to participate in scientific research projects, practical activities and extracurricular development to cultivate their innovative spirit and practical ability. This teaching style of football coaches

not only broadens students' horizons and knowledge, but also stimulates their curiosity and thirst for knowledge. In addition to the innovation of teaching methods, teachers also give students strong support in terms of professional knowledge. They not only have solid subject knowledge and teaching skills, but also can constantly update their knowledge structure and teaching ideas, to adapt to the development of The Times and the needs of students. At the same time, teachers also pay attention to students' emotional needs and mental health, helping them relieve their study pressure, adjust their mentality and enhance their self-confidence.

In conclusion, the teaching style of football coaches has a significant positive impact on students' learning input. A perfect teaching style can not only stimulate students' interest and motivation in learning, but also improve their learning efficiency and performance. Therefore, teachers should constantly pay attention to the cultivation and promotion of their own teaching style in order to better serve the students' learning and growth of students.

3.2. Mediating the role of academic self-efficacy

In the vast field of educational psychology, teaching style, learning input and academic self-efficacy have always been the core elements of much attention. There are not only closely related between them, but also interact, jointly affecting the students' learning effect and growth trajectory. This paper aims to explore the internal relationship between these three factors, especially how teaching style indirectly promotes students' learning investment by influencing academic self-efficacy, and based on this, we propose targeted educational strategies.

First, we must make it clear that the teaching style of football coaches has a significant impact on students' learning input and academic self-efficacy. This effect is not single-dimensional, but multi-dimensional and complex. Among them, the three effective teaching styles, humorous and active, rigorous and logical, and caring and sharing, are proved to have a profound impact on students' learning investment through the intermediary variable of academic self-efficacy. The humorous and active teaching style, with its unique charm and appeal, creates a relaxed and pleasant atmosphere for the classroom. Teachers explain knowledge in humorous language, which can not only relieve students' learning pressure, but also stimulate their interest in learning and curiosity. In this dynamic classroom environment, students are more likely to feel the fun of learning, and thus more actively participate in the classroom activities. The study of FAST et al. shows that the humorous atmosphere in math classes can significantly enhance students' math self-efficacy, which in turn promotes their performance in standardized math tests^[18]. This positive emotional experience will undoubtedly enhance students' confidence and learning motivation, and make them more brave and firm in the face of academic challenges. The caring and sharing teaching style emphasizes the emotional communication and interaction between teachers and students. Teachers' care and respect for students can shorten the distance between teachers and students and establish a close and trusting relationship^[19]. In this relationship, teachers are not only the impartors of knowledge, but also the informants and supporters of students' emotions. When students encounter difficulties and setbacks, teachers can give them timely encouragement and help, so that they can feel the warmth and care from teachers. This emotional support can greatly improve students' academic self-efficacy, and make them more confident and self-reliant in the learning process. At the same time, the deep affection between teachers and students will also stimulate students' interest and enthusiasm in learning, so that they are more devoted and focused in class^[20]. Different from the humorous, active and caring and sharing teaching style, the rigorous, logical and innovative and exploratory teaching style mainly affects students at the cognitive level. Rigorous and logical teaching style requires teachers to be rigorous in thinking and clear in logic in the teaching process, and to explain the knowledge thoroughly. This teaching method helps students to understand and absorb knowledge,

so that they can grasp the nature and law of knowledge more deeply. When students have a clear and accurate understanding of the knowledge, their self-confidence and learning motivation will also be improved accordingly, thus enhancing their sense of academic self-efficacy^[21]. The innovative and exploratory teaching style emphasizes the teachers' continuous innovation and exploration in teaching methods. By introducing new teaching concepts and means, teachers can broaden students' horizons and stimulate their innovative thinking and practical ability. In this learning environment full of novelty and challenges, students will more actively participate in classroom activities, and actively think and solve problems. This positive learning experience can not only enhance students' sense of academic self-efficacy, but also cultivate their innovative spirit and practical ability, laying a solid foundation for their future development. In addition, the self-efficacy theory tells us that individuals who feel support from important others, such as emotional support and material help, can effectively improve their self-efficacy level. For students, family, teacher, and peer support is an important source of their academic self-efficacy^[22,23]. Those who receive more support tend to be more confident in the ability to complete their studies and are more willing to study. This belief and motivation will encourage them to work harder and be more persistent in the learning process, so as to achieve better academic performance. This support is particularly important for graduate students majoring in special education. Due to the particularity and challenge of special education, these students are often faced with greater learning pressure and difficulties. If they can feel full support from teachers and peers, then they are more likely to establish a positive sense of academic self-efficacy and believe that they can overcome all difficulties and achieve academic success. At the same time, this support will also stimulate their learning enthusiasm and motivation, making them more brave and firm in the face of professional learning pressure^[24].

In conclusion, there are close connections and interactions between football coach teaching style, learning input and academic self-efficacy. Effective teaching styles such as humorous activity, rigorous logic and caring sharing can affect students' sense of academic self-efficacy, and then indirectly promote their learning input. In order to better promote students' investment in learning and improve their academic self-efficacy in the future, we should pay attention to the diversification and individuation of teaching styles, and choose the appropriate teaching methods according to the characteristics and needs of students.

4. Conclusion

In the context of exploring students' learning investment, this paper focuses on the core perspective of academic self-efficacy, and deeply analyzes the internal connection between the three by constructing the intermediary mechanism model of football coach teaching style on learning investment. Using advanced statistical methods such as correlation analysis and structural equation model, the following important conclusions:

(1) The research results clearly reveal the significant positive influence of football coaches' teaching style on students' learning input. In addition, the teaching style also has a partial positive effect on the learning investment through the intermediary variable of academic self-efficacy. This means that the teaching style not only directly stimulates the students' enthusiasm for learning, but also indirectly promotes the increase of learning investment by enhancing their sense of academic self-efficacy. This finding provides a new perspective on our understanding of how teaching styles influence students' learning behavior.

(2) Through theoretical analysis, this study innovatively introduces academic self-efficacy as an intermediary variable, and constructs a new path for teaching style to promote students' learning investment. The revelation of this path not only enriches the theoretical framework between the teaching style and the

learning investment, but also provides us with a new idea to improve the students' learning investment by optimizing the teaching style.

(3) For the specific field of —— football teaching, this study has conducted an empirical exploration. The results found that the teaching style of football coaches was diverse and interesting, which effectively enhanced students' academic self-efficacy. This finding not only verifies the mediation effect of academic self-efficacy between teaching style and learning input, but also provides us with specific teaching practice cases. It shows that when coaches adopt an attractive and innovative teaching style, it can enhance students' confidence and learning motivation, thus improving their academic self-efficacy, and ultimately promoting their learning input.

Conflict of interest

The authors declare no conflict of interest.

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