

Study on Learning Self-efficacy and Learning Engagement of College Students Majoring in Physical Education from the Perspective of Informatization

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Abstract. The reform of educational informatization promotes the development of information technology-enabled education, and puts college students in an educational technology environment. Students' perception and use of educational technology affect their self-efficacy in learning. This paper uses the Scale of college students' learning Self-efficacy and the survey scale of information learning investment. Through questionnaire survey, SPSS is used to analyze the correlation between information education and self-efficacy, and then explore the influence of information education on learning self-efficacy and learning investment of college students majoring in physical education.

Keywords: information-based education; Physical education major; College students; Self-efficacy

1. Introduction

In the Action Plan of Information Technology 2.0 for Higher Education issued by the Ministry of Education, it is clearly proposed to "give full play to the advantages of information technology resources, reform the traditional teaching mode, and promote the deep integration of high and new technology and teaching" [1]. The emergence of computer multimedia technology is a qualitative leap in the history of education and teaching, and information education, as a product of information technology enabling education, is the first step in the development of education. It has broadened the methods and approaches for students to receive knowledge. According to the 52nd Statistical Report on the Development of the Internet in China^[2] of China Internet Network Information Center (CNNIC), as of June 2023, the number of netizens in China has reached 1.079 billion, and among all netizens, the proportion of middle school students is the largest, accounting for 32.2%. The majority of them are college students, and the proportion of college students who take acquiring knowledge and information as the main purpose in the use of the Internet exceeds 70%. It can be seen that information education without platform of multimedia network technology has become a new teaching concept and learning mode. Information-based teaching makes learning more contextualized and autonomous, improves students' interest in learning and sense of gain, and improves their sense of learning self-efficacy. This study takes information-based teaching as the background to understand the relationship between self-efficacy and learning performance

of college students majoring in physical education under the information-based learning environment, and explores how self-efficacy affects the learning of college students majoring in physical education through emotions, their own experience and self-confidence.

2. Research objects and methods

2.1 Research object

In this study, the freshman and sophomore students of sports major in Guangzhou were selected as the research objects. A total of 182 questionnaires were distributed in the early stage, and 170 were returned, with a recovery rate of 93.4%, including 156 valid questionnaires, and an effective recovery rate of 91.8%.

2.2 Research Tools

2.2.1 Learning self-efficacy questionnaire of college students majoring in physical education

The scale of learning self-efficacy of college students was used to measure the three dimensions of self-confidence, effort and experience based on the summary of previous studies. The scale adopts five-level Likert scoring method, with 1-5 indicating "completely inconsistent", "basically inconsistent", "uncertain", "basically consistent" and "completely consistent" respectively. The study self-efficacy of sports majors was investigated. The higher the total score, the higher the learning efficacy.

Table 1. Reliability test of learning self-efficacy scale

Scale	Dimension	Cronbach' a coefficient	Item of question
Learning Self-efficacy Scale	Self-confidence	0.960	T1,T5,T6
	Try hard	0.945	T7,T8,T9,T10
	Experience	0.937	T2,T3,T4

As can be seen from the table1, the coefficients of the three dimensions (self-confidence, effort and experience) of the learning self-efficacy scale for college students majoring in physical education were 0.960, 0.945 and 0.937 respectively. The Cronbach 'a coefficient of the learning self-efficacy scale was 0.975, greater than 0.8, indicating that the reliability of the scale was ideal and could be further analyzed.

2.2.2 Physical education major college students learning engagement questionnaire

Based on the mixed learning engagement scale compiled by scholar Zhou Jing, the questionnaire was modified according to the research needs to form an information-based learning scale. The questionnaire consisted of 16 questions, including four dimensions: independent learning, group cooperation, learning strategy and interest-driven. The scale adopted 5-level Likert scoring method. 1-5 marks are "never", "occasionally", "sometimes", "often" and "always" respectively. The scale adopts a total score system, and the higher the total score, the deeper the degree of learning involvement of college students. See the following table2 for details:

Table 2. Dimension reliability test of learning engagement scale

Scale	Dimension	Cronbach'a coefficient	Item of question
Learning Engagement Scale	Active learning	0.890	T1, T2,T3,T4
	Group cooperation	0.877	T5,T6,T7,T8
	Learning strategy	0.932	T9,T10,T11,T12,T13
	Interest-driven	0.890	T14, T15,T16

As can be seen from the table2, the coefficients of the four dimensions (active learning, group cooperation, learning strategy and interest-driven) of the scale for college students majoring in physical education are 0.890, 0.877, 0.932 and 0.890 respectively. The Cronbach 'a coefficient of the scale for learning self-efficacy is 0.967, greater than 0.8. It shows that the reliability of the scale is ideal and can be further analyzed.

2.3Data Processing

All data were statistically processed using SPSS26.0. Specific data processing methods include descriptive statistical analysis, Pearson correlation analysis and linear regression analysis.

3. Research results and discussion

3.1 Descriptive analysis of information-based learning self-efficacy and learning engagement of college students majoring in physical education

Table 3. Descriptive statistics of informatization learning self-efficacy and learning engagement

	N	Mean	Standard deviation
Self-confidence	3	3.8333	.01528
Try hard	4	3.9075	.05377
Experience	3	3.8233	.03512
Learning self-efficacy	10	3.8547	.03257
Active learning	4	3.4250	.16217
Group cooperation	4	3.6525	.20823
Learning strategy	5	3.5920	.09311
Interest-driven	3	3.6100	.10536
Learning engagement	16	3.5699	.13429

Through the descriptive statistics on the self-efficacy and learning investment of college students majoring in sports(table3), it can be seen that there is no significant difference between the mean scores of each dimension. The overall mean value of college students majoring in sports' self-efficacy of information-based learning is 3.8547, indicating that the learning self-efficacy of college students majoring in sports is at an intermediate level. Therefore, the level of college students' self-efficacy needs to be improved. The overall learning engagement of college students majoring in sports is 3.5699, and the average value of the effort dimension is the highest among the seven dimensions of self-efficacy and learning engagement, reaching 3.9057. It can be shown that college students majoring in physical

education have the courage to try and master new and unknown things and knowledge in information learning. In addition, the values of the overall and standard deviation of each dimension of learning self-efficacy and learning engagement of college students majoring in sports are small, indicating that the cognitive opinions of the respondents on their own learning self-efficacy and learning engagement are not significantly different in each dimension.

3.2 Correlation analysis of self-efficacy in information learning of college students majoring in physical education

Table 4. Correlation analysis of information learning self-efficacy

		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
	Pearson	1									
T1	Sig.(2-tailed)	.000									
	N	156									
	Pearson	.809**	1								
T2	Sig.(2-tailed)	.000	.000								
	N	156	156								
	Pearson	.748**	.796**	1							
T3	Sig.(2-tailed)	.000	.000	.000							
	N	156	156	156							
	Pearson	.789**	.798**	.823**	1						
T4	Sig.(2-tailed)	.000	.000	.000	.000						
	N	156	156	156	156						
	Pearson	.787**	.797**	.792**	.801**	1					
T5	Sig.(2-tailed)	.000	.000	.000	.000	.000					
	N	156	156	156	156	156					
	Pearson	.831**	.768**	.766**	.816**	.827**	1				
T6	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000				
	N	156	156	156	156	156	156				
	Pearson	.802**	.802**	.726**	.749**	.826**	.822**	1			
T7	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	.000			
	N	156	156	156	156	156	156	156			
	Pearson	.774**	.744**	.822**	.795**	.816**	.793**	.820**	1		
T8	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		
	N	156	156	156	156	156	156	156	156		
	Pearson	.766**	.711**	.739**	.788**	.816**	.842**	.805**	.833**	1	
T9	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	156	156	156	156	156	156	156	156	156	
	Pearson	.806**	.759**	.754**	.789**	.852**	.826**	.849**	.883**	.826**	1
T10	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	156	156	156	156	156	156	156	156	156	156

** .At level 0.01 (2-tailed), the correlation is significant.

Pearson correlation analysis was used to explore whether there was correlation between each index and the degree and direction of correlation. The correlation coefficient exists between -1 and 1, and the greater the absolute value of the coefficient, the higher the correlation. As can be seen from the table4, the correlation coefficients of all indicators in the learning

self-efficacy of college students majoring in sports are greater than 0.7 and close to 1, indicating that there is a significant correlation between all indicators at the level of 0.01.

3.3 Correlation analysis of learning involvement of college students majoring in physical education

Table 5. Correlation analysis of each dimension of learning input

	Active learning	Group cooperation	Learning strategy	Interest-driven
Active learning	1			
Group cooperation	.831**	1		
Learning strategy	.802**	.822**	1	
Interest-driven	.766**	.842**	.805**	1

** .At level 0.01 (2-tailed), the correlation is significant.

As can be seen from the table5, the correlation coefficients of the four dimensions of information-based learning input, namely, active learning, group cooperation, learning strategy and interest-driven, are all greater than 0.7 and close to 1, indicating that the four dimensions of information-based learning input are significantly correlated at the level of 0.01.

3.4 Correlation analysis between self-efficacy and learning involvement of college students majoring in physical education

It can be seen from the table6, the three dimensions of self-efficacy of information-based learning, namely self-confidence, effort and experience, are significantly correlated with the secondary dimensions of learning engagement, namely, active learning, group cooperation, learning strategy and interest-driven, at the level of 0.01. Analysis of each dimension shows that between self-confidence and experience, active learning and hard trying, group cooperation and hard trying, group cooperation and active learning, interest-driven and self-confidence, interest-driven and experience, All the above relationships had significant positive correlation ($P < 0.01$), and the Pearson correlation coefficients were 0.402, 0.802, 0.531, 0.835, 0.962, 0.635, respectively, showing moderate correlation.

Table 6. Correlation analysis between learning self-efficacy and learning engagement

	Self-confidence	Try hard	Experience	Active learning	Group cooperation	Learning strategy	Interest-driven
Pearson	1	-.018	-.402**	-.018	-.029	-.021	.962**
Self-confidence Sig.(2-tailed)		.821	.000	.823	.716	.792	.000
N	156	156	156	156	156	156	156
Pearson		1	.037	.802**	.531**	.015	-.026
Try hard Sig.(2-tailed)			.647	.000	.000	.854	.744
N			156	156	156	156	156
Pearson			1	.023	.032	.007	-.635**
Experience Sig.(2-tailed)				.772	.688	.927	.000
N				156	156	156	156
Pearson				1	.835**	.014	-.022
Active learning Sig.(2-tailed)					.000	.867	.784
N					156	156	156
Group Pearson					1	.008	-.034

cooperation	Sig.(2-tailed)	.922	.670
	N	156	156
	Pearson	1	-.020
Learning strategy	Sig.(2-tailed)		.803
	N		156
	Pearson		1
Interest-driven	Sig.(2-tailed)		
	N		156

** . At level 0.01 (2-tailed), the correlation is significant.

3.5 Regression analysis of learning self-efficacy and learning engagement of college students majoring in physical education

The influence of self-efficacy on learning engagement was studied. The scale of self-efficacy was divided into independent variables, and the scale of learning engagement was divided into dependent variables. The overall structural equation was discussed.

Table 7. Model parameters of self-efficacy scale versus learning engagement scale

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
.614a	.877	.873	.62104	93.322	.000b

a. Dependent variable: Learning engagement

b. Predictors: (Constant), Self-efficacy

As can be seen from the table7, the value of R^2 is 0.877, and the adjusted value of R^2 is 0.873, close to 1. The results show that the regression model has acceptable fit and good interpretation. F value is 93.322, P value is $0.000 < 0.01$, indicating that the self-efficacy of the independent variable can predict the change of the dependent variable, that is, the model is significant, the regression equation is effective and has useful value.

Table 8. Coefficient test of regression model between self-efficacy scale and learning engagement scale

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.416	.228		6.200	.000
Self-efficacy	.558	.058	.614	9.660	.000

It can be seen from the table8 that the P-value of self-efficacy is less than 0.01, and the scale of self-efficacy has an explanatory effect on learning engagement. And β coefficient 0.614 is positive, indicating that the former can predict the latter. Self-efficacy has a significant positive predictive effect on learning engagement. Set self-efficacy as independent variable X and learning input as Y, then the regression equation of this regression analysis is as follows:

$$Y (\text{Learning engagement}) = 1.416 + 0.558X (\text{Self-efficacy}) \quad (1)$$

In summary, the structural regression equation of self-efficacy on learning engagement is obtained through regression analysis, and it can be seen that the level of students' efficacy in information-based learning has a positive predictive effect on learning engagement. Self-efficacy can predict students' learning engagement.

3.6 Result Discussion

Through the correlation analysis and regression analysis of the dimensions of self-efficacy and learning engagement in information-based learning, it can be seen that there is a correlation between the three dimensions of self-efficacy (self-confidence, effort and experience) and the four dimensions of learning engagement (active learning, group cooperation, learning strategy and interest-driven). And self-efficacy has a positive predictive effect on learning engagement.

3.6.1 The degree of students' learning self-confidence affects their learning engagement

Physical education college students with a high level of self-efficacy have a high degree of confidence in completing difficult learning tasks. They like to choose tasks that are higher than their own ability to seek challenges, maintain optimism when encountering obstacles [3], adhere to their own behavior, continue to work hard, and increase learning input through active learning and group cooperation. And then affect the learning effect. A person who has high self-efficacy and high confidence will be able to perform the learning activities task, will have confident in academic achievement. [4]

3.6.2 Students' existing experience affects their learning engagement

With the accelerated process of education informatization, students' learning channels are more diversified. Scholar Thomas has studied that in blended learning environment, digital support can better meet students' needs compared with teacher support [5]. If the existing students have received skills training or have experience in using information technology, then they belong to the students with higher computer information self-efficacy, and they will be more involved in learning in the learning process. This also shows that students' existing experience has a promoting effect on learning engagement. Students gain more from their studies when they are more engaged. [6]

4. Conclusions

Information-based learning resources can visualize abstract and difficult knowledge, create an immersive learning environment for students, stimulate their desire to learn, enhance their self-efficacy in learning, and then improve learning efficiency to achieve the purpose of knowledge construction.

Information education based on a variety of media represented by the Internet can fully meet the requirements of learners with its innovative teaching mode. In information-based teaching, self-efficacy affects the learning commitment of sports majors through their efforts, experience and self-confidence. In turn, college students' learning involvement has a reverse effect on their self-efficacy. Self-efficacy and learning engagement are mutually reinforcing, and they form a two-way relationship.

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