Research on the Effect of the Students' Online Learning and Its Influencing Factors

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Abstract. In order to clarify the related factors that affect the online learning effect and better help teachers to effectively improve the quality of online teaching, a random sampling survey was conducted through online questionnaires, and stata26.0 statistical tools were used to analyze the influence of individual characteristics on college students' online learning effect, in order to find out the main influencing factors. The results show that there is a correlation between the selected individual characteristics and the learning effect. Students' previous experience, learning motivation and self-efficacy have a significant positive impact on online learning effect.

Keywords: Online Learning Effect · Previous Experience · Learning · Motivation · Self-efficacy

1 Introduction

1.1 Research Background

As early as 2013, China has issued 'Opinions on Strengthening The Application and Management of Online Open Courses in Colleges and Universities', 'Guidance on Promoting The Healthy Development of Online Education' and other documents, focusing on the development of online education. The '14th Five-Year Plan' calls for the sustainable development of online education and the vision of building a high-quality education system [1]. Online learning is one of the focuses of future education development, and personalization is the direction of online learning. With the popularization of information technology and the deepening of the concept of lifelong learning, online learning and personalized learning will continue to move towards the road of integration and innovation. Constructing models based on the personal characteristics of online learners can provide timely and effective learning resources for learners, and lay a solid foundation for the further realization of educational informatization. However, the empirical evidence needed for learner models is still scarce, the theoretical foundation is weak, and there are few research focus on the comprehensive and systematic exploration of learner' characteristics [2]. Therefore, it is of great significance to systematically study learners' individual characteristics.
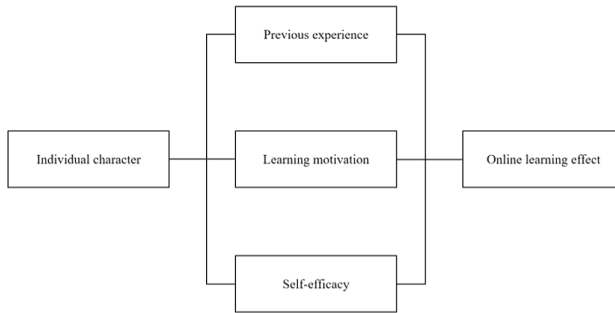
Fig. 1. Empirical analysis model

1.2 Theoretical Framework and Analysis Model

The concept of student-centered education emphasizes the importance of students' learning effect and the necessity of exploring the factors influencing learning effect. In their exponential learning model, Johnston and Aldridge point out that individual characteristics are important factors that influence learning effect [3]. Learner characteristics are the sum of various aspects of the internal factors that affect the learning process [4], including basic information related to personal learning background, psychological information related to personality and preferences.

Through the integration of literature review, it is found that previous experience, learning motivation and self-efficacy are important factors in the study of individual characteristics. Therefore, this study takes learners as the center, select these factors as the impact of college students online learning factors, considering the learner as a stable organism to carry on the analysis and the structure (see Fig. 1).

2 Material and Methods

2.1 Research Object and Basic Information

In the choice of research object, in order to understand the effect of college students' online learning, it is necessary to choose college students who carry out online learning courses as the research object, which is more in line with the research goal of this study. Questionnaire survey is the main research method in this study. A total of 135 questionnaires were collected by online self-administered questionnaire and random sampling, of which 133 were valid with an effective rate of 98.5% (see Table 1).

2.2 Questionnaire Design and Variable Definition

The main purpose of the questionnaire is to find out the effect of college students on web-based learning. For this purpose, the questionnaire includes 47 items including basic information, effective feedback and content feedback. Among them, the 'Likert quintile' data extraction method selects 33 valid feedback items, 11 content feedback items (1 represents completely inconsistent, 2 represents slightly inconsistent, 3 represents

Table 1. Basic information of research object

Category		Frequency	Percentage (%)
Gender	*Male*	61	45.9
	Female	72	54.1
Grade	*Freshman*	28	21.1
	Sophomore	45	33.8
	Junior	40	30.1
	Senior	20	15.0

Table 2. Reliability statistics of scale

Item	Cronbach's Alpha	Based on standardized items Cronbach' s Alpha	Number of Topics
Overall Questionnaire	0.974	0.970	47
Effective Feedback	0.928	0.928	7
Content-focused Feedback	0.978	0.976	33

slightly consistent, 4 represents very consistent, 5 represents completely consistent). The higher the score, the better the result. In this article, 133 electronic questionnaires were collected. Then the sample data were analyzed by SPSS 26.0 to test the reliability of the questionnaire. According to the statistical results (see Table 2), the overall reliability coefficient of the questionnaire is 0.974, and the reliability is high, which indicates that the questionnaire has high internal correlation and is generally reliable.

3 Results

3.1 The Basic Situation of College Students' Online Learning

Different from the traditional online learning method that focuses on the online teaching platform [8], the time input of online learning is the sum of the time that learners invest in all activities related to learning [5], including both the learning time invested by students in the online classroom and the learning time invested outside the classroom. The change of online and offline learning time input refers to the difference between the average daily learning time input of students offline and online. In this paper, the time spent by college students online and offline is obtained by random sampling. The statistical results indicate that among 133 college students, 22.6% show a downward trend in their online learning time, 33.8% of the students' learning time remain unchanged, and 39.1% increase. This suggests that despite the use of a new learning style, more than 60% of college students'

Table 3. Basic situation of college students' online and offline learning time investment

Items	Offline learning time		Online learning time	
	N	*Percentage (%)*	*N*	*Percentage (%)*
Less than 3 h	5	3.8	5	3.8
3–5 h	4	3.0	8	6.0
5–7 h	16	12.0	22	16.5
7–9 h	79	59.4	81	60.9
More than 9 h	29	21.8	17	12.8

learning time are in a stable or growing state (see Table 3). Therefore, most college students will be able to quickly adapt to online learning and devote sufficient time to it, which is a good start, meaning that the traditional teaching mode to a new transition.

3.2 The Overall Situation of the Individual Characteristics of College Students

Learning is a system composed of many factors, any change in the system will affect the learning effect of students. According to the 3 core learner characteristics identified in the literature review, a comprehensive scale of learner's individual characteristics was developed with corresponding scales, and each characteristics corresponded to 2–4 questions, the descriptive statistics are shown in Table 4. The average of the descriptive statistics is between 3.68 and 3.74, the standard deviation is between 1.04 and 1.08. Through the analysis of the data, it shows that the item with the highest score is learning motivation, and the lowest score is self-efficacy.

In this study, Likert scale was used to measure the questionnaire data, and the total scores of the study subjects were accumulated to find the average value, mainly to express the average level of learner-related characteristics.

1) Previous Experience
In actual learning, individual learning effect is the effect of comprehensive influence of factors [7]. Many factors such as the previous experience of students' online learning will affect students' online learning effect. The mean value of the overall performance of previous experience is 3.70, the minimum value is 3.59, and the maximum value is 3.79. The average score of each item of previous experience is shown in Fig. 2. Among

Table 4. Descriptive statistics of learner characteristics

Item	N	Full Range	Min	Max	Mean	Standard deviation
Previous Experience	133	4	1.00	5.00	3.70	1.08
Learning motivation	133	4	1.00	5.00	3.74	1.04
Self-efficacy	133	3.75	1.25	5.00	3.68	1.08

them, PE_2 scored the lowest and PE_3 scored the highest, indicating that although most students have experience in solving problems in online learning, they do not believe that they have strong information technology capabilities.

Note:

① PE_1, learner has previous online learning experience

② PE_2, learners have strong information technology capabilities

③ PE_3, learners have experience in solving problems in online learning

2) Learning motivation

Learning motivation is a kind of motive tendency which can guide and maintain learning behavior and direct it to a certain academic goal [8]. The average, the minimum and the maximum of learning motivation were 3.74, 3.68 and 3.87. The average scores of the learning motivation items are shown in Fig. 3. Among them, LM_2 score is the lowest, indicating that most students' learning motivation is not for the purpose of acquiring knowledge and skills. At the same time, the interest in online learning is not enough to become the driving force of learning. On the contrary, LM_3 scores the highest, so in general, learners have relatively strong motivation to be influenced by others.

Note:

① LM _ 1, participate in online courses because of the content of the platform is very interesting

② LM_2, participation in online courses is to improve personal ability

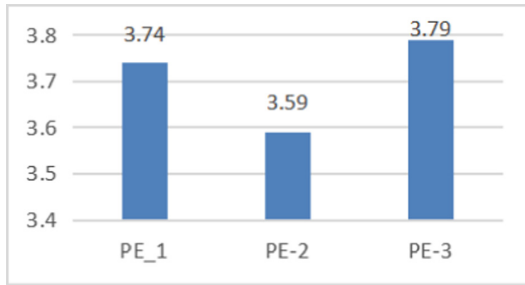③ LM_3, participate in online courses is to gain recognition and appreciation
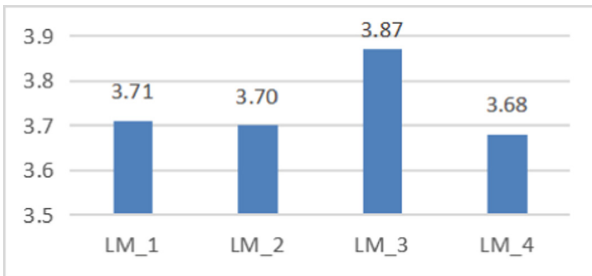

Fig. 2. Average score of previous experience

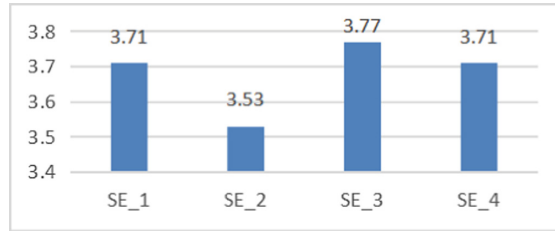**Fig. 3.** Average score of learning motivation

Fig. 4. Average score of self-efficacy

④ LM_4, participate in online course is to obtain a certificate of competency

3) Self-efficacy

Self-efficacy refers to the individual's belief in whether they can successfully complete the established learning tasks [9]. As an individual internal trait, self-efficacy has a significant impact on learning outcomes. The mean value of the overall performance of self-efficacy was 3.68, the minimum value was 353, and the maximum value was 3.77. The average scores of self-efficacy are shown in Fig. 4. Among them, SE_2 has the lowest score and SE_3 has the highest score. It shows that most learners are confident that they can overcome the difficulties in online learning, and think that they can insist on completing the online courses and do a good job in various learning tasks. However, most learners also think that they may not be able to pass the assessment of online courses smoothly.

Note:

① SE_1, confident in your ability to complete the task of online learning

② SE_2, believe yourself can pass the course examination smoothly

③ SE_3, confident that it is possible to solve the problem of online learning

④ SE_4, the course is easy to stick to.

3.3 The Effect of Individual Characteristics on the Online Learning of College Students

1) Correlation Analysis

In order to examine whether there is a significant correlation between the characteristics of each learner and the online learning effect, it is necessary to carry out correlation analysis, therefore, the Pearson product-difference correlation was used to make bivariate correlation analysis. The results are shown in Table 5. At the 0.01 level (two sides), there was a significant positive correlation between the characteristics of the learners and the online learning effect.

2) Regression Analysis

With the help of regression analysis, we can explore the description, explanation or prediction function of each independent variable to the dependent variable. According to the correlation analysis in the previous section, all learner characteristics are significantly correlated with the online learning effect, so we take 3 learner characteristics as

Table 5. Person correlation between personal characteristics and digital learning effect

Item	Previous Experience	Learning motivation	Self-efficacy
Learning effects	.642**	.658**	.639**

*. Significant correlation at the 0.05 level (two-sided). **. Significant correlation at the 0.01 level (two-sided)

predictive variables, the online learning effect is taken as a calibration variable, which is a continuous variable, and a multiple linear regression model can be established, it is used to illustrate whether the linear combination of learners' characteristics has a significant influence on the online learning effect and the magnitude of the predictive power. The summary of the model is shown in Table 6. The multivariate correlation coefficient (R) is 0.680 and the determinant coefficient (R^2) is 0.463. It shows that the 4 learner characteristics can explain 46.3% of the variance of online learning effect.

The results of variance analysis of the linear regression model are shown in Table 7. The F value of the overall significance test is 28.171, the degree of freedom is 4, the P value is 0.000, which is less than the significance level of 0.05, it is shown that in the linear regression model, the 3 learner characteristics can explain the variance of online learning effect significantly.

Standardized regression coefficient β can be used as a criterion for comparison between predictors. The greater the absolute value, the greater the influence of the predictor on the calibration variable and the stronger the explanatory power, the positive and negative signs indicate the direction of the influence of the predictive variable on the calibration variable. As shown in Table 8, among the 3 learner characteristics, motivation has the greatest influence on online learning, with a standardized coefficient of 0.389.

Structural equation model is a multivariate linear statistical modeling method. Its analysis process includes model construction, model correction and model interpretation. The structural equation model can not only measure the reliability and validity of the scale, but also find the influencing factors and clarify the relationship between the

Table 6. Summary of the Regression analysis model

R	R^2	Adjusted R^2	The error of the standard estimate
.680	.463	.452	.809

Table 7. Variance analysis of Regression analysis

Item	Sum of squares	df	Mean Square	F	Sig.
Regress	72.688	3	24.229	37.009	.000
Residuals	84.455	129	.655		
Total	157.143	132			

Table 8. Coefficient of regression analysis

	Non-standardized coefficients		Standard coefficient	t
	B	Standard error	Beta	
Constant	1.003	.267		3.757
Previous Experience	.246	.136	.245	1.815
Learning motivation	.347	.161	.332	2.265
Self-efficacy	.136	.155	.135	0.878

influencing factors, which has the incomparable advantages of the traditional regression analysis method. Therefore, the structural equation model is very suitable for this study. A structural equation model is constructed by AMOS24.0 software to analyze the influencing factors of college students' self-regulation ability in online learning. The structural equation model is shown in Fig. 5.

Note:
① PE: Previous experience
② LM: Learning motivation
③ SE: Self-efficacy
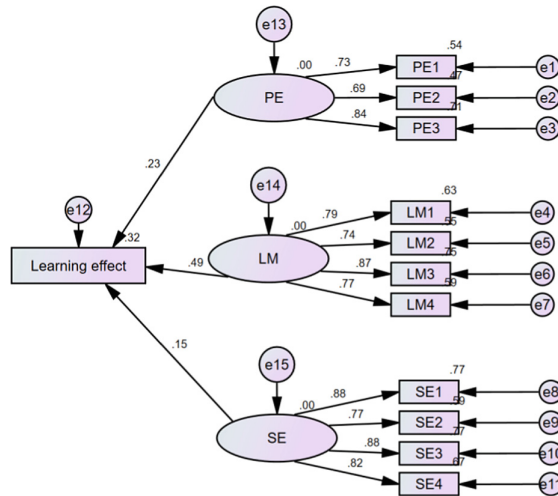
Fig. 5. Influence model of personal characteristics on online learning effect

4 Discussion

4.1 Problems

Initially, although 68.4% of students agree with the online learning model, about 30% of students still think that it is difficult to organize online learning materials into a logical structure, and that their knowledge and skills have not been improved in the process of online learning. After that, students online learning utilitarian purpose, more than half of the students said online learning for teachers and students recognition and appreciation, rather than in the interest in learning content. However, 63.9% of the students set goals before participating in online learning, and 72.9% of the students can complete their learning tasks within the prescribed time, indicating that most learners have strong self-control ability.

4.2 Problem Cause

The problems can be attributed to the following reasons:

With the continuous development of science and technology, the online teaching mode shows a trend of diversification, resulting in the course is often scattered on different platforms, which requires students to familiar with the operation requirements of different platforms in a short time. At the same time, colleges and universities do not pay enough attention to the cultivation of students' information ability, and there is no systematic improvement process of college students' information technology ability, so that there are certain operational difficulties in practice.

The ideal of autonomous learning is that learners have the ability to determine their own learning goals, time, place, method, learning content, and to monitor, evaluate adjust their own learning. However, China's long-term implementation of 'examination-oriented education', resulting in the formation of rote learning. Students of their own outlook on life, values without systematic thinking, do not know for whom to learn, why to learn. College students have strong test-taking ability, but weak innovation ability. They are also lack of learning initiative, independent learning and research ability.

Compared with offline learning, online learning mode lacks effective supervision on both students and teachers. Teachers cannot monitor the specific situation of students, and thus they are not able to control their students' listening effect. Most students are weak in self-control and initiative, so they are inevitably tired of learning. On the other hand, with the rapid development of mobile equipment technology, the cyberworld outside the online learning platform is more exciting and attractive. Therefore, it is not surprising that students cannot concentrate on online learning and lack self-discipline.

4.3 Strategies for Improving Online Learning Effect

According to the influencing factors, the strategies of improving college students' online learning mainly focus on the following aspects:

In order to improve students' information technology ability, it is important to pay more special attention to the students' experience, learning motivation and personal ability as the starting point, guiding systematic study with pertinence. At the same time,

colleges and universities should create a good information environment and strengthen the information consciousness of college students.

Additionally, the teaching managers should adjust the talent training scheme and teaching plan during the epidemic period, allowing the selection of online teaching scheme according to local conditions. They should also clarify the teaching objectives and cultivate students in accordance with professional characteristics in older to understand and meet the needs of students to stimulate their learning motivation. Teachers can improve students attention online through class discussion, and design teaching situations to improve teaching interaction and enhance attention.

To create an autonomous learning environment, it is necessary to pay more attention to the cultivation of students' practical ability, innovation ability and independent learning ability. Teachers should be the guide of students' learning. Between teachers and students, students and students should establish a completely equal cooperative relationship. College students should learn to master their own learning methods, tap their potential and play their own advantages.

5   Conclusions

This research carries on the quantification statistics and the analysis to the questionnaire survey data. The results show that there is a significant correlation between previous experience, learning motivation, self-learning ability, self-efficacy and students' online learning effect, which fully verifies the effectiveness of various influencing factors. Although college students are still satisfied with the online learning mode, and the adaptability and effect feedback of online learning is also admirable, there are still some differences. Generally speaking, this study advocates that we should pay attention to students' individual characteristics in the future online teaching. Only after we fully understand the individual differences of learners can we truly teach students according to their aptitude, help learners adapt to online learning faster and better.

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