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Study on the Influence of College Students' Learning Engagement on Learning Effectiveness in Blended Learning

Sicong Li [1,2]

[1] *School of Graduate Studies, Adamson University, 1000 Metro Manila, Philippines*
[2] *School of Economics and Management, Shaoyang University, Shaoyang, 422000, China*

Abstract: *Blended learning (or called blended teaching), which combines best practices from online and face-to-face learning, is one of the future development trends of higher education. This studies have explored the influence of college students' learning engagement on learning effectiveness in blended learning. The hypothesis studies shown that there is no significant difference in learning engagement and learning effectiveness among college students of different genders, grades and majors, and they show high consistency. The correlation analysis confirms learning engagement is a key determinant of learning effectiveness and is highly positively correlated with students' learning effectiveness. of course, the influence between the two is mutual, that is, while learning engagement has a great impact on learning effectiveness, learning effectiveness will form a positive feedback on learning engagement, and further strengthen the correlation between them. Furthermore, blended learning reform strategies have also been proposed including improving teachers' professional quality,improving the digital education resource service system,teaching design based on learning situation analysis and so on. These findings provide useful reference for the theoretical development and practical application of online and offline blended teaching.*

Keywords: *Blended learning; Learning engagement; Learning effectiveness; Strategy*

1. Introduction

1.1 Background of the Study

The 21st century is an era of "knowledge intelligence". The blended teaching model, which many advantages of online teaching and offline teaching, has become the "product of the new era" in field of education and has been increasingly valued. The research report released by the U.S. of Education in 2009 pointed out that compared with the simple face-to-face classroom teaching and remote online learning, blended teaching mode is the most effective way.[1] Blended learning can effectively promote learners to devote themselves to the whole process of learning, improve academic performance and achieve the goal of deep learning.[2]

However, It should be pointed out that blended teaching also faces multiple challenges in practice, such as creatively managing class time, coordinating face-to-face and online content, motivating ensuring adequate extracurricular support, and assessing students' adaptability to the online [3]

By its very nature, online and offline blended learning is a mixture of learning theories, learning methods, learning media, learning content, learning models, and student support services and learning environment. The change of teaching and learning methods caused by online and offline blended learning urgently requires us to study the influence of college students' learning engagement on effectiveness in blended learning.

Blended learning has become one of the hot spots in educational theory and model research in years. As one of the core contents of blended learning research, there are many research results on the relationship between learning engagement and learning effectiveness, but the existing academic viewpoints are still controversial, and there are many obstacles in educational practice.

Some scholars have suggested that learning engagement is a necessary condition for students to effectively participate in learning activities.[4] The triggers sustained and high-intensity learning

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engagement, which is considered a key factor in determining students' learning effectiveness in the learning environment.. [5] [6] [7]

But other scholars argued that online learning platforms provide a variety of rich learning features,[8] such as electronic voting, live broadcast, note-taking, focus groups, discussion communities, hot news, and short videos. However, some features are rarely used and exceed the students' basic learning needs. Moreover, irrelevant features interfere with students' normal learning activities. In addition, some online learning platforms have a poor interface design, [9][10]which reduces students' learning efficiency and creates difficulty in performing learning tasks.

Why do different scholars have different research conclusions? This is because each study has different aims, including different subjects (such as different age groups), different learning content, and different research methods and measurement scales.[1]

Previous studies examined the role of learning engagement in blended instruction, detailed analyses of learning engagement is lacking [3]. On the basis of existing research and teaching practice, this paper investigates undergraduates in a local university in Hunan Province, China. And takes the effective improvement of blended learning as the starting point, chooses learning engagement and learning effectiveness as the research variables, furthermore, analyzes the correlation and difference between the two. The research results can not only help teachers optimize and improve teaching strategies, but also promote learners' autonomous learning and effective learning, and further provide useful reference for the theoretical development and practical application of online and offline blended teaching.

1.2 Conceptual Framework

Based on a review of existing research theories and viewpoints,the conceptual framework of this study is described as shown in Figure 1 below.The profile of the undergraduate students will be assessed on the basis of sex, grade, and major, as illustrated in the paradigm above. The researcher will assess their level of learning engagement in blended learning utilizing cognitive, behavioral, and emotional engagements as indicators. their learning effectiveness will be assessed including Knowledge and ability, Attitudes and behaviors, Literacy and values. Their significant differences from the profile will be tested as well. The relationship between learning engagement and learning effectiveness will also be explored. As a result of this study, an enhanced blended learning program will be crafted.

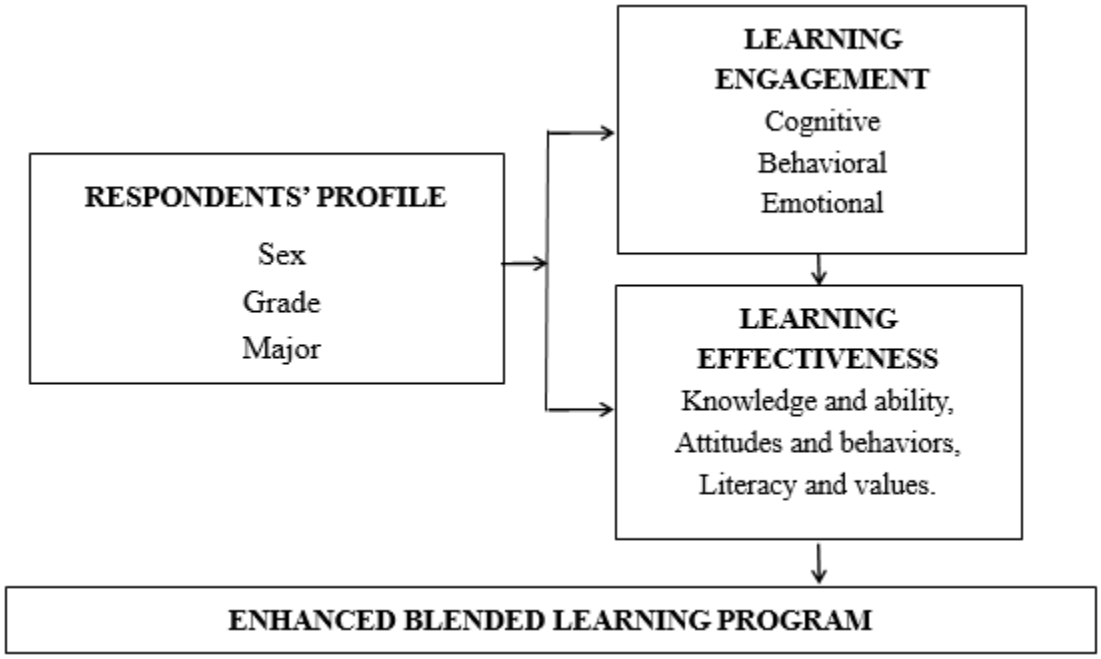

Figure 1 Research Paradigm

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2. Methodology

2.1 Research Design

The proponents use the Quantitative Method as the primary strategy for data gathering. The proponents desired this method because the purpose of this process is to accumulate the data through close-ended questions. The data is analyzed by using statistics, mathematical, and computerized tools.

The four-point Likert scales are designed to measure cognitive differences in learning engagement and individual differences in blended learning effectiveness among respondents. The scale is divided into four -point, including 1-Strongly Disagree(SD), 2-Disagree(D),3-Agree (A) and 4-Strongly Agree(SA).

2.2 Sampling Method

This study intends to adopt simple random sampling method. The sampling design tries to cover different grades of students and different disciplines (such as engineering, education, arts,business,etc.). According to representativeness of sampling, this results is 367 with a confidence level of 95% and 5% degree of error. It means the sample population of 367 student respondents.

To test whether the hypothesis is true when the Sig value is less than the significant level of 0.05, the original hypothesis is rejected, indicating that there is a correlation between variables, which is suitable for factor analysis.

2.3 Procedures

The research procedure includes questionnaire survey, data collection and data processing. Once the total of respondents is reached, the interpretation of the data and answers will be made in MS Excel, where the proponent will utilize its features. The gathered data from respondents will be demonstrated using Pie charts, Bar chart,or Curve diagram, and their answers to the question is shown by the form of Frequency.

3. Result

The obtained data, their findings, and an analysis in accordance with the problem description are presented in this chapter. It will also include the researcher's judgments and inferences based on factual facts and direct experience.

3.1 Profile of the Respondents

As a comprehensive university, HIST has a wide range of students from more than 20 provinces in Chinese mainland, with roughly the same number of males and females. The table 1 shows that majority of the student respondents are female (62.3%), and The data show that mostly are in the sophomore level (45.6%) and Freshmen(40.6%).

Table 1 Frequency Distribution of the Respondents' Profile

Profile	Frequency	Percentage
Sex		
Male	143	37.7%
Female	236	62.3%
Total	379	100%
Grade		
Freshmen	154	40.6%
Sophomore	173	45.6%
Junior	31	8.2%
Senior	21	5.5%
Total	379	100%
Major		
Engineering	74	19.5%
Education	36	9.5%
Arts & Literature	81	21.4%
Business & Law	40	10.6%
Medicine	148	39.1%
Total	379	100%

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In terms of major categories, students participating in this survey mainly concentrated in Medicine (39.1%)and Arts & Literature (21.4%). This paper analyzes that, compared with engineering and technology majors, medicine and art and culture majors not only have a large number of students, but also have a relatively higher proportion of female students. This is the main reason why the number of respondents is more concentrated in medicine and art and culture majors.

3.2 Student Respondents' Assessment on their Learning Engagement in Blended Learning

The statistical results of Table 2 show that in blended learning, the average score of emotional engagement of the interviewed students is the highest (3.04), behavioral engagement ranks the second (2.98), and cognitive engagement ranks the third (2.97). Its standard error is stable and fluctuates slightly between 0.43 and 0.47. On the one hand, this reflects that these three elements of learning engagement have a high degree of consistency, and cognitive engagement, behavioral engagement and emotional engagement are interrelated and mutually affecting. On the other hand, it reflects that student-centered blended learning has a more obvious positive effect on improving college students' learning engagement by providing learning resources and focusing on learning interaction. Qing Tang et al.(2022) also found that flow experience plays an important role in blended teaching and positively affects students' cognitive, emotional and behavioral engagement.[3]

Table 2 Summary of the Student Respondents' Assessment on Their Learning Engagement in Blended Learning

Learning Engagement Factors	Mean	SD	Qualitative Description	Interpretation	Ranking
1.Cognitive Engagement	2.97	0.47	Agree	Engaged	3
2.Behavioral Engagement	2.98	0.46	Agree	Engaged	2
3.Emotional Engagement	3.04	0.44	Agree	Engaged	1
Over-all Mean	3.00	0.43	Agree	Engaged	

Legend: 3.51-4.00 Strongly Agree/Strongly Engaged; 2.51-3.50 Agree/Engaged; 1.51-2.50 Disagree/Disengaged; 1.00-1.50 Strongly Disagree/Strongly Disengaged

3.3 Student Respondents' Assessment of Their Learning Effectiveness in Blended Learning

As shown in Table 3, among the three factors that constitute the effect of blended learning, students' self-perceived literacy and values are more effective (average score 3.06), followed by learning attitude and behavior (average score 3.04), and finally knowledge and skills (average score 3.03), with an overall evaluation value of 3.04. This finding indicates that student respondents considered blended learning to be effective in improving their own knowledge and skills, cultivating learning attitudes and behaviors, and enhancing literacy and values. Many existing studies also support this conclusion. For example, Isiguzel(2014) found that compared with face-to-face learning, students who participated in blended learning had higher learning motivation. Learning motivation, as an emotional factor affecting learning, facilitates new learning by focusing attention and increasing effort.

Table 3 Summary of the Student Respondents' Assessment of their Learning Effectiveness in Blended Learning

Learning Effectiveness Factors	Mean	SD	Qualitative Description	Interpretation	Ranking
1.Knowledge and Skills	3.03	0.47	Agree	Effective	3
2.Attitude and Behaviors	3.04	0.46	Agree	Effective	2
3.Literacy and Values	3.06	0.45	Agree	Effective	1
Over-all Mean	3.04	0.44	Agree	Effective	

Legend: 3.51-4.00 Strongly Agree/Strongly Effective; 2.51-3.50 Agree/Effective; 1.51-2.50 Disagree/Ineffective; 1.00-1.50 Strongly Disagree/Strongly Ineffective

3.4 Relationship Between the Learning Engagement and Learning effectiveness of Students in Blended Learning

As shown in Table 4, the correlation coefficient between students' learning engagement (Over all)

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and learning effectiveness (Over all) in blended learning was 0.90, indicating a strong correlation between the two. In terms of each sub-item index, students' sub-item learning engagement in three aspects of cognition, behavior and emotion showed a highly positive correlation with their sub-item learning effectiveness in knowledge and skills, attitude and behavior, literacy and values, and the correlation coefficient was between 0.76 and 0.88. This result indicates that in blended learning, the degree of learning engagement of students has a great influence on the learning effectiveness of students. Of course, the influence between the two is mutual, that is, while learning engagement has a great impact on learning effectiveness, learning effectiveness will form a positive feedback on learning input, and further strengthen the correlation between them.

Table 4 Relationship Between the Learning Engagement and Learning Effectiveness of Students in Blended Learning

Learning Engagement	Learning Effectiveness	Computed r	Sig	Decision on Ho	Interpretation
1.Cognitive Engagement	Knowledge & Skills	0.76	0.00	Rejected	Significant
	Attitude & Behavior	0.77	0.00	Rejected	Significant
	Literacy & Values	0.76	0.00	Rejected	Significant
	Average	0.80	0.00	Rejected	Significant
2.Behavioral Engagement	Knowledge & Skills	0.80	0.00	Rejected	Significant
	Attitude & Behavior	0.80	0.00	Rejected	Significant
	Literacy & Values	0.79	0.00	Rejected	Significant
	Average	0.83	0.00	Rejected	Significant
3.Affective Engagement	Knowledge & Skills	0.88	0.00	Rejected	Significant
	Attitude & Behavior	0.83	0.00	Rejected	Significant
	Literacy & Values	0.82	0.00	Rejected	Significant
	Average	0.88	0.00	Rejected	Significant
Over-all Learning Engagement	Over-all Learning Effectiveness	0.90	0.00	Rejected	Significant

Previous studies have shown that increased learning engagement can lead to better learning effectiveness. Of course, some scholars have pointed out the shortcomings of blended learning from the aspects of learning initiative, learning burden, information overload, and functional experience, [9][10] but this paper argues that these shortcomings or problems can actually be solved by means of instructional design, instructional interaction, functional iteration, and teacher training. Therefore, the question we should be concerned about is not "whether blended learning is the most effective", but "how to make blended learning more effective, and what methods and strategies should be adopted to improve and promote learning in blended environment".

4. Discussion

4.1 Conclusion

Based on the findings of the study,the following conclusions are drawn.

Blended learning, which combines best practices from online and face-to-face learning, is one of the future development trends of higher education.however, It also faces practical challenges such as online interaction between teachers and students, online resource production, energy and time investment, and learning effect evaluation.

There is no significant difference in learning engagement and learning effectiveness among college students of different genders, grades and majors, and they show high consistency.

In blended learning, learning engagement is a key determinant of learning effectiveness and is highly positively correlated with students' learning effectiveness. Of course, the influence between the both is mutual, that is, while learning engagement has a great impact on learning effectiveness, learning effectiveness will form a positive feedback on learning engagement, and further strengthen the correlation between them.

Blended learning has no unified model in learning content, learning time, learning mode and learning evaluation. According to the nature of the course and the characteristics of the profession, the

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teaching methods and teaching content should be flexibly applied.

4.2 Recommendations

4.2.1 Improve teachers' professional quality

Teachers' development and training center, teachers' professional alliance and other institutions should be established to strengthen peer learning exchanges, build learning communities, regularly carry out teaching exchanges and activity salones of blended learning, and continuously improve the ability of blended teaching.

4.2.2 Improve the digital education resource service system

The educational management should improve the public service system of digital education resources, and improve the information construction and application level of colleges and universities.

4.2.3 Teaching design based on learning situation analysis

Learning situation analysis is an important basis for teaching design and a prerequisite for blended teaching. Teachers can use technical support forms such as group discussion, questionnaire survey, preschool test and big data to accurately grasp the basic information, learning characteristics and other learning conditions of learners, optimize the design of teaching objectives and content system, push personalized and differentiated knowledge content and learning tasks, and achieve the learning goal of "adaptive learning".

4.2.4 Design open and interactive learning activities

In blended teaching, teachers use digital technology to design open learning activities such as project discussion, project research and project design for students, so that students can master the necessary practical skills and realize knowledge construction through the process of independent exploration and independent inquiry.

4.2.5 Create a good learning environment to support

A good learning environment plays an extremely important role in promoting efficient knowledge interaction among learners. different learning situations such as collaborative learning, autonomous learning and cooperative learning should be designed flexibly according to learning objectives in the learning activity environment to promote the improvement of learning effect.

4.2.6 Establish a multi-dimensional and dynamic evaluation system

With the help of information and digital teaching tools, data information of the learning process such as pre-class preview, course discussion and classroom practice should be collected in real time, and a multi-dimensional and dynamic evaluation system with process evaluation as the main body should be established, so as to stimulate learners' interest and motivation of knowledge interaction and promote the development of autonomous learning ability.

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