The Impact of Digital Teaching Resources on Student Learning Engagement

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Abstract: *Digital teaching resources, composed of multimedia network learning resources, online learning communities, and network technology platforms, offer the advantage of being unrestricted by time, location, and space, enabling the maximization of educational resource utilization, effectively reducing learning costs, and improving learning efficiency. Among the evaluation indicators of digital teaching resources, the learning engagement of learners is one of the key indicators. The degree of student learning engagement affects the quality of student learning and is influenced by multiple factors. This study analyzes the learning engagement of students and its influencing factors from different dimensions such as teachers, students, learning peers, and learning environment, and quantifies the influencing factors of student learning engagement using questionnaire surveys and empirical analysis methods. The study finds that self-factors, teacher factors, peer factors, and environmental factors have a significant impact on learning engagement, and strategies and suggestions for improving learning engagement are proposed based on the analysis results.*

Keywords: *Digital Teaching Resources; Learning Engagement; Survey Questionnaire;*

1. Introduction

1.1 Research background

With the rapid development of digital technology, digital education, as an emerging trend in education, has been quickly recognized worldwide.The aim of educational informatization and digitalization is to improve the quality of education, promote educational equity, and achieve the optimal allocation of educational resources through the application of digital teaching resources.

The use of digital teaching resources provides flexible learning time and space but also brings about issues such as learning motivation and self-monitoring. The degree of learner engagement is one of the key indicators affecting learning outcomes and evaluating learner learning effects. Therefore, in-depth research on the learning engagement of college students under the background of digital teaching resource usage and its influencing factors is an important way for educators to improve the quality of education and learning outcomes; it is of great practical significance for improving the teaching quality of colleges and universities and optimizing student learning experiences.

1.2 Research purpose and significance

The purpose of this study is to explore the impact of the use of digital teaching resources on student learning engagement, to reveal the main influencing factors of student learning engagement in the use of digital teaching resources, to provide empirical evidence for teachers to use digital teaching resources, and to provide examples for colleges and universities to promote the level of educational digitalization[1].

The significance of this study lies in a: In the context of digital teaching resources transforming classroom teaching, taking student learning engagement as the research perspective, providing support examples for the study of personalized teaching strategies supported by new technologies, new media, and new forms.b:Based on the practical case analysis of the artificial intelligence professional group, this project explores the impact of digital teaching resources on student learning engagement, proposes strategies to improve learning outcomes from different aspects, and provides a basis for improving digital teaching resources, which helps to promote the reform of vocational college teaching and the development of educational informatization.

1.3 Research content

1.3.1 Analysis of the Current Status of Student Learning Engagement

Based on the current situation of the increasing abundance of digital teaching resources in the current education and teaching environment, this study analyzes the current status and characteristics of student learning engagement among students in the artificial intelligence professional group of the school, laying a practical foundation for the subsequent data collection and research analysis of this study[2].

1.3.2 Analysis of Influencing Factors on Student Learning Engagement

This study focuses on individual factors, teacher factors, peer factors, and environmental factors. It refines and perfects the formal questionnaire through small sample interviews and pre-investigations to collect relevant data. Descriptive statistical analysis and differential statistical analysis of demographic variables are conducted using data analysis software, and empirical analysis is performed on the variables affecting the degree of student engagement in learning. Based on the results of data analysis, this study aims to understand the relationship between college students' engagement in the use of digital teaching resources and various influencing factors, ultimately forming a corresponding relationship between engagement and influencing factors.

1.3.3 Strategies and Suggestions for Improving Student Learning Engagement

After data analysis and summarization, based on the relevant conclusions, some suggestions are expected to be made for the use of online learning methods, teacher teaching, and student development. Problems are considered, discovered, and solved from the perspective of students to effectively improve the learning engagement of vocational students in online learning.

2. Model construction and research design

2.1 Determination of learning engagement

In existing research, learning engagement is refined into behavioral engagement, emotional engagement, and cognitive engagement for study, so this study adopts the same division method to analyze learning engagement in the context of digital teaching resource use.

2.2 Influencing Factors of Learning Engagement

Influencing factors in the learning process generally regard self-factors as the core elements for study, especially several models based on self-determination theory. Therefore, this study refers to the research results of predecessors and regards "self-factors, environmental factors, teacher factors, and peer factors" as the main influencing factors of learning engagement[3].

2.3 Research Hypotheses and Model Proposal

Combining the determination of variables in the early stage, research hypotheses are proposed for the influencing factors of college students' learning engagement in the context of digital teaching resources.

2.3.1 Research Hypotheses

Considering the impact of self-factors, teacher factors, peer factors, and environmental factors on learning engagement, the following hypotheses are proposed in this study:

H1: Self-factors have a significant impact on the behavioral engagement of college students in the context of digital teaching resources.

H2: Self-factors have a significant impact on the cognitive engagement of college students in the context of digital teaching resources.

H3: Self-factors have a significant impact on the emotional engagement of college students in the context of digital teaching resources.

H4: Teacher factors have a significant impact on the behavioral engagement of college students in the context of digital teaching resources.

H5: Teacher factors have a significant impact on the cognitive engagement of college students in

the context of digital teaching resources.

H6: Teacher factors have a significant impact on the emotional engagement of college students in the context of digital teaching resources.

H7: Peer factors have a significant impact on the behavioral engagement of college students in the context of digital teaching resources.

H8: Peer factors have a significant impact on the cognitive engagement of college students in the context of digital teaching resources.

H9: Peer factors have a significant impact on the emotional engagement of college students in the context of digital teaching resources.

H10: Environmental factors have a significant impact on the behavioral engagement of college students in the context of digital teaching resources.

H11: Environmental factors have a significant impact on the cognitive engagement of college students in the context of digital teaching resources.

H12: Environmental factors have a significant impact on the emotional engagement of college students in the context of digital teaching resources.

2.3.2 Theoretical Model Proposal

A theoretical model of online learning engagement and influencing factors is constructed as shown in Figure 1.

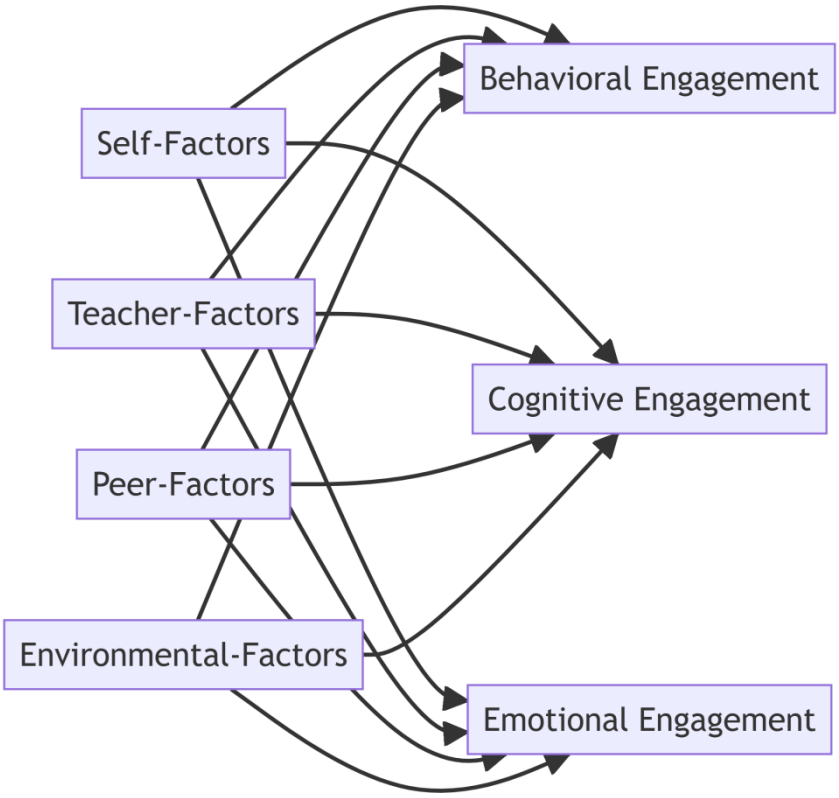

Figure 1 Theoretical Model

2.4 Research Design

2.4.1 Variable and indicator design

The overall structure of the scale and the indicators of each research variable are as follows.

a: Basic Information Section

The basic information section mainly investigates the basic situation of the survey subjects from two aspects. On the one hand, the study investigates the basic situation of learners, mainly including background information such as gender and grade; on the other hand, it investigates the learners' inclination to use digital teaching resources, with the survey content mainly including the duration and purpose of learners' use of digital teaching resources, the source of motivation, and learning outcomes[4-6].

b: Learning engagement section

There are many types of learning engagement scales with strong professionalism. According to the research theme and content, learning engagement is divided into three engagement dimensions. Behavioral engagement has specific indicators such as learning attitude, concentration, and initiative. Cognitive engagement has specific indicators such as learning planning, learning evaluation, and learning application. Emotional engagement has specific indicators such as learning desire and learning feedback.

c: Influencing Factors of Learning Engagement Section

According to the research theme and content, the influencing factors of learning engagement are divided into four dimensions. Self-factors have specific indicators such as learning motivation, self-learning evaluation, learning difficulty, and learning emotions. Teacher factors have specific indicators such as digital literacy, course planning, and guiding role. Peer factors have specific indicators such as peer communication and peer influence. Environmental factors have specific indicators such as resource quantity and resource functionality.

2.4.2 Questionnaire design

The questionnaire was compiled after the research indicators were determined. The questionnaire mainly consists of three parts: questionnaire introduction, basic situation investigation, learning engagement investigation, and influencing factor investigation.

The formal items in the questionnaire use the Likert 5-point scale, with 1-5 points indicating "A does not conform at all, B does not conform basically, C conforms partially, D conforms basically, E conforms completely."

3. Research implementation and result analysis

3.1 Research implementation

The distribution of questionnaires mainly adopts online data collection, using the Wenjuanxing platform as the main tool for questionnaire compilation, uploading and distribution. This study distributed survey questionnaires to freshmen and sophomores in the artificial intelligence major group of Shandong Vocational Institute of Fashion Technology. The total number of questionnaires is 1804, the number of valid questionnaires is 1767, and the effective response rate were 97.9%. The sample data size meets the requirements for data analysis and can be further analyzed.

3.2 Result analysis

3.2.1 Descriptive statistical analysis

a: Basic Information Analysis

In the statistical analysis of demographic variables in the questionnaire data, it can be concluded that the number of male participants in the formal survey is higher than that of female participants. Among them, there are 1026 male participants, accounting for about 56.8% of the total surveyed population, and 741 female participants, accounting for about 42.1% of the total surveyed population.

The proportion of students in different grades is highest, with 1044 students in the second year accounting for approximately 57.9%, followed by 760 students in the first year accounting for approximately 42.1%.

b: Analysis of the use of digital teaching resources

The statistics of the tendency to use digital teaching resources include the duration of using digital teaching resources, the source of learning motivation, the purpose of participation in learning, the evaluation of learning effects, and the tendency of the learning environment. From the perspective of

learners themselves, understand the current situation and learning tendencies of using digital teaching resources, providing references and basis for the proposal of strategies.

In terms of learning duration, about 43% of people have a learning duration of 0-1 hour; about 31% have a duration of 1-3 hours; about 21% have a duration of 3-5 hours; and about 5% of people can reach a duration of more than 5 hours[7].

In terms of learning motivation, the highest number of students is from active learning, about 53%, and the proportion of forced learning is the smallest, about 11%, and the source of motivation from external social passivity is about 36%.

In terms of learning purposes, professional course learning accounts for about 45%; interest learning accounts for about 21%; skill improvement learning accounts for about 16%; employment guidance learning accounts for about 8%; other course learning accounts for about 10%.

In terms of learning effects, about 52% of people have a certain improvement; about 19% have an improvement but not obvious; about 15% have obvious improvement; and about 14% have no obvious change.

In terms of learning environment, the dormitory type accounts for the most, 58%; the study room type is the next, 32%; the open type is 7%; the home type is the least, 3%. This is related to the current situation where most students in this school live in dormitories.

3.2.2 Differential statistical analysis

a: Gender difference analysis

Gender is an important demographic variable to divide students, and students of different genders may have different levels of learning engagement in the learning process. This study uses the method of independent sample T-test to analyze the data and obtains the following results:

Boys have the highest average cognitive investment, followed by behavioral investment, and the lowest is emotional investment; Girls have the highest average emotional investment, followed by behavioral investment, and the lowest behavioral investment.

b: Grade difference analysis

Student grade differences represent the differences in student experience, experience, and knowledge volume. This study explores the differences in student grade differences and obtains the following results:

First-year students have the highest mean in emotional engagement, followed by behavioral engagement, and the lowest in cognitive engagement; second-year students have the highest mean in behavioral engagement, followed by cognitive engagement, and the lowest in emotional engagement.

3.2.3 Empirical testing

a: Coefficient of Determination

The coefficient of determination is used in statistics to measure the proportion of the variation in the dependent variable that can be explained by the independent variables, thereby judging the explanatory power of the statistical model. Through software analysis, the coefficient of determination for emotional engagement, behavioral engagement, and cognitive engagement are 0.423, 0.532, and 0.621, respectively. The overall range is between 0.33 and 0.67, and the explanatory power validity is relatively good.

b: Model fitting degree

The model fit is used to evaluate the degree of fit between the model and the measurement indicators. The goodness of fit in this study is 0.567, which is greater than 0.36, indicating a strong fit of the model and suggesting its acceptability.

c: Path coefficient

In structural equation modeling, path coefficient refers to the regression coefficient between interconnected variables used to measure the degree of influence between variables. The path coefficients of self factors on behavioral investment, cognitive investment, and emotional investment in this study were 0.245, 0.324, and 0.467, respectively; And the p-values are all less than 0.05. From the results, it can be seen that self factors have a significant positive impact on learning engagement, and self factors have an extremely significant positive impact on behavioral, cognitive, and emotional engagement in learning engagement[8].

The path coefficients of teacher factors on behavioral engagement, cognitive engagement, and emotional engagement are 0.381, 0.187, and 0.134, respectively, and the p-values are all less than 0.05. The results show that teacher factors have a significant positive impact on learning engagement, and self-factors have a very significant positive impact on behavioral engagement, cognitive engagement, and emotional engagement in learning engagement.

The path coefficients of peer factors on behavioral engagement, cognitive engagement, and emotional engagement are 0.301, 0.329, and 0.311, respectively, and the p-values are all less than 0.05. The results show that peer factors have a significant positive impact on learning engagement, and self-factors have a very significant positive impact on behavioral engagement, cognitive engagement, and emotional engagement in learning engagement.

The path coefficients of environmental factors on behavioral engagement, cognitive engagement, and emotional engagement are 0.071, 0.231, and 0.023, respectively. Environmental factors have a significant positive impact on behavioral engagement and cognitive engagement with p-values less than 0.05, and no significant impact on emotional engagement with a p-value of 0.193 greater than 0.05.

In summary, the hypotheses proposed in this study have been tested through a survey questionnaire and empirical analysis, and the results are shown in the table below.

number	H1	H2	H3	H4	H5	H6
Inspection results	establish	establish	establish	establish	establish	establish
number	H7	H8	H9	H10	H11	H12
Inspection results	establish	establish	establish	establish	establish	Not established

Table 4-1 Hypothesis Verification Results

4. Research conclusions and recommendations

4.1 Research Conclusion

This study obtained the following conclusions through the distribution of survey questionnaires, descriptive statistical analysis based on questionnaire data, differential statistical analysis, and path testing of various variable models:

Most students have a positive attitude towards the use of digital teaching resources. Most of the students showed a relatively positive state in terms of the duration of using digital teaching resources, sources of learning motivation, participation in learning objectives, evaluation of learning outcomes, and inclination towards the learning environment. This indicates that the use of digital teaching resources has played a positive role in improving students' learning outcomes.

In the analysis of differences, there are gender differences and grade differences in cognitive investment, emotional investment, and environmental investment in terms of learning engagement. This indicates that as students age and gain more experience, they become more mature in terms of learning engagement.

Empirical analysis through structural equation modeling found that self factors, teacher factors, and peer factors have significant effects on the behavioral, cognitive, and emotional engagement of learners in the use of digital teaching resources. Environmental factors only have a significant impact on learners' behavioral and cognitive engagement, and do not have a significant impact on learners' emotional engagement. This also confirms the hypothesis of this study that self factors are the core influencing factors, that is, the essence of learning still needs to start from the learners' subjective initiative. The influence of teacher factors on learning engagement is also significant. Although digital teaching resources are used, traditional teacher-student interaction methods are more effective and familiar for students. Peer factors have a significant positive impact on learning engagement, indicating the necessity for our college to continuously strengthen the construction of academic atmosphere. Environmental factors have a significant impact on behavior and cognition in learning engagement, but not on emotional engagement. This indicates that learners' emotional engagement is still more inclined towards interpersonal emotional engagement rather than human-machine interaction. However, creating a good digital resource usage environment can have a certain effect on enhancing learners' behavior and cognitive engagement.

4.2 Suggestion

From the perspective of students. Self factors play a major role in the learning process. Therefore,

in order to better utilize digital teaching resources and improve learning quality, it is necessary to stimulate students' learning motivation and increase their interest in learning. Add positive feedback to students' learning process, and immediately give encouragement or rewards when students make progress or complete tasks; Further improve teaching content, reduce learning difficulty, simplify redundant information, make knowledge easier to understand and remember, and reduce students' thinking workload.

From the perspective of a teacher. Teachers, as builders and leaders of digital teaching resources, have a direct impact on improving teaching quality, while also indirectly affecting students' participation in learning. Therefore, strengthening the cultivation and construction of the teaching staff, enhancing teachers' digital literacy and teaching strategies play a crucial role in improving the quality of the curriculum.

From the perspective of peers. Peer factors play an important role in the learning process. The use of digital teaching resources and peer interaction behavior among peers play an important role in improving learning engagement. Therefore, peer interaction should be strengthened to help students form peer support groups; Strengthen peer influence, fully leverage the role of peer evaluation and feedback, help each other discover their own shortcomings and areas for improvement, and promote everyone's learning progress

From an environmental perspective. The use environment of digital teaching resources refers to providing students and teachers with a virtual learning platform through Internet and other network technologies, so that they can carry out learning and teaching activities at any time and anywhere. A good environment is conducive to stimulating students' interest in learning. Therefore, the first step is to strengthen the construction of network card platforms. A suitable platform is a prerequisite for improving student participation; Secondly, it is necessary to continuously enrich digital teaching resources, organize and categorize them in detail according to different types of resources such as video tutorials, online courses, book materials, etc., to facilitate students' use.

Fund Project

2023 Annual Key Teaching and Research Project of Shandong Fashion Vocational College: An Empirical Study on the Impact of Digital Teaching Resources on Students' Learning Engagement —A Case Study of the Artificial Intelligence Major Group, Project Number: 2023-SF-20.

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