THE IMPACT OF INNOVATIVE LEARNING ENGAGEMENT IN TEACHING BEHAVIORS ON ACADEMIC OUTCOMES: A CASE STUDY FROM CHONGQING

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Abstract: This study constructed a core conceptual framework using learning engagement and Learning Outcome as variables by introducing the following demographic gender and grade level variables. Attempting to analyze the differences in the perceived mean values of the respondents' demographic variable groupings for each variable of Learning Engagement, Learning Outcome and the influence of the independent variables on the dependent variable, the study formulated the research hypotheses: H1: There were statistically significant differences in the mean values of students' learning engagement behaviors depending on their general information (gender, age). H2: There were statistically significant differences in the mean values of students' learning outcome depending on their general information (gender, age). H3: The student learning engagement has had a significant impact on the learning outcomes of students.) H3: The student learning engagement has a positive and significant effect on student learning outcomes that is predictive. In the study in general, a total of 420 questionnaires were distributed in this study, utilizing simple random sampling method to distribute the questionnaires and 407 questionnaires were returned with a recovery rate of 96.9%.

This study found that junior high school students scored around 3.5 on both physics learning engagement and its dimensions, indicating that students' physics learning engagement was generally positive, with the behavioral dimension having the highest level of engagement, the affective dimension having the lowest level of engagement, and there were only minor differences in the levels of engagement across the dimensions. Although students' physics engagement was positive overall, approximately 30% of students had negative engagement on each dimension. Analyses of variance based on gender and grade level demographic variables that categorized students into groups showed little difference by gender and generally consistent levels of engagement across the dimensions of engagement. There were significant differences in behavioral and cognitive engagement across grade levels. The behavioral engagement, cognitive engagement, and total learning engagement of students in higher grades were higher than those of students in lower grades, while the emotional engagement of students in lower grades was higher than that of students in higher grades. This study provides a reference point for subsequent scholars to explore future directions for conducting student teaching and

learning, as well as an outlook and suggestions for future related research.

Keywords: Learning Engagement, Learning Outcome

Introduction

"Internet + education" has been promoting because the complexity of the field of education and slow to have universal leap. In this epidemic, more than 200 million students went online to study for the first time in China, as a result of the "no classes, no school" epidemic. This poses a great challenge to teachers and students alike, especially in terms of forcing teachers to reconfigure their teaching methods and pushing schools to change the way they educate people. This new crown epidemic is an opportunity for school education to turn a crisis into an opportunity and change as a result of the situation, bringing some changes to school education. After this long period of "online learning", an important goal of school education in the future is to cultivate students' independent learning, so that they can learn and love learning. Cultivate good habits, especially self-discipline. The most important feature of home learning for students is the increased autonomy of the learning schedule. The essence of online teaching requires independent learning for students. With less face-to-face guidance and supervision from teachers, students' self-discipline and commitment to independent learning are important factors that affect teaching effectiveness. In the usual offline classroom teaching, most students are in a passive learning state, accustomed to teachers, parent's tangible and invisible supervision and urging, not many opportunities for independent learning. With online learning, the location of the class has changed, the way the teacher teaches has changed, and the style of homework exams and teacher-student interaction has changed. The most critical thing is whether children have strong "immunity" to online games and online social networking. The most worrying thing is that the virus can't help the children, but the children may be defeated by themselves in online learning. In this reality, to achieve the desired academic results, students must be able to build up a strong self-discipline and a high level of commitment to learning with tenacity and perseverance

Home-based online learning can be a huge watershed for students' academic performance. Some people tease that the high school and middle school exams are.

Since the reform and opening of China, politics, economy and culture have developed rapidly, and education, as an extremely important part of socialist construction, has gained more and more attention to its development. In order to support national revitalization and nation-building, high-level talent cultivation and ensuring and improving the quality of education have been the focus of educational research in various countries. In 2016, China defined the specific contents of the core quality of student development, including "learning to learn". The 19th National Congress pointed out the importance of building a strong education country, and there is a long way to go to improve the

quality of education. The allocation of students' time and energy for learning directly affects their academic performance and development, and the overall quality of education. Learning engagement reflects the extent to which students' behavioral, emotional, and cognitive engagement is used and profoundly affects the development of learned learning. At the level of the entire school system in which students are currently enrolled, students are facing significant cognitive and behavioral challenges that require higher levels of learning engagement to integrate into current and future society. Engagement in learning assesses the positive aspects of student motivation, the complete, positive, and sustained state of mind that students exhibit in their learning and is a measure of the school climate and quality of instruction. Middle school students are developing rapidly both psychologically and physically, and guidance during this period becomes extremely important as their outlook on life and values begin to form and their personality development tends to stabilize. And learning, as the main task and main activity of junior high school students, is preferred as an educational vehicle. On the one hand, attention to the level of learning engagement can improve academic effectiveness, help junior high school students better master learning methods, perform major activities with a sense of meaning, and complete major tasks more efficiently; on the other hand, the positive psychological traits embedded in a high level of learning engagement can also benefit junior high school students through learning and have a sustained, long-term positive impact on their later development. Existing research has found that engagement in learning is significantly and positively related to academic outcomes and can reduce dropout rates and promote academic achievement, while it is significantly and negatively related to problem behaviors in middle school students, suggesting that attention to students' levels of engagement in learning is critical.

Foreign research on learning engagement is early, and the concept of "learning engagement" has been flourishing since the 1830s, when it was introduced by Schaufeli, and fruitful research results have been achieved. The research on learning engagement in China has started to be explored in recent years and is now at a preliminary stage of development. The domestic research on learning engagement has mainly focused on the current situation of learning engagement and its influencing factors. In a questionnaire study conducted by Cui Jing Gui and Xiong Min et al. in five different regions of China, they found that secondary school students' learning status has remained at a medium level of concentration in the learning process. In a survey study, Dan yang Li concluded that junior high school students' learning commitment varied greatly by grade level, and academic performance varied by grade level, with junior high school students being the most enthusiastic about learning, junior high school students being the second most enthusiastic, and junior high school students being less enthusiastic about learning than junior high school students and junior high school students. Wang Hong Rui et al. found in their study on the academic engagement of junior high school students in Baoji that family upbringing and place of origin would have some influence on the academic development of junior high

school students, and students who grew up in urban areas were more focused on learning and had better behavioral performance of academic engagement compared to those who grew up in rural areas. In a study conducted by Xiao Mei Wu with mobile junior high school students, she found that the level of parents' education has a direct impact on students' academic behavior. In her study, Feng Fang Yu concluded that students of different genders also showed significant differences in learning status, with girls generally having better learning status and scoring higher in learning concentration than boys. According to previous studies, it can be found that students who present different levels of learning engagement will perform differently in terms of demographic variables such as grade level, gender, and family origin.

From the existing studies, it can be found that: from the research subjects, there are college students, senior students, and elementary school students, but there are fewer studies on junior high school students. In terms of subjects, there are studies on English and mathematics, but in general, there are few subject categories.

Research Problem Statement:

In recent years, the landscape of education has been increasingly shaped by innovative learning engagement strategies aimed at enhancing teaching behaviors and subsequently influencing academic outcomes. Despite widespread adoption, there remains a need to systematically examine the specific impacts of these strategies within diverse educational contexts, such as Chongqing. This study seeks to investigate how innovative learning engagement practices employed by educators in Chongqing influence teaching behaviors and, ultimately, academic outcomes among students.

A research question is posed:

What innovative learning engagement strategies are currently being implemented in educational settings in Chongqing?

How do these strategies manifest in teaching behaviors among educators?

What are the perceived benefits and challenges associated with the adoption of these strategies by educators in Chongqing?

To what extent do innovative learning engagement practices correlate with improved academic performance and learning outcomes among students in Chongqing?

How do contextual factors within Chongqing's educational environment impact the effectiveness of these strategies?

What recommendations can be made for educators and policymakers based on the findings to enhance the integration and impact of innovative learning engagement strategies?

These questions are designed to guide research in exploring the relationships between innovative learning engagement, teaching behaviors, and academic outcomes within the specific context of Chongqing. They should help focus investigation and provide a clear direction for thesis.

Research Objective (s)

1. This article starts from the research background to understand the status of physics learning engagement of junior high school students.

2. Through the article, we organize, summarize, and analyze the correlation relationship between students' learning engagement and academic effectiveness.

3. This paper proposes the research hypothesis of this paper through literature analysis and constructs the theoretical model of learning engagement on academic effectiveness according to the research hypothesis, verifies the positive effect of students' learning engagement on academic effectiveness, and analyzes the collected data empirically through SPSS.

4. Finally, based on the results of the empirical analysis, the research findings are summarized, conclusions are targeted, countermeasures related to improving teachers' innovative teaching behaviors and improving students' learning engagement are proposed, and an outlook on the innovation of teaching behaviors and learning engagement studied in this paper is made.

Literature Review

Task time was proposed by Tyler at the beginning of his study on learning engagement, in which he explained its meaning and pointed out that there was a positive relationship between student engagement and student gain. Since then, many scholars have begun to study this area and have used empirical research to verify it. Jackson (1982) stated that students need to be more deeply engaged in learning beyond the act of participating in learning. According to Pace (1982), the quality of student engagement is not directly determined by the amount of time students devote to learning, but rather by the quality of the engagement, which is both qualitative and quantitative.

Newman (1992) defines the concept of learning engagement as the psychological factors and behaviors involved in the acquisition of knowledge and skills. In this regard, students' commitment to learning cannot be achieved by merely doing mechanical tasks and listening to lectures, but also by paying attention to students' enthusiasm and commitment to learning.

In 1979, the American curriculum theorist Eisner first defined student learning effectiveness as the result of students' intentional or unintentional participation in some form of learning. The Joint Committee on Standards for Educational Evaluation (JCE), an authoritative official organization, defined "student learning effectiveness" as the expectation of what students will achieve at the end of their learning, i.e., what they will be able to achieve after completing theory and skills training. The Joint Committee on Standards for Educational Evaluation (JCSE) defines "student learning effectiveness" as the expectation of what students can understand and do after completing theoretical learning and skills training. Different scholars have explained the definition of learning effectiveness from different perspectives. Wang, Qui xiao et al. considered learning effectiveness as a learning

outcome that can be quantified and an objective indicator to assess whether there is a facilitative effect of learning activities. According to Cheng Yao Zhang, learning effectiveness is the ratio of the combined outcome of learning behavior to the learning cost incurred to obtain this outcome, i.e., the combined learning outcome per unit of learning cost. These scholars elaborated the relationship between learning effectiveness and learning outcomes and considered learning effectiveness as a quantitative indicator. Some scholars define student learning effectiveness from the perspective of assessment, and Chen Li Zhen defines learning effectiveness as the changes in knowledge, skills, and attitudes produced by learners after receiving education. Guo Gui Xiang and Hu Lian Mei point out that learning effectiveness is different from simple learning achievement and different from learning efficiency. If learning efficiency emphasizes the role of unit time and is the ratio of learning effort to acquisition, exploring how to use less time and energy to acquire more and higher quality knowledge and ability, then learning effectiveness refers to the effect of the more far-reaching impact on learners after the learning activity is completed, and is It is a comprehensive consideration of the learner's knowledge, skills, and attitudes.

Based on a review of foreign studies in the article "The conceptual connotation and structure of student engagement", Mr. Kong Qi ping defines the structure of learning engagement in three dimensions, namely cognitive engagement, affective engagement, and behavioral engagement. Based on An Xiao Jing, Cheng Cheng, and Sun Jiao Jiao's "Review of Research on Students' Learning Engagement" and Kong Qi ping's "Conceptual Connotation and Structure of Students' Engagement", this paper collects the current literature on learning engagement research and discusses the relationship between students' learning engagement and academic effectiveness in more depth from three aspects: cognitive engagement, affective engagement, and behavioral engagement , and thus proposes targeted teaching and learning strategies. The term "engagement" is often used to describe the relationship between student engagement and academic achievement.

The term engagement is often used to describe the behaviors and attitudes of college students engaged in high-quality learning experiences, and refers to the amount of time, energy, and resources students devote to learning activities. These learning activities include the educational purpose and meaningful learning experiences that result from time spent on and off campus, in and out of the classroom, and among peers. Kearslev and Shneiderman (1999) and Cocea (2007) suggest that learning engagement consists of two aspects; first, it must be an active cognitive process activity. Secondly, students must be active in meaningful learning environments and activities to learn. The level of students' learning engagement is closely related to their academic achievement and long-term healthy development. According to Newman, cognitive and affective engagement is carried out with behavioral engagement and expresses the substantive content of student engagement. Student engagement is a combination of behavioral, affective, and cognitive engagement, which are both closely related and

relatively independent. Therefore, it is necessary to study the relationship between these three aspects and students' academic effectiveness.

The concept of learning engagement was first proposed by Schaufeli more than 70 years ago, who regarded the student body as a working group and considered learning engagement like work engagement as a learning-related, active and complete state of learning, covering three dimensions: vitality, dedication and concentration. Vitality originally means vigorous vitality, and in the context of learning, it means that in the process of learning, individuals are active in learning knowledge in their thoughts and actions, are not afraid of difficulties, and have abundant energy and resilience; dedication means that individuals feel that learning is meaningful, are full of enthusiasm in learning, are able to accept challenges, have a strong sense of pride, and feel proud of it; concentration means that individuals in the process of learning will According to Finn (1989), learning engagement is to some extent behavioral engagement, and he argues that students' behavioral engagement involves positive behavioral characteristics such as respecting rules and conforming to classroom norms, while overcoming negative behaviors such as skipping class and causing disruptions, etc. Birch argues that learning engagement is the deep involvement of students in learning, including such characteristics as Corno, Pintrich, and DeGroot consider learning engagement as the student's use of cognitive strategies for learning and active cognitive monitoring and self-regulation in the learning process, i.e., learning engagement is a cognitive engagement. By comparing and analyzing the literature on cognitive engagement, many scholars believe that the use of cognitive strategies and investment in mental effort are the key to determining learning engagement. Epstein & Mcpartland believe that learning engagement emphasizes positive emotions and high involvement in learning or learning-related activities, which is a kind of emotional engagement, and advocates focusing on the learning pleasure and Mcpartland believes that learning engagement emphasizes positive emotions and high involvement in learning or learning-related activities.

Methodology

The overall population of the study was middle school students in a middle school, of which 14 classes were randomly selected, with 30 students from each class as the study population, for a total of 420 students as respondents.

This paper uses a random sampling method. The random sampling method is to investigate the total number of objects in each part of the possibility of being equally sampled, is a sampling survey in full accordance with the principle of equal opportunity, is known as a "probability". Random sampling has four basic forms, namely, simple random sampling, equidistant sampling, type sampling, and whole-group sampling. Its greatest advantage is that when inferring the total from the sample information, the reliability of the inferred value can be objectively measured in a probabilistic way, thus

making the inference based on science. Because of this, random sampling is more widely used in social surveys and social research. Commonly used random sampling methods are pure random sampling, systematic sampling, and whole-group sampling. The main common random sampling methods are pure random sampling, systematic sampling, whole group sampling, multi-stage sampling, etc.

The sampling form published by Yamane, 1967. was used for sample sampling in this study and a 95% confidence level was chosen with p=0.5.

Table 1: Sampling

Size of Population	Sample Size (n) for Precision (e) of:			
	±3%	±5%	±7%	±10%
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
a=Assumption of the normal population is poor (Yamane, 1973). The entire population should be sampled.				

The overall population of this study is students in junior high school in Chongqing. The overall sample of this study is 716 peoples, as seen in Taro Yamane's sample sampling because 716 less than 1000, when we choose at 95% confidence level, P=0.5 we can see that the value corresponding to 1000 and corresponding to 5% is 286. Corresponding to Table 3-3 sampling table, the sample size was obtained as 286 people. To increase the accuracy of the study results and generalizability of the findings, this study enlarged the sample size and issued and collected 420 valid questionnaires.

This paper was distributed to the respondents through paper questionnaires, which were completed and submitted by the respondents. After the questionnaires were collected, the valid questionnaires were counted and further analyzed on the computer, and the results of the study were written based on the analysis. The validity of the questionnaires was testing, and invalid questionnaires were excluded, and a total of 407 valid questionnaires were obtained.

Results

Regression models are gradually added to the regression models from high to low according to the strength of association of the respective variables with the school standard variables, and independent variables for which the regression coefficients fail to reach significance are excluded from the models. Through the analysis, all three dimensions of learning engagement reached significant

correlation with academic achievement, behavioral dimensions were introduced first, followed by affective engagement, and no variables were excluded. The third model determined the coefficient R-square of 0.800, which could explain 80.0% of the variance of the dependent variable academic achievement, and the Durbin-Watson test statistic was 1.629, when the DW value approximated to 2. indicates that the residuals are independent, and the model is the best.

In the F-test of the total linear regression equation, the F-value was 162.590, p<0.01, indicating that the model reached the significance level, and the predictions of the regression equation described the academic achievement school standard variables with high accuracy. It can be assumed that there is a linear relationship between behavioral input, cognitive input, emotional input, and academic achievement.

The table shows the list of coefficients of the multiple linear regression, and according to the significance of the input of one dimension on academic achievement.

The t-test shows that the influence of three dimensions of input on academic achievement is significant, and thus a linear regression model of learning engagement and academic achievement can be established. Let x1 behavioral input, x2 affective input, and X3 cognitive input, the multiple linear regression equation established according to the model is:

$$Y=-6.263+0.654X1+0.644x2+0.575X3$$

The constant term of the equation was -6.263, the partial regression coefficient of behavioral input X1 was 0.654, emotional input x2 was 0.644, and cognitive input X3 was 0.575, all of which were significant. The covariance of the independent variables is not significant according to the tolerance values.

The maximum absolute value of the standardized residuals was 2.522, which did not exceed the default value of 3. No singular values could be found. Again, using the three dimensions of learning engagement as independent variables and academic achievement as dependent variables, a linear regression model was established for regression analysis for group 2 with learning engagement greater than 4.1. Through the analysis, the three dimensions of learning engagement did not reach a significant correlation with academic achievement and were all excluded. Subsequently, a stepwise regression analysis was conducted by adding total learning engagement as the independent variable, and a linear regression equation was established by entering l learning engagement as the independent variable.

In the F-test of the total linear regression equation, the F-value was 201.296, p<0.01, indicating that the model reached the significance level, and the predictions of the regression equation described the academic achievement school standard variables with high accuracy. It can be assumed that there is a linear relationship between learning engagement and academic achievement.

When the learning engagement score was less than 4.1, the correlation between academic achievement and learning engagement was as high as 0.894, reaching a significant level of 0.01, indicating a high positive correlation between the two. Meanwhile, the correlation coefficients between academic achievement and learning

The correlation coefficients of the three dimensions of academic achievement and learning engagement are 0.644, 0.583 and 0.624 respectively, which show significant positive correlation and are relatively strong. The correlation coefficients of academic achievement and learning engagement were -0.874 when the learning engagement score was greater than 4.1, and the correlation coefficients of the three dimensions of learning engagement were -0.467, -0.549, and -0.391, which also showed negative correlation, but the correlation was not significant. The results of the correlation analysis indicated that there was a strong association between academic achievement and each category of input and total input. When the academic input is less than 4.1, the more students put in, the higher the achievement in physical, but if it exceeds 4.1, it may be that the more students put in the lower the achievement. When academic achievement is positively correlated with learning engagement, the greatest effect on achievement in physics is behavioral input, and the relatively weakest effect is cognitive input, which corresponds to the results of our previous analysis. When the two are negatively correlated, the greatest impact on academic achievement is on cognitive input, and the least impact is on emotional input. Thus, it is not clear that the more physical inputs are used, the higher the achievement will be.

Discussion

From the findings of this study, there is a significant relationship between learning engagement and academic achievement. Herein, comprehensive suggestions are made to teachers and students from the perspective of learning engagement to exploit the educational effectiveness of different categories of learning engagement to improve students' learning engagement, increase academic achievement, and reduce the gap between different achievement levels.

Differences in academic engagement among students at different levels of academic achievement.

The variability in engagement in learning was particularly pronounced among students at different levels of academic achievement, with high-achieving students having the highest engagement in learning, followed by middle-achieving students, and lowest-achieving students. The higher the level of academic achievement, the higher the score for engagement in learning, with the average score for average achievers being below 3 on behavioral, cognitive, and affective dimensions. The differences between the moderate and high achieving students were mainly in the behavioral dimensions, with no significant differences in the cognitive and affective dimensions. The average achievers differed

significantly from the moderate and high achievers on all dimensions. Behavioral engagement was the only category of engagement that differed significantly in academic achievement levels, and the higher the student's academic achievement level, the more behavioral engagement there was. The higher the student's academic achievement level, the more behavioral input. Students at either achievement level had the lowest scores on the affective dimension, and the goal was to have individuals who were negatively engaged in learning on all dimensions. A one-way multivariate ANOVA revealed that the interaction between students' academic achievement level and grade level did not have a significant effect on academic engagement, the main effect of grade level on academic achievement was not significant, the academic engagement of high-achieving students had been maintained at a higher level, while c had been maintained at the lowest level as well, and both had a tendency to rise step by step, but the bifurcation of the situation of physical academic achievement has not improved.

The correlation analysis revealed that academic achievement is closely related to learning engagement and its dimensions. When learning engagement is less than 4.1, the more students put in, the higher their achievement in mathematics will be, but if it exceeds 4.1, it is possible that the more students put in, the lower their achievement will be. When academic achievement is positively correlated with learning engagement, the greatest effect on achievement in physics is behavioral input, and the relatively weakest effect on achievement in physics is cognitive input. When the two are negatively correlated, the greatest impact on academic achievement is on cognitive input, and the least impact is on emotional input. It is not true that the more students invest in physics, the higher their academic achievement will be, but too much input will cause burnout and affect academic achievement. When the level of learning engagement is between 0 and 4.1, the three dimensions of learning engagement can effectively explain 80.0% of the variance in academic achievement, and the joint explanation rate is very high, and the prediction of physics academic achievement based on learning engagement has good credibility. However, there is still a gap existing between learning engagement and physics academic achievement, and the engagement is not fully reflected in academic achievement.

Conclusions

In this study, 420 junior high school students in a school were studied and their physics learning engagement and various dimensions and closely related academic achievement were explored by means of a questionnaire, and the following conclusions were drawn.

The scores of middle school students on physics engagement and its dimensions were all around 3.5, indicating that students' engagement in physics was generally positive, with the most engagement in the behavioral dimension and the least engagement in the affective dimension, with only minor differences in each category. Although students' physical engagement was generally positive, about 30% of students were negatively engaged in each dimension. Differential analysis of students into

different groups based on gender and grade demographic characteristics variables revealed that. Gender did not differ significantly across the dimensions of learning engagement and overall, and the level of learning engagement remained generally consistent. There were significant differences in behavioral and cognitive inputs among students in different grades. Students in the upper grades had higher behavioral engagement, cognitive engagement, and total learning engagement than students in the lower grades, while students in the lower grades had higher emotional engagement than students in the upper grades.

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