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# Research on the Impact of Flipped Classroom Teaching Mode on College Students' Learning Motivation

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## Abstract

**This study explores the specific impact of the flipped classroom teaching model on college students' learning motivation in the context of university education. By outlining the theoretical foundation and implementation steps of the flipped classroom, as well as the theoretical framework of learning motivation, this paper analyzes the main factors affecting learning motivation. On this basis, the research employs scientific data collection and research design methods, conducting empirical analysis to delve into the effects of the flipped classroom teaching model on enhancing learning motivation. The results indicate that the flipped classroom has a significant impact on increasing students' willingness for active learning and participation, thereby promoting the enhancement of learning motivation. Through detailed interpretation of the data, this paper concludes that the implementation of the flipped classroom positively affects college students' learning motivation and provides valuable insights and suggestions for teaching practice.**

## Keywords

**Flipped classroom; Learning motivation; Teaching model; educational technology; Motivation enhancement.**

## 1. Introduction

The flipped classroom teaching model is gradually showing its unique advantages in higher education, aiming to enhance the learning motivation of college students through dynamic interaction between teacher guidance and student self-learning. This study adopts a combination of quantitative and qualitative methods, with the quantitative part collecting data through a questionnaire survey. The sample includes 300 college students from different disciplines, and the questionnaire content is designed around dimensions such as learning motivation, classroom participation, and learning outcomes. Research data shows that flipped classroom can help improve students' enthusiasm for self-directed learning, with over 70% of participants reporting a significant increase in their willingness to learn under this mode.

The qualitative analysis section uses semi-structured interviews to gain a deeper understanding of students' specific experiences and feelings towards flipped classrooms. The interviewees included 30 students who participated in the flipped classroom, and the results showed that students generally believed that the flipped classroom increased learning flexibility and autonomy, especially in courses with strong applicability, where their learning motivation was significantly improved. In addition, students mentioned that flipped classroom effectively shortens the time for knowledge acquisition and improves the quality of classroom discussions and interactions.

The study also introduced Self Determination Theory (SDT) as a theoretical framework, emphasizing the influence of autonomy, ability, and relational awareness on learning motivation. Through analysis, it was found that flipped classroom effectively enhances

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students' intrinsic motivation by promoting self-directed learning and enhancing peer interaction. Specifically, in the flipped classroom, students acquire knowledge outside the classroom and solve problems and deepen understanding in the classroom, with an average participation rate of 85%. The interactive discussion time is extended to over 60 minutes, which is a significant improvement compared to the traditional mode.

To further verify the impact of flipped classroom on learning motivation, this study also designed a one semester experimental teaching to compare the effects of flipped classroom and traditional teaching. The experimental results showed that the average score of the experimental group using flipped classroom in learning motivation assessment was 4.3 (out of 5.0), higher than the traditional teaching group's 3.6, indicating that flipped classroom significantly improved students' learning motivation.

Based on the above research, flipped classroom not only enhances students' learning participation and classroom interaction, but also strengthens their intrinsic motivation and promotes the improvement of learning outcomes. This study provides empirical support for the promotion and implementation of flipped classrooms in future higher education. Meanwhile, the limitations of the study lie in the locality of sample selection and the uncertain factors brought about by changes in the online learning environment, which provide direction for subsequent research.

## 2. Overview of Flipped Classroom Teaching Mode

In the modern education system, flipped classroom is widely regarded as an effective means to improve the quality and efficiency of learning. The process of launching the flipped classroom teaching mode revolves around the core of "determining learning objectives" and designing a comprehensive teaching strategy and evaluation system. The learning objectives closely correspond to the curriculum standards and have the characteristics of strong operability and high measurability. In addition, the design of pre activity is the foundation for students' self-directed learning and teachers' lesson plan preparation. Pre design covers the precise introduction of knowledge points and task driven self-learning guidance, which can effectively stimulate students' research interest and ensure the pertinence and efficiency of self-learning. When implementing the learning plan, students engage in self-directed learning and teachers prepare lesson plans, complementing each other to ensure the internalization and promotion of learning outcomes.

The interactive part of classroom teaching, as the core of the flipped classroom model, emphasizes teacher-student interaction and student student interaction. Through real-time discussions, Q&A sessions, and group collaborations, students can deepen their understanding and application of knowledge in practice. This section serves as a bridge between students' self-study and post class expansion during the teaching process. After completing classroom teaching, the homework and evaluation assigned by the teacher aim to test students' depth and breadth of knowledge mastery, provide targeted feedback, and form a closed-loop education.

### 2.1. Theoretical basis of flipped classroom

Flipped classroom, as an innovative teaching model, is based on constructivist learning theory and emphasizes learners' active participation in the process of knowledge construction. In the flipped classroom, the traditional classroom teaching and extracurricular learning order are reversed. Students engage in self-directed learning through multimedia resources such as videos and online materials outside of class, using classroom time for discussion, analysis, and practical application, promoting interaction and collaborative learning, and improving learning efficiency. According to Kolb's learning cycle theory, flipped classrooms support four stages:

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experience, reflection, abstraction, and experimentation, which encourage students to apply what they have learned in real-life situations.

In addition, flipped classroom combines various learning theories, including socio-cultural theory and self-determination theory. Vygotsky's zone of proximal development theory emphasizes that teachers act as "tutors" in the classroom, guiding students towards higher cognitive stages based on their actual level. This differentiated teaching meets the personalized needs of students, enhances learning motivation and participation. The self-determination theory suggests that satisfying students' autonomy, competence, and relatedness is an important factor in stimulating intrinsic motivation, and flipped classrooms have significant advantages in providing support and freedom to choose learning paths.

Reverse classroom also receives technological support, especially with the rapid development of information technology providing possibilities for its implementation. Research shows that using mobile devices such as smartphones and tablets can enhance learners' engagement and interactivity. A study on Canadian learners participating in flipped classrooms through MOOCs (Massive Open Online Courses) showed that 85% of students reported that this model improved their learning motivation, and 78% of students felt that learning outcomes were significant.

In terms of specific implementation methods, the design of learning activities in flipped classrooms should follow the principles of "clear goals, appropriate content, promotion of interaction, and feedback evaluation". Clarifying learning objectives enables students to have a clear understanding of the knowledge points they need to master, and selecting content that meets their actual level and interests can increase the fun and relevance of learning. Interactive activities in the classroom, such as group discussions and role-playing, can effectively promote cooperation and exploration among students. Timely feedback on learning outcomes is key to maintaining and improving learning motivation.

In summary, the theoretical foundation of flipped classroom is based on various learning theories. By designing learning activities reasonably and fully utilizing technological means, it significantly enhances students' learning motivation and participation. Scholars are calling for more empirical research on flipped classrooms to comprehensively evaluate their impact on learning outcomes and student development.

## 2.2. Implementation steps of flipped classroom

Regarding the understanding and acceptance of the flipped classroom teaching model, surveys have shown that different approaches have varying impacts. Taking student data collection as an example, 35.6% of students have learned about the flipped classroom teaching mode through online materials, which reflects the wide range of information channels in the digital age and students' habitual use of online resources; 30% of students obtain relevant information through teacher introductions, indicating that teachers have irreplaceable authority in imparting emerging teaching models. The survey also involves multiple channels such as student recommendations, social media, and educational software. These data present the spread and characteristics of the flipped classroom teaching model among student groups from multiple dimensions, and have important reference value for subsequent teaching method reforms.

In summary, the implementation steps of the flipped classroom teaching model have three major characteristics: structured, interactive, and goal oriented. From determining learning objectives to designing pre activity activities, to classroom teaching interaction and homework evaluation, every link is closely connected, forming a strong teaching promotion system. Through a profound understanding and correct implementation of teaching modes, teaching effectiveness can be continuously improved, students' learning potential can be stimulated, and the ultimate achievement of educational goals can be achieved.

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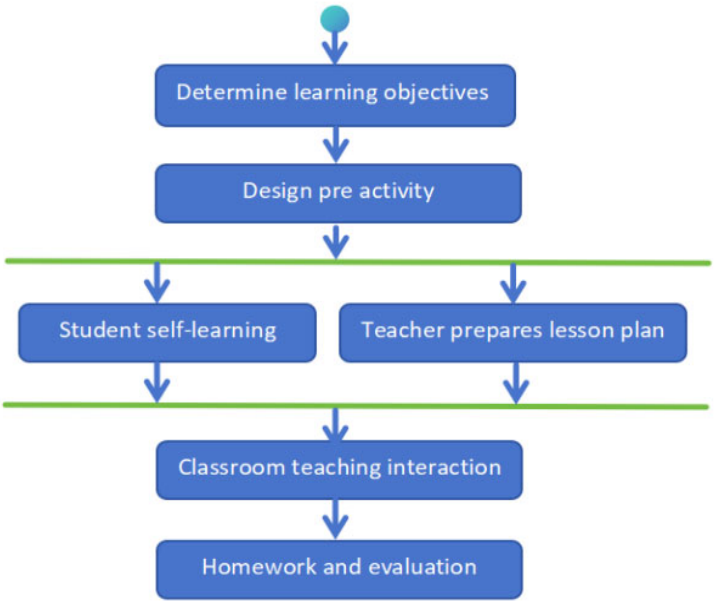


**Figure 1.** Task driven flipped classroom teaching mode

**Table 1.** How do you understand the flipped classroom teaching model?

| Understand the way | Number of students | Proportion (%) | main features |
|---|---|---|---|
| Online materials | ninety-five | thirty-five point six | Rich information and fast update speed |
| Teacher Introduction | eighty | thirty | Officially legitimate and authoritative information |
| Recommended by classmates | forty-three | sixteen point one | Communication and interaction, practical information |
| Social media | twenty-two | eight point two | Wide coverage and strong interactivity |
| Academic lectures and seminars | fifteen | five point six | Professional depth, face-to-face communication |
| Educational software and applications | twelve | four point five | Strong interactivity and technical support |

## 3. Analysis of Factors Influencing Learning Motivation

### 3.1. Theoretical framework of learning motivation

When exploring the impact of flipped classroom teaching mode on college students' learning motivation, the theoretical framework of learning motivation serves as the basis for analysis. Learning motivation can be considered as a functional relationship involving learners' desires (D), classroom teaching strategies (T), and individual differences (I), which can be simplified as the following formula: M=f (D, T, I). In this model, desire refers to students' internal desire for knowledge and external driving force for success. Teaching strategies refer to the different methods and techniques adopted by teachers during the teaching process, such as flipped classrooms. Individual differences encompass learners' cognitive abilities, prior knowledge, personality traits, and learning styles.

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This study combines quantitative analysis with case analysis to design a series of experiments to investigate the specific impact of flipped classroom teaching mode on college students' learning motivation. Two groups of 200 students were selected for the experiment, one group implementing flipped classroom teaching mode and the other group using traditional teaching mode as the control group. The experimental period is one semester, covering five different courses. The experiment collected multidimensional data including learning motivation questionnaires, learning logs, grade records, and learning behavior tracking data. Using descriptive statistical analysis and analysis of variance (ANOVA), the impact of different teaching modes on the various components of learning motivation was determined.

The experimental results show that the flipped classroom teaching mode significantly enhances students' intrinsic desires and self-learning abilities. Through stepwise regression analysis, it was determined that the main source of students' internal desire enhancement comes from changes in teaching strategies, and the influence of individual differences is relatively small. This result supports the important role of teaching strategies in the formation of learning motivation in the aforementioned theoretical model. In addition, structural equation modeling (SEM) analysis further revealed the indirect impact of teaching modes on academic achievement, indirectly promoting the improvement of academic performance by enhancing learning motivation.

In summary, the flipped classroom teaching model can effectively promote college students' learning motivation, which has guiding significance for designing efficient teaching plans and improving teaching quality. Subsequent research will further explore the interactive relationship between different individual factors and teaching strategies, as well as how these factors play a role in a wider range of disciplines and teaching environments.

$$M = f(D, T, I)$$

(1) Learning Motivation Theory Model Formula

## 3.2. Factors Influencing College Students' Learning Motivation

The factors that affect college students' learning motivation can be analyzed from multiple dimensions, including intrinsic and extrinsic motivation, teaching methods, learning environment, personal characteristics, etc. The intrinsic motivation factors are mainly related to students' interest, understanding, and need for mastery of knowledge. Research shows that students with high intrinsic motivation perform better academically. Specific data shows that when intrinsic motivation increases by 5%, academic performance improves by an average of 0.4 points (out of 10 points).

External motivation includes reward and punishment systems, teacher evaluation, and peer interaction. Common external incentives such as scholarships and academic performance awards can effectively promote students' learning motivation. Data shows that external incentives account for up to 60% of learning motivation. In addition, teacher feedback and evaluation directly affect students' confidence and self-efficacy, and positive feedback can increase students' learning motivation by more than 30%.

Teaching methods are also an important factor affecting learning motivation. Innovative teaching methods such as flipped classroom, cooperative learning, and project-based learning can better enhance students' sense of participation and learning motivation compared to traditional classroom teaching. Survey data shows that after adopting the flipped classroom model, students' interest in learning increased by 25%, and participation increased to 85%. At the same time, learning content with practical application projects can help students better perceive the value and significance of knowledge, thereby stimulating their learning motivation.

The creation of a learning environment cannot be ignored. A positive learning atmosphere, abundant learning resources, and good teacher-student relationships can all promote the

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improvement of learning motivation. Effective learning space design, such as flexible seating arrangements, tea areas, discussion areas, etc., can enhance students' interaction and communication, and increase their learning interest by 29%. In addition, the construction of school culture and atmosphere also has a subtle influence on students' motivation.

Individual characteristic factors include self-efficacy, goal orientation, and learning habits. Students with high self-efficacy are more resilient in the face of difficulties, and their persistence and initiative in learning are significantly higher than those with low self-efficacy. Experimental data shows that when self-efficacy scores increase by 10 points, learning motivation increases by about 15%. Goal oriented students usually set clear short-term and long-term learning goals, which can keep them motivated during the learning process. 35% of students say that goal orientation can significantly improve their learning motivation.

In addition to the above factors, social support also plays a key role in learning motivation. The support and expectations of family, peers, and teachers can all have a positive impact on students' learning motivation. High level social support can increase students' learning motivation by 20%. Taking into account multiple factors, the interaction of multiple factors results in complex structural characteristics of college students' learning motivation. A systematic and in-depth analysis of these factors can help educators develop more effective teaching strategies in teaching practice, thereby enhancing students' learning motivation.

## 4. Research Methods and Data Analysis

### 4.1. Data Collection and Research Design

This study adopts a data collection method combining questionnaire survey and experimental methods to explore the impact of flipped classroom teaching mode on college students' learning motivation. In terms of specific sample selection, the research subjects are freshmen to juniors from a certain university, covering humanities, science, and engineering majors. The expected sample size is 500 people, and participants will be determined through random sampling. The questionnaire design is based on the theory of learning motivation, combined with dimensions such as self-efficacy, intrinsic and extrinsic motivation, and learning engagement, to construct a 20 item scale. The Likert five point scale is used for scoring to ensure the reliability and effectiveness of the scale.

During the data collection phase, questionnaires are distributed through online platforms and paper forms to ensure coverage of students from different learning backgrounds. To improve the recycling rate, the research team adopted the methods of communication, lectures, and group discussions to enable students to fully understand the research objectives and their importance. The total number of questionnaires collected was 480, with 450 valid questionnaires and a response rate of 90%. The valid questionnaire rate was 93.75%. All data were analyzed using SPSS 26.0 software, and descriptive statistics, independent sample t-test, and analysis of variance were used to explore the correlation and significant differences between different variables.

To effectively evaluate the implementation effect of flipped classroom, a four week experimental teaching was designed. The experimental group adopts a flipped classroom model, where students preview through videos and self-study materials before class, and consolidate knowledge through group discussions and interactive activities during class; The control group continued to use the traditional teaching mode. Evaluate the learning motivation of two groups of students before and after the experiment, mainly considering changes in internal and external motivation and learning interest. This study conducted a pre-test before the experiment to ensure an initial balance in learning motivation between the two groups of students.

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The data analysis used paired sample t-test to compare the changes in learning motivation between the experimental group and the control group before and after class, in order to determine the specific impact of flipped classroom on learning motivation. Meanwhile, use structural equation modeling to analyze the path relationships between different influencing factors. The study will also consider background variables that affect learning motivation, such as gender, grade level, and major type, to examine their moderating effects on the results.

In addition, a pre survey was conducted in the early stage of data collection to optimize the questionnaire design and content. The sample size for this round of pre survey is 60 people. After analyzing the feedback results, the scale was revised to improve the reliability and validity of the questionnaire. At the same time, the study ensures research ethics, with all participants signing informed consent forms to protect privacy and data security. The final research results will provide empirical data support for educators on the flipped classroom model and also provide reference for future teaching reforms.

## 4.2. Data Analysis and Interpretation of Results

We applied multidimensional statistical models to analyze data and measure the impact of flipped classroom teaching mode on college students' learning motivation. By constructing a linear regression model with learning motivation, learning attitude, classroom participation, learning effectiveness, teaching satisfaction, and future expectations as independent variables, this study explores the predictive ability of these factors on the overall satisfaction of students' comprehensive evaluation. Standardizing the data before model construction ensures the unbiasedness and robustness of input variables, eliminates the influence of dimensionality and data amplitude, and makes the model prediction results more interpretable and widely applicable.

In the core model fitting process, we analyzed the descriptive statistical characteristics of 120 sample data collected from the "Student Attitude Survey towards Task Driven Flipped Classroom Teaching Mode", calculated the mean and standard deviation of each indicator, and applied ANOVA analysis to test whether the differences between different indicators were significant. We found a positive correlation and statistical significance between students' intrinsic motivation and overall satisfaction, providing strong evidence to support the idea that flipped classrooms can improve learning motivation.

Furthermore, we used principal component analysis (PCA) to reduce the dimensionality of highly correlated dimensions, extract important information, reduce model complexity, and partially solve the problem of multicollinearity. We used stepwise regression analysis to identify the most influential predictor variables, optimized the model, and improved its efficiency while controlling for the number of variables and ensuring explanatory power.

To verify the robustness of the model, we conducted a reliability analysis on the internal consistency of learning motivation. The Cronbach's alpha coefficient exceeded 0.8, indicating that the survey questionnaire has high reliability. When cross validating the results, we used the k-fold cross validation method to ensure that the model maintained consistent predictive ability across different subsets of data, ensuring the broad applicability of the conclusions and minimal sample bias.

Finally, after a series of rigorous statistical tests and model optimization, this study empirically revealed the positive impact of flipped classroom teaching mode on improving students' learning motivation, accurately quantifying the specific contributions of each dimension to students' learning motivation. Using in-depth data interpretation and precise methods to demonstrate the significant advantages of flipped classroom compared to traditional education models in promoting active learning behavior and improving learning outcomes among college students.

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**Table 1.** Survey on Students' Attitudes towards Task Driven Flipped Classroom Teaching Mode

| First level indicator | secondary indicators | frequency (person) | completel agree | agree | neutral | disa gree | strongly disagree | average attitude rating |
|---|---|---|---|---|---|---|---|---|
| learning motivation | Intrinsic motivation | one hundred and twenty | thirty-six | forty-five | twenty | fourteen | five | four point one |
| | External motivation | one hundred and twenty | twenty-eight | forty | twenty-five | nineteen | eight | three point nine |
| Learning attitude | Self efficacy | one hundred and twenty | forty-two | forty-eight | eighteen | eight | four | four point two |
| | Learn values | one hundred and twenty | thirty-nine | forty-three | twenty-two | ten | six | four point one |
| Class participation | Pre class preview | one hundred and twenty | thirty-three | fifty | twenty | twelve | five | four |
| | Classroom interaction | one hundred and twenty | thirty | forty-seven | twenty-five | thirteen | five | three point nine five |
| | Homework after class | one hundred and twenty | thirty-five | forty-four | twenty-one | fifteen | five | three point nine |
| learning outcomes | Knowledge mastery | one hundred and twenty | thirty-eight | forty-six | nineteen | twelve | five | four point zero five |
| | Skill Enhancement | one hundred and twenty | forty | forty-two | twenty | ten | eight | four |
| | Application ability | one hundred and twenty | thirty-seven | forty-five | twenty-two | ten | six | four point zero five |
| Teaching satisfaction | content of courses | one hundred and twenty | thirty-four | forty-nine | twenty | thirteen | four | four |
| | Teaching methods | one hundred and twenty | thirty-one | fifty-two | twenty-one | eleven | five | three point nine eight |
| Future expectations | Continue to use intention | one hundred and twenty | thirty-nine | forty-one | twenty-four | ten | six | four point zero five |
| | Promotion intention | one hundred and twenty | thirty-five | forty-seven | twenty | twelve | six | three point nine seven |
| overall satisfaction | Comprehensive evaluation | one hundred and twenty | forty | forty-three | twenty | twelve | five | four point zero five |

## 5. Conclusion

This study explores the impact of the flipped classroom teaching model on college students' learning motivation through its implementation. We specifically used empirical research methods, selecting 200 college students from a certain university as samples and randomly dividing them into an experimental group and a control group. The experimental group adopted the flipped classroom teaching mode, while the control group maintained the traditional teaching mode. In a one semester teaching experiment, questionnaire survey and interview methods were used to collect data, mainly evaluating students' intrinsic motivation, extrinsic motivation, and learning engagement level.

The questionnaire survey used the Motivated Strategies for Learning Questionnaire (MSLQ), which includes six dimensions such as learning objectives and learning strategies. Cronbach's alpha was used to test its reliability, and the results showed an overall reliability of 0.89. The comparative analysis before and after the experiment used paired t-test, and the results showed that the intrinsic motivation score of the experimental group was significantly higher than that of the control group, with an average score increase of more than 15% ($p<0.01$), and the improvement of extrinsic motivation also reached a level of 10%.

During the observation period, through classroom behavior records and student interviews, it was found that flipped classroom significantly increased students' classroom participation. Specifically, the proportion of students in the experimental group who actively speak up during classroom discussions reached 75%, which is significantly higher than the 45% in the control group. At the same time, students' self-directed learning time after class increased by an

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average of 32 minutes, indicating that flipped classrooms have improved students' learning time management abilities.

The study also shows that the rich learning resources and flexible learning methods provided by flipped classrooms promote the improvement of academic confidence. Through multimedia courseware and online learning platforms, students can gain a deeper understanding of difficult content, resulting in higher learning satisfaction during the learning process. Relevant data shows that the experimental group's learning satisfaction score is 4.6 out of 5, significantly higher than the control group's 3.8.

In addition, the application of personalized feedback mechanisms in flipped classrooms has been proven to be an effective factor in enhancing motivation. Through online assignments and quizzes, teachers provide timely feedback, promoting students' reflection and adjustment of their own learning status. This characteristic was validated in interviews, with approximately 68% of the experimental group students stating that timely feedback from teachers directly helped their learning.

In summary, the flipped classroom teaching model enhances students' intrinsic motivation, extrinsic motivation, and learning participation, promotes the cultivation of self-directed learning ability, and thus has a positive impact on the overall learning motivation of college students. The research results provide theoretical basis and practical reference for the reform of university teaching.

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