



Learning Engagement and Academic Achievement—An Empirical Study Based on Structural Equation Modeling

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Abstract. Task-driven teaching is an important research field of teaching reform. From the perspective of participation, this study constructs a conceptual model of learning engagement from the dimensions of cognitive engagement, behavioural engagement and emotional engagement, and designs a learning engagement research scale. Select 366 students who participated in the task-oriented course - “ERP Enterprise Simulation Training Course” as the research sample, and process the collected data through SEM. The research shows that the conceptual model of learning participation has a good fit with the data. Correlation analysis shows that each dimension of participation has a correlation with academic achievement. Selecting academic achievement as the dependent variable, regression analysis shows that behavioural engagement has a significant positive correlation with academic achievement.

Keywords: learning engagement · academic achievement research · SEM model · regression analysis

1 Introduction

Education Minister Chen Baosheng proposed to cultivate students’ innovative spirit and practical ability through classroom revolution. Classroom teaching reform is the core area of education reform. Only by grasping the core area can education truly develop. In the process of students’ learning in school, how to make full use of classroom teaching time and improve the effect of teaching is an urgent problem for educators to solve. The task-driven teaching method is based on interesting situations that can stimulate students’ learning motivation and curiosity, and uses tasks closely integrated with the teaching content as the carrier, so that learners can complete specific tasks in the process of teaching. A teaching method for acquiring knowledge and skills (Chen 2017). Because it can significantly improve the quality of students’ training, it has received extensive attention from the academic and educational circles, and they have begun to study how to

carry out task-driven teaching methods. At present, task-driven teaching mainly focuses on the following research areas. Discussion on theoretical basis and the specific design of how to carry out task teaching in specific courses on the basis of theory.

1.1 The Theoretical Basis of Task-Driven Teaching

Different from the teaching concept of cognitivism and behaviorism, the teaching concept of teacher's main body, the core idea of constructivism teaching theory is "to solve problems as the core, to be student-centered, and to be guided by teachers". The task-driven teaching method based on this teaching concept can allow students to achieve the purpose of knowledge meaning construction while completing interesting tasks. This discussion is similar to the widely concerned problem-based learning (Problem Based Learning) teaching model. PBL also emphasizes setting learning in complex and meaningful problem situations, and allowing learners to cooperate to solve real problems. Learn the scientific knowledge hidden behind the problem, form problem-solving skills, and form the ability to teach independently [3].

1.2 Application Research of Task-Driven Teaching Method

Building on the earlier theoretical foundations, scholars have conducted extensive research on how to carry out curriculum reform in their respective subject areas. From the type of courses, it mainly focuses on computer courses. For example, Zhao Chengling (2011) in the experimental course of "Modern Educational Technology" how to design the course based on task-driven teaching, and combines the characteristics of the course to decompose the teaching process into tasks. The course is the process of completing the task. [7].

Judging from the existing research on task-driven teaching, the research results are mostly concentrated in the fields of computer and information science with strong operability. In recent years, teachers in non-computer and information science courses have also tried to use task-oriented teaching models. For example, scholar Wu Ping (2014) conducted research on how to adopt task-driven teaching in the English teaching process, and made a study on the use of task-driven teaching in the teaching process. [4] Pattern-chunk strengthening exercises are used to verify the relationship with the improvement of learners' comprehensive English ability. Research shows that the task-driven teaching process can effectively stimulate students' interest in learning, and the learning effect of students in learning by doing is more obvious. The research of Gong Huaping (2015) also shows that the task-driven teaching process can significantly improve the learning effect of students in interpreting courses [2].

However, the current applied research on task-driven teaching mainly focuses on the relevant research of specific courses, such as decomposing tasks for courses and designing workflows to connect different tasks. Driven teaching models for evaluation.

This study structured the task teaching process with the thinking of students' participation, and evaluated the students' participation in the task-driven process, so as to evaluate the teaching effect of task-driven teaching more objectively.

2 Research Perspective

According to Pascarrera and Trenzini, "the impact of university on students is largely determined by the degree of individual effort and participation of students", evaluating the effect of the reform of task-driven teaching methods, also It needs to be evaluated from the extent to which students participate in the task teaching process.

Exploring the task-driven teaching model from the perspective of student participation is not only an evaluation of the teaching effect of the teaching model, but more importantly, it can provide a specific path for students to participate in the teaching process.

Research on learning participation mainly focuses on the study of academic burnout in the field of psychological research in the early days. People advocate that people's actual and potential constructive strengths and skills should be used to explain people's psychology and behavior in a positive way. Fredircks believes that learning participation includes three dimensions: behavior, emotion and cognition. Behavioral engagement is active participation in academic, social and extracurricular activities; cognitive engagement is the willingness and commitment to master complex learning content, mainly including cognitive strategies and psychological resources used in learning; The degree of belonging to the school and teachers, positive emotional expression will make students more willing to participate in the daily activities of teaching.

From the theoretical perspective of student participation, this research classifies the task-driven teaching model according to the chronological order of the tasks. It is divided into pre-task preparation, task in progress and student reflection after the task to evaluate students' participation in task-driven teaching activities degree. The theoretical framework is shown in Fig. 1.

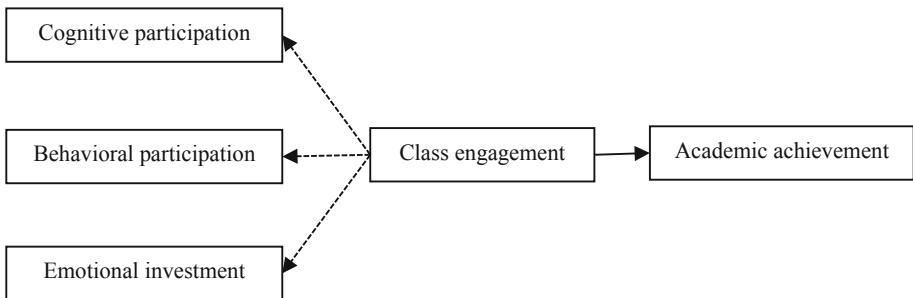


Fig. 1. Theoretical framework

2.1 Cognitive Participation Before Class

According to the definition of Fredircks [6], cognitive engagement mainly refers to the learning strategies and learning methods that students use in participating in the learning process. Cognitive engagement is mainly reflected in the preparatory work before the task begins, such as the acquisition of task-related background knowledge and the corresponding strategies used in previous tasks. Based on the teaching process of task-oriented courses, basic understanding of task content information, general strategies for performing tasks, and rules and norms to be tried when performing tasks, these tasks can be prepared before class.

2.2 In-Class Behavioural Participation

According to the survey dimension given by the NSSE survey in the United States, student behavior participation refers to the specific activities that students participate in and related to the process of acquiring knowledge, including participation in academic reports, weekly time spent in the library, the number of professional books read, and research reports specific items such as quantity. The task-driven teaching process is to decompose the teaching process into specific tasks. In order to achieve the task goals, students also need to complete the corresponding activities. These tasks can be broken down differently by combining different task-driven courses.

2.3 Emotional Investment After Class

Reinforcement theory states that whether the behavior is repeated or not is affected by the positive or negative evaluation of the behavioral outcome. After the task is completed, reflect on the activities during the task process. On the one hand, the knowledge points that appear in the task process can be summarized. On the other hand, through discussions with classmates and teachers, learners can deepen their understanding of the knowledge points.

In summary, this study is based on the above research framework.

3 Research Methods

3.1 Variable Measurement and Questionnaire Design

The research on learning participation by domestic and foreign scholars is relatively mature, and there are already measurement scales with high reliability and validity. The scale design of this study mainly draws on previous research literature, and makes necessary adaptive revisions according to specific research scenarios. The questionnaire is mainly divided into three parts, which respectively measure the cognitive participation before the task, the behavioral participation in the task and the teaching reflection after the task in the task-driven teaching process. Finally, a survey of demographic characteristics variables is added. In this study, data was collected in the form of a structured questionnaire, and the scale used the Likert 5-point scale.

3.2 Sample Survey

This study selects the course “ERP Enterprise Simulation Sand Table” as a task-driven course carrier. The ERP Enterprise Simulation Sand Table virtualizes an industrial enterprise, which starts from raw material planning and procurement, production planning, financial planning, and business Different aspects of business activities such as strategic and competitive strategies and production costing. The development of the course is also a process of task development, which meets the requirements of task-oriented and driven curriculum design. Students understand and master the basic knowledge and basic principles of business management through the execution and implementation of the above tasks. The course is set in the third semester, that is, the first semester of the sophomore year. The participating students have already set up courses such as basic management, basic accounting and marketing, and have basically mastered the relevant principles.

Survey sample selection the research sample selects the business administration, marketing and e-commerce majors of the 2016 class of a management school as electives. For business administration majors and marketing majors, this course is a restricted professional course, while for e-commerce majors; the nature of the course is a professional optional course.

After completing the teaching tasks of the course, the students fill in the questionnaire. After one semester of teaching, a total of 427 questionnaires were recovered. After checking and confirming the questionnaires, 61 wrongly filled and obviously randomly filled questionnaires were excluded, and finally 366 valid questionnaires were obtained, with an effective rate of 85.71%.

4 Data Analysis

4.1 Basic Characteristics of the Sample

See Table 1.

Table 1. Basic statistical characteristics of the sample

Project	Category	Number of people	Percentage	Cumulative percentage
Gender	Male	155	42.3	42.3
	Female	211	57.7	100.0
Specialized	Business management	243	66.4	66.4
	Marketing	111	30.3	96.7
	e-commerce	2	0.5	97.3

(continued)

Table 1. (continued)

Project	Category	Number of people	Percentage	Cumulative percentage
	Other	10	2.7	100.0
GPA	less than 1.0	2	0.5	0.5
	1.0–1.9	13	3.6	4.1
	2.0–2.9	248	67.8	71.9
	3.0–3.9	103	28.2	100
Total		366	100	

4.2 Reliability and Validity

Firstly, the structural equation model method is used to analyze the model fit. According to the suggestion of Anderson and Gerbing (1988), the structural equation model is used to process the data, and the number of samples should be more than 150. Require. Among them, CMIN/DF is 1.807, GFI is 0.955, AGFI index is 0.930, and RMSEA index is 0.046. The simulation fitting degree meets the requirements. The structural model of this study has a good overall fitting degree [1].

The reliability analysis of the scale is used to test the internal consistency of the items of the evaluation scale, which reflects the reliability of the measurement and evaluation results of the scale. The Cronbach's α coefficient is generally used to test and measure the reliability of the scale. When the α coefficient is greater than 0.7, it indicates that the scale has good reliability, and each item has strong internal consistency. The test results are shown in the table. Except for the coefficient of emotional engagement, the α coefficient of each construct of the scale in this study is lower than 0.7, and the coefficients of other constructs are all higher than 0.7, indicating that the scale has good reliability, as shown in Table 2.

Convergent validity, this study uses the average extraction variance AVE and the combined reliability CR to evaluate. When the AVE value of the observed variable is greater than 0.5 and the CR value is greater than 0.6, the scale can be considered to have good convergent validity. The CR value of each variable in this study was greater than the standard of 0.6. Except for the AVE value of behavioral input, which was 0.4597, which was slightly lower than 0.5, the AVE of other variables was higher than the standard of 0.5. The scale of this study has convergent validity. In addition, the square root of AVE of each variable is greater than its correlation coefficient with other variables, and the scale of this study has discriminant validity.

Table 2. Correlation coefficient, reliability and validity between constructs

	cognitive engagement	behavioral input	emotional engagement	academic achievement
cognitive engagement	0.7124			
behavioral input	.270 **	0.678		
emotional engagement	.468 **	.450 **	0.722	
academic achievement	.107 *	.492 **	.235 **	0.887
Cronbach'α	0.792	0.842	0.652	0.916
CR	0.802	0.8548	0.6851	0.9177
AVE	0.5076	0.4597	0.5214	0.788

Note 1.**. Correlation is significant at 0.01 level (two-tailed)

2.*. Correlation significant at 0.05 level (two-tailed)

3. The value of the diagonal line is the square root of AVE, and the value below the diagonal line is the correlation coefficient of construct variables

Table 3. Parameter test

R	R squared	Adjusted R-squared	Standard skewness error	Durbin-Watson	F	salience
.494a _	.244	.237	.73812	1.771	38.875	.000 b

Table 4. Regression model of academic achievement

	Unstandardized coefficients		standardized coefficient	T	salience	Collinearity Statistics	
	B	standard error	beta			Tolerance	VIF
(constant)	1.529	.254		6.013	.000		
cognitive engagement	-.045	.057	-.041	-.789	.430	.777	1.287
behavioral input	.643	.068	.487	9.492	.000	.793	1.261
emotional engagement	.041	.065	.036	.637	.525	.669	1.495

4.3 Regression Analysis

The effect of participation on academic achievement was tested by multiple regression method. The independent variable of the model is each observed variable of learning participation, and the dependent variable is academic achievement. The regression results show that the behavioral input in learning participation has a significant positive correlation with academic achievement ($\beta = 0.487$, $p < 0.001$), and the other two observed variables are correlated with academic achievement, but not significant. The VIF value of each variable is lower than 10, and the model has no obvious multicollinearity problem (Tables 3 and 4).

5 Research Conclusions

Task-driven teaching is an important dimension of curriculum teaching reform, and it is also an important direction of teaching evaluation reform. It is an important research attempt to explore the factors affecting students' academic achievement from the perspective of learning participation. This study builds a learning engagement model from three dimensions of cognitive engagement, behavioral engagement, and emotional engagement, supported by data. The data show that behavioral engagement has a significant positive relationship with students' academic achievement. Although the relationship between cognitive engagement and emotional engagement on academic achievement has not been supported by data, there are mainly the following reasons: (1) the learning atmosphere is lacking. Students with a short school-running time have not formed a good learning atmosphere, which will significantly affect students' cognitive input. This view is consistent with the research of Wang Xiaoyan (2013), who selected samples with long school-running history in her research, a good student atmosphere has been formed in the student group, and the senior students can guide and lead the lower grade students [5]. These factors will significantly affect the students' cognitive input and participation. (2) Low sense of belonging. For students in public undergraduate schools, they have a very strong sense of belonging to the school, and this sense of belonging will in turn affect the learning enthusiasm and participation of subsequent students. Therefore, although the learning engagement model in the study is supported by the data, the data does not support the conceptual model of the impact on academic achievement. This also provides a reference for the formulation of subsequent learning policies, which should focus on cultivating a learning atmosphere and enhancing students' sense of belonging.

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