A study on the factors influencing undergraduate students' sense of learning gain based on learning experience

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Abstract. Undergraduate students, as the core group in higher education teaching activities, the sense of learning gain is an important manifestation of the education work in universities. Based on this, a questionnaire survey was conducted on the learning experience of undergraduate students in a certain university in Beijing from six dimensions: learning engagement, classroom experience, learning methods, teacher influence on students' learning, school support for students' learning, and sense of learning gain. And based on survey data, we will focus on exploring the influencing factors that affect students' sense of learning gain, in order to provide reference for universities to identify the path to improve students' sense of learning gain, and to achieve high-quality development of higher education.

1. Introduction

The high-quality development of higher education is of great significance for building an educational power nation. The key to high-quality development of higher education is to focus on the quality of student development. Undergraduate students, as an important group in higher education teaching activities, the sense of learning acquisition is closely related to the quality of higher education teaching. Based on this, this study takes undergraduate students from a certain university in Beijing as the research object, investigates their learning experience in school, and focuses on analyzing the impact path of learning gain, in order to provide reference for promoting the high-quality development of higher education.

Learning experience is a complex proposition that requires a comprehensive understanding from multiple disciplines, perspectives, and dimensions[1]. Wei Bao et al. emphasized that the function of higher education lies in providing learning guidance, improving the learning environment, and enhancing student achievement, rather than simply imparting knowledge. The investigation of learning experience should be student-centered and explore students' learning gains and feelings from multiple dimensions[2]. The sense of learning gain is a specific feedback generated by students towards the process of school education, which is a phased and dynamic positive emotional experience that occurs in the field of learning[3]. From a multidimensional perspective, Learning style refers to the motivation and strategies adopted by students in learning, which is an important factor affecting the quality of learning. Junyi Bai pointed out that the appropriate choice of learning methods not only directly affects the learning results, but also determines the final quality of talent cultivation in higher education[4]. Learning engagement, due to its positive correlation with learning quality, will become a new perspective for evaluating teaching quality in universities[5]. The understanding of effective teaching investment by teachers and students is an important factor that affects teaching investment and its effectiveness[6].

In addition, many scholars have conducted exploratory research on students' sense of learning gain. Curriculum teaching, environmental support, and campus culture all have a positive impact on overall learning experience satisfaction[7]. Universities need to re-examine and understand the classroom. The main place for students to learn their major is still the classroom, and teachers, students, and courses are the three constant elements of classroom teaching[8]. Qingmei Xue found through experiments that students who actively participate in classroom discussions perform better academically, and there is a positive correlation between classroom participation and learning experience[9]. The supportive campus environment, academic activities, and social activities have a significant direct impact on learning outcomes. Creating a campus environment conducive to student participation, improving students' learning engagement, enriching their learning experience, and more effectively promoting students to achieve more learning outcomes[10].

Based on the above literature, it can be found that the factors that affect the sense of learning acquisition are complex and diverse. Therefore, this article attempts to take learning experience as the starting point, and design a questionnaire from six dimensions: learning engagement, classroom experience, learning methods, teacher influence on students, school support for students' learning, and sense of learning gain. It examines students' basic learning situation and

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constructs a structural equation model to study the impact path of sense of learning gain, in order to further provide effective support for improving the quality of university education and teaching.

2. Research design

2.1 Questionnaire design

On the basis of reviewing relevant theories and literature, a questionnaire survey on students' learning experience was conducted from six dimensions: learning engagement, classroom experience, learning methods, teachers' influence on students' learning, school support for students' learning, and sense of learning gain, taking freshmen, sophomores, and juniors as research subjects.

Learning engagement refers to the time and energy that students invest in effective learning processes, mainly measured from aspects such as pre class, in class, and post class learning situations, learning attitudes, and time engagement; Classroom experience mainly measures students' concentration, efficiency, and course difficulty in the classroom; Learning methods mainly investigate students' mastery of effective learning methods and methods; The impact of teachers on students' learning mainly measures the impact of teachers' teaching attitude, teaching methods, etc. on students' learning; The school's support for students' learning includes the abundance of software and hardware facilities and educational resources, as well as the service provided for students' learning; Finally, the sense of learning gain is mainly measured from two aspects: students' learning effectiveness and emotional gain.

Based on the different learning goals, tasks, and other situations of sophomores, juniors (higher grade) , and freshmen (lower grade) students, set differentiation issues for these aspects. For example, designing questions such as ' My college classroom experience is better than high school ' for first-year students to measure the difference in learning outcomes between high school and university; In response to the design of "the school can reasonably arrange courses for each semester and reserve enough time for me to pursue higher education and employment" in my sophomore and junior years, in order to measure the higher education and employment issues that senior students are more concerned about.

2.2 Data processing and reliability and validity analysis

For freshmen, sophomores, and juniors, a stratified sampling method based on college was used to select students, and data was collected using Wenjuanxing ,a platform providing functions equivalent to Amazon Mechanical Turk. The collected questionnaires were sorted out, unreasonable questionnaires were excluded, and missing values, outlier, repeated values and subjective questions were processed. Finally, 1767 valid questionnaires were obtained, with an effective rate of 82.9%.In terms of grades, there are 776 freshmen (lower grade) questionnaires and 991 sophomores, juniors (higher grade) questionnaires. From a gender perspective, the gender ratio is roughly 1:2, which is in line with the actual situation of the university.

Evaluate the reliability and validity of the survey questionnaire to ensure the quality of subsequent questionnaire analysis. Firstly, a reliability analysis was conducted on the questionnaire questions of different grades, and the results showed that Cronbach's were all greater than 0.90, indicating high reliability of the questionnaire. Then factor analysis was used for structural validity analysis, and the KMO values were all greater than 0.90, which passed the Bartlett spherical test. Therefore, it is believed that the questionnaire has high validity.

2.3 Overall evaluation of learning experience

In this survey, freshman, sophomore and senior year students evaluated six dimensions of learning engagement, classroom experience, learning methods, teacher influence on students' learning, school support for students' learning, and sense of learning gain. Five levels of options were set, including "complete conformity", "relatively conformity", "basic conformity", "relatively non conformity", and "completely non conformity", with assigned values of 5, 4, 3, 2, and 1, Calculate the average scores M1 and M2 for each dimension of the first and second year and third year samples respectively. When calculating the overall score of each dimension, the calculation formula is as follows:

$$OSED=M1\times PRF+M2\times PRS\&S \quad (1)$$

OSED：Overall score for each dimension; PRF：Proportion of respondents in freshman; PRS&S：Proportion of respondents in sophomores and seniors. The specific calculation results are shown in Table 1.

Table 1. Sample Score Evaluation Results

Grade	Freshmen	Sophomores & Seniors	Overall score
School support for students' learning	3.65	3.54	3.59
classroom experience	3.57	3.54	3.55
The influence of teachers on students' learning	3.56	3.53	3.54
Learning method	3.5	3.52	3.51
Learning engagement	3.48	3.52	3.5
Sense of learning gain	3.44	3.28	3.35

From the above table, it can be seen that overall, the respondents have the highest comprehensive evaluation of "school support for student learning", with a score of 3.59; Secondly, there is the 'classroom experience', which indicates that the school attaches great importance to students' learning situation and can consider the hardware and software requirements required for their

learning activities, providing sufficient support to students. By comparison, students have the lowest scores in the evaluation of their sense of achievement in learning. The sense of learning gain not only represents learning effectiveness, but also reflects students' subjective feelings, and its influencing factors are complex. Schools not only attach importance to students' learning 'gains', but also consider their' feelings'. By introducing modern information technology into teaching, organizing practical courses, and other methods, teaching objectives are transformed into actual gains for students.

3. Analysis of the Path of Learning Gain Impact

3.1 Assumption proposal

Through sorting and summarizing relevant literature, it was found that learning engagement, the influence of teachers on students' learning, and the support of schools for students' learning can directly promote students' sense of learning gain, while classroom experience and learning methods have an indirect impact on learning engagement. Based on this, the following assumptions are proposed:

H1：The school's support for students' learning has a positive impact on their sense of learning gain.

H2：The influence of teachers on students' learning has a positive impact on their sense of learning gain.

H3：Learning engagement has a positive impact on learning gain.

H4：Classroom experience has a positive impact on learning engagement, which in turn affects students' sense of learning gain.

H5：Learning methods have a positive impact on learning engagement, which in turn affects students' sense of learning gain.

The pathways through which various dimensions affect students' sense of learning gain are shown in the following figure.

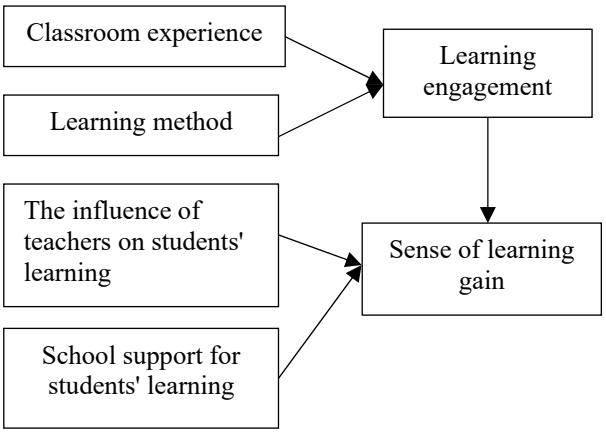

Fig 1. Diagram of the Pathways in which Each Dimension Affects Sense of learning gain.

3.2 Model construction and result analysis

On the basis of theoretical analysis, construct an SEM model to empirically test the research hypotheses. Considering the different actual learning situations of freshmen and sophomores, it is necessary to construct structural equation models separately. In terms of model fitting, it can be seen that the SEM model adaptation index does not exceed the recommended range, indicating that the structural equation model fits well.

In the model, all path coefficients pass the significance level test of 1%. Through the analysis of the structural models of freshmen, sophomores, and seniors, it was found that school support for students' learning has a positive impact on their sense of learning gain. Hypothesis 1 is valid. Due to the significant academic pressure faced by the surveyed group, the school provides support for students' learning through lectures, providing learning resources, and updating hardware facilities, which can help students better solve their learning difficulties and improve their sense of learning gain.

The impact of teachers on students' learning has a positive impact on their sense of learning gain, and hypothesis two holds true. In fact, teachers play a crucial role in students' learning process, and a good teacher can greatly improve students' learning efficiency, thereby reducing their learning pressure.

Learning engagement has a positive impact on learning gain, and hypothesis three holds true. An increase in learning engagement can often enhance students' sense of learning gain. Classroom experience will have a positive impact on learning engagement, which in turn affects the sense of learning gain. The coefficient of influence for the first year group is 0.068 (0.20 * 0.34), and for the second and third year groups is 0.0738(0.18*0.41), all of which pass the 1% significance level test. Hypothesis 4 is valid. Classroom experience has a certain positive impact on students' learning engagement, and a good classroom experience can stimulate students' interest in learning and increase learning engagement.

Learning methods will have a positive impact on learning engagement, which in turn affects the sense of learning gain. The coefficient of influence for the first-year group is 0.214 (0.63 * 0.34), and for the second and third year groups is 0.291 (0.71 * 0.41), all of which pass the 1% significance level test. Hypothesis 5 is valid. By comparison, there are certain differences in their impact coefficients. As grades increase, students' learning methods will gradually shift from "supervised learning" in high school to "autonomous learning" in university. This transformation makes students' learning methods more reasonable and more suitable for university learning methods, which can promote the increase of students' learning investment.

In summary, learning engagement has the greatest positive impact on students' sense of learning gain. The influence of teachers and schools on students' learning is objectively supported by the outside world, while learning engagement is the internal role of students' subjective and active learning. Learning engagement

itself can bring a sense of learning gain. Therefore, its promoting effect on learning gain is the most significant.

4. Conclusions and Recommendations

Through the use of descriptive statistical analysis, structural equation modeling, and other methods to conduct in-depth analysis of learning experience and sense of achievement, we comprehensively understood the evaluation and differences between freshmen and sophomores in the dimensions of learning engagement, classroom experience, learning methods, teachers' influence on students' learning, school support for students' learning, and sense of achievement; Further exploration was conducted on the path analysis of factors affecting learning gain. By establishing a structural equation model, it was found that learning engagement, classroom experience, learning methods, the influence of teachers on students' learning, and school support for students' learning all have a positive impact on students' sense of learning gain. Among them, learning engagement, the influence of teachers on students' learning, and school support for students' learning directly promote students' sense of learning gain, Classroom experience and learning methods indirectly promote students' sense of learning acquisition by acting on learning engagement. From the estimation results of the model, it can be seen that learning engagement has the greatest impact on the sense of learning gain. Students can enhance their sense of learning gain by doing well in various learning tasks before, during, and after class, investing time and actively learning knowledge both inside and outside of class.

Based on the above research, the following suggestions for improvement are proposed. The first is to attach importance to various learning needs and provide basic support for students' development. The second is to strengthen the academic and learning atmosphere construction of the school, guiding students to improve their passive learning methods; The third is to flexibly use phased assessment methods to enhance students' initiative in daily learning; The fourth is to collaborate with multiple parties to solve students' learning anxiety and create a positive and healthy learning environment; The fifth is to enhance students' interest in learning, guide them to consciously and actively engage in learning, and thereby enhance their sense of learning gain.

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