What Is the Impact of Major Diversion Attitude on Undergraduates' Learning Gains? ——The Mediating Role of Course Perception

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Abstract: Major diversion is an important part of the large-category student enrollment and training model. The degree to which undergraduates recognize the logic of the major diversion system, their satisfaction with the diverted major, and their major identity after diversion all influence their subsequent learning process and outcomes. The questionnaire survey of undergraduates in this study discovered that major diversion attitude has a significant positive effect on undergraduates' learning gains; the mediating effect test discovered that course perception plays a partially mediating role between major diversion attitude and learning gains. Therefore, under the large-category student enrollment and training model, it is necessary to improve the major diversion system in terms of formulation, major selection guidance, and major identity promotion. Furthermore, strengthening the logical connection and content coupling of different types of courses, dealing with the proportion, priority, and sequence of courses, optimizing the allocation of course resources, and reasonably planning and setting courses all play an important role in improving undergraduate learning gains.

Keywords: the large-category enrollment and training; major diversion attitude; course perception; learning gains

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Introduction

With the advancement of education reform, the focus of education quality has shifted from efficiency-centered ideas to student-centered ideas, focusing on students' learning process and learning experience (Zhang et al., 2014). Students' learning gains have become increasingly prominent in international higher education evaluation (Wang, 2015). As a key indicator of measuring students' cognitive, affective, and behavioral development, learning gains have become a topic of concern for many higher education powerhouses. In this context, many studies have investigated the learning gains of students in their own countries, such as the National Survey of Student Engagement (NSSE) in the United States, the Course Experience Questionnaire (CEQ) in Australia, and the National Student Survey (NSS) in the United Kingdom. In addition, there are many studies that investigate the factors influencing students' learning gains, such as personal factors, major factors, and course factors (Long & Wang, 2018; Yan, 2008; Liu et al., 2012). It can be seen that exploring the current situation of students' learning gains, analyzing the influencing factors of learning gains and ways to improve learning gains have become the focus of international researches.

In recent years, China has paid more attention to improving the quality of undergraduate education and has implemented many related education projects. A typical project is the large-category enrollment and training model, initiated by Peking University in 1980s, aiming to cultivate compound talents with wide caliber and thick foundation. This model different from entering a major to learn singular and narrow professional knowledge and skills. In this project, junior undergraduates are trained in large discipline categories, then move into subordinate majors even interdisciplinary majors to start in-depth study through major diversion a year or a year and a half later. This model means undergraduates will experience three stages: basic learning before diversion, major diversion, and major learning after diversion (Tang, 2009). Nowadays, the large-category student enrollment and training model is widely implemented in colleges and universities (Tan & Zhang,2021). But how well does the model work? Has the goal of cultivating interdisciplinary and compound talents been achieved? It needs further investigation.

As an important subject of talent training model, undergraduates' learning gains directly reflect the actual effect of the project. Besides, undergraduates' attitude to major diversion and direct perception of course teaching reflect the possible problems in the process of project implementation, providing practical guidance for subsequent improvement. As key links of this project, do undergraduates' attitudes towards major diversion and their perceptions of course teaching and content have impact on their learning gains? How can we promote higher quality learning gains for undergraduates? It is of great significance to answer these questions.

Existing studies have separately discussed undergraduates' satisfaction of major diversion or learning gains in the large-category enrollment and training model. However, they seldom analysis the undergraduates' actual perception of curriculum settings and teaching (Zhu, 2021; Tan, 2015), let alone whether how attitude towards major diversion and course perception affect learning gains from a holistic perspective (Fan, 2021). In addition, most studies are mainly based on theory or experience, lack of empirical support (Tan, 2015). In view of this, this study will explore the influence and specific mechanism of undergraduates' major diversion attitude and course perception on learning gains in the large-category student enrollment and training model. The research results are of reference significance for examining and improving the quality of the large-category student enrollment and training model.

Literature Review

Major Diversion Attitude and Learning Gains

Under the large-category student enrollment and training model, the process of major diversion can be divided into four stages: the formulation of diversion policy, the choice of undergraduates, the comprehensive decision of colleges and universities, and undergraduates enter the major for study (Yuan, 2018). Accordingly, in order to analyze the rationality and practical effect of major diversion policy, it is necessary to examine the undergraduates' recognition of major diversion policy, the major satisfaction and recognition after diversion. Freeman's ABC attitude model divides attitude into three parts: affect, behavior and cognition. Cognition is the subject's evaluation of the object and a kind of cognition of good or bad. Affect is the subject's preference for the object. Behavior is that the subject intends to take some action (Ma, 2014). This study introduces major diversion attitude to investigate undergraduates' cognition of the rationality of major diversion policy, their degree of satisfaction and identification with major after major diversion.

Relevant studies find that major diversion has significant impact on learning gains of undergraduates in different ways. Whether undergraduates can understand different majors, whether enter the ideal major, whether identify with the major, all have important impact on undergraduates' academic development. Some studies point out that the degree of understanding of the major before major selection significantly affects the degree of learning effort, learning efficiency and self-efficacy of undergraduates (Zhao & Qian, 1999). Similarly, other researches find that the deeper major understanding, the higher major satisfaction, the better learning results of undergraduates (Liu, 2013). Other studies point out that major interest and major commitment also have a significant positive impact on the academic achievement of undergraduates (Zhang et al., 2018; Xu, 2013). Major identity can not only promote undergraduates to take positive learning behavior, producing a positive learning experience (Chen, 2014), but also has a significant inhibitory effect on learning burnout and learning procrastination (Peng & Kang, 2012). Relevant researches on the large-category student enrollment and training model also find that undergraduates' views on the process and results of major diversion affect their learning enthusiasm (Tian et al., 2019).

Course Perception and Learning Gains

According to Paul Ramsden, course perception refers to students' specific perceptions of the course content arrangement, teacher teaching, and student-teacher interaction. It is students' perceptual experiences of the contextual environment of course teaching (Ramsden, 1979). In the large-category student enrollment and training model, the type, objectives, content, and structure of courses, as well as the contextual context of course instruction, have changed significantly. In order to analyze undergraduates' course perceptions relatively accurately, this study defines course perception as undergraduates' comprehensive perceptions of course objective, content, instruction, and structural features.

According to Geroge D. Kuh (2009), learning gains refer to the ability of students to demonstrate that they are competent in knowledge, skills and values after completing a series of course learning. Ernest Pascarella and Patrick T. Terenzini (2005) view learning gains as the changes and gains in individual student thinking, cognition, and skills as a result of learning process. This study defines learning gains as the development of undergraduates' general knowledge gains, professional knowledge and literacy, and interdisciplinary literacy. The definition reflects the "broad-caliber" and strong foundation of the large-category student enrollment and training model.

Some studies find that undergraduates' perception of different aspects of the course has a significant

impact on their learning gains. In terms of course perception level, a study finds that different course perception levels affect undergraduates' learning methods and behavior (Diseth, 2007) and also have a significant impact on academic achievement, learning satisfaction and improvement of key skills (Furrer & Skinner, 2003; Lu, 2013). In terms of the overall arrangement of the course, studies find that undergraduates' good perception of the characteristics of the basic and applied courses significantly inhibit the decline in academic performance and promote the improvement of core competencies (Wang, 2012; Bao, 2010). Other studies find that good classroom learning activities, reasonable course settings and course requirements can also significantly affect students' learning gains (Tang, 2015; Hu, 2018; Nishigori, 2009). In terms of course teaching environment, studies find that students are more likely to achieve better grades in a classroom environment with high cohesion, strong organization and clear goals (Fraser & Walberg, 2005). Aldridge finds that when teachers' support in the classroom is high and the atmosphere of cooperation between students is strong, students are more likely to have good academic performance (Aldridge et al., 2002). Finally, few studies have directly proved that course perception plays a mediating role in major diversion and learning gains. However, a small number of studies have proved that school course construction and students' course engagement play a mediating role in the influence of external factors such as school system on learning gains (Furrer & Skinner, 2003; Liu et al., 2012).

Theoretical Models

With the continuously research on the topic of students' learning, students learning theories have been improved and developed, such as Astin's "I-E-O" model, Biggs' "3P" model, etc. These theoretical models all point out that the combination of background characteristics, school environment characteristics, and learning process of students affect learning outcomes. John Biggs' (1987) "3P" model of student learning suggests that classroom teaching activities can be divided into three stages, presage stage, process stage and product stage. Presage stage and process stage are intertwined to influence the product stage. The presage stage is divided into two parts: one part is subjective factors of students, such as relevant prior knowledge and interest in the subject matter. Another part is contextual factors, such as the classroom and the school atmosphere. Two parts interact to determine the student's process stage and product stage. He also points out that presage stage is closely related to teaching environment factors, which includes the structure and content of courses. The interaction of presage stage and teaching environment factors has a significant impact on product stage through the process stage (Ji, 2019). John Biggs' "3P" model places students' learning at the center of the learning chain. He points out that students' learning is the core of the whole learning chain. Both presage stage, process stage and product stage should be student-centered and focus on students learning.

According to the "3P" model, undergraduates' consensus degree of the rationality of diversion policy, their satisfaction with the diverted major and their major identity after the diversion reflect their priori knowledge and interest in majors, which are subjective factors in the presage stage. Undergraduates' course perception reflects their experience of classroom, school atmosphere, course content and structure, which are teaching contextual factors in presage stage and teaching environment factors. Undergraduates' learning gains belongs to product stage. Major diversion attitude and course perception interact with each other to influence the learning gains of undergraduates through process stage.

Research Hypothesis

Through the above literature review, most of the existing studies have focused on single effect of major diversion or course perception on learning gains, but

lack comprehensive analysis and in-depth study of specific influencing mechanisms.

Biggs' "3P" model focuses on students' learning, and emphasizes that presage stage and teaching environment factors comprehensively affect students' learning gains. Therefore, in the large-category student enrollment and training model, as the factors of presage stage and teaching environment, major diversion attitude and course perception are not only the key factors that affect the learning gains of undergraduates, but also have possibility of interaction. Course perception occurs after major diversion, and it will be affected by major diversion attitude. Therefore, course perception may play a mediating role in the influence of major diversion attitude on learning gains.

Accordingly, this study introduces comprehensive factors of major diversion attitude and course perception to systematically investigate the influence of these two factors on learning gains. Besides, this research also intends to explore the influence mechanism of major diversion attitude and course perception on learning gains. This study constructs a theoretical model (Figure1) and proposes the following hypotheses.

Methodology

Research Tools

This study uses questionnaire to collect data. The questionnaire mainly includes four parts: basic information, major diversion attitude, course perception and learning gains. The basic information mainly involves gender, grade, institutional type, discipline category, performance and class rank in high school. Major diversion attitude mainly includes three items, which respectively measure consensus degree of the rationality of diversion system, satisfaction with the diverted major, and major identity after the diversion. In terms of course perception, based on existing literature and exploratory factor analysis, three subordinate dimensions of course perception are identified, namely, course teaching perception, course content perception and course structure perception, and a total of 11 items are set. In terms of learning gains, on the basis of exploratory factor analysis, three subordinate dimensions, general knowledge gains, professional knowledge and literacy, and interdisciplinary literacy are identified, and a total of 10 items are set. Lickert five-point scoring method is used to score the items in three parts of major diversion attitude, course perception and learning

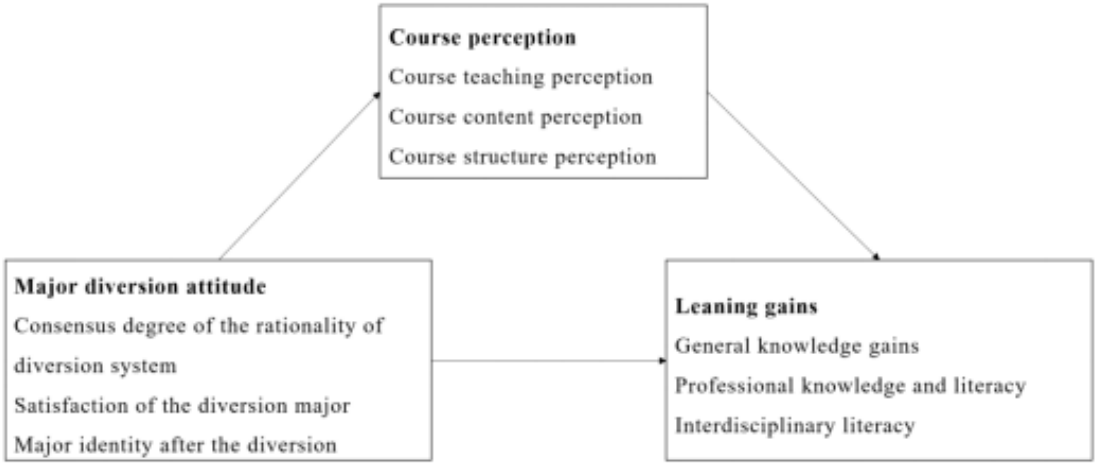

Figure 1 Theoretical model diagram

H1: Major diversion attitude significantly and positively affect learning gains.
H2: Course perception significantly and positively affects learning gains.
H3: Course perception mediates the prediction of major diversion attitude on learning gains.

gains. The value ranges from "1-5". The higher the value, the higher the level.

The reliability test results show that Cronbach' α of course perception and learning gains scales are 0.941 and 0.925, indicating high reliability. Single factor confirmatory factor analysis is used to test the common method deviation, and the results show that χ^2/df=6.044, AGFI=0.589, NFI=0.777, CFI=0.806, RMSEA=0.118, so the overall structure of the questionnaire doesn't have serious common method deviation. The results of structural equation model fit test (Table 1) show that the AVE values of the three variables are all greater than 0.5. The square root of the AVE values of each variable is greater than the absolute value of the correlation coefficients of the row and column in which the variables are located. The factors loading of variables are also within the range of 0.652-0.844, greater than the recommended standard value of 0.5. The combined reliability is higher than the standard value of 0.7, indicating that the scale has good discriminant validity and meets the standard.

Table 1 Reliability and validity of the measurement model

Variables	Factor loading range	CR	AVE	The difference between validity		
				1	2	3
Major diversion attitude	0.652-0.810	0.785	0.551	0.551		
Course perception	0.667-0.844	0.941	0.592	0.598	0.592	
Learning gains	0.689-0.823	0.938	0.602	0.524	0.72	0.602
Square root of AVE				0.743	0.769	0.776
Recommended values	>0.5	>0.7	>0.5	Greater than the correlation coefficient between this factor and other factors		

Sample

A total of 543 questionnaires are distributed in this study. In order to ensure the quality of questionnaire responses, 182 unqualified questionnaires are eliminated and 361 valid questionnaires are retained with the standard of no less than 3 seconds for each question. As shown in Table 2, among all the samples, male account for 53.5% and female account for 46.5%. Sophomore undergraduates account for 50.7%, junior undergraduates account for 29.4%, senior undergraduates account for 19.9%[Due to the large-category student enrollment and training model, most schools start to divert their students from the sophomore year and start to study professional courses, so the sample objects are mainly sophomores, juniors and seniors]. Undergraduates from double first-class[First-class universities and first-class disciplines] colleges and universities account for 38.5%, undergraduates from ordinary colleges and universities account for 61.5%. In terms of discipline categories, 14 discipline categories are collected, including chemistry and life science, computer science, medicine, and education. Because of the large number of disciplines, according to the basic types of disciplines they are combined into humanities and social sciences discipline, science and engineer discipline. In general, the gender of the respondents is relatively balanced, and most of students are sophomores. The proportion of undergraduates from ordinary colleges and universities is relatively high, and most of them are majoring in science and engineer. Because there are great differences between grades, institutional types and discipline categories, these factors are considered to be treated as control variables in the follow-up study.

Table 2 Statistical characteristics of the study samples

Demographic variables		Sample size	Proportion
Genders	Male	193	53.5%
	Female	168	46.5%
Grades	Sophomore year	183	50.7%
	Junior year	106	29.4%
	Senior year	72	19.9%
Institutional types	Double First-Class	139	38.5%
	Ordinary	222	61.5%
Discipline categories	Humanities and social sciences	122	33.8%
	Science and engineer	239	66.2%
All		361	

Findings

In this study, SPSS (20.0) and AMOS (24.0) software are used to analyze data and construct structural equation model. Firstly, the mean and standard deviation of each dimension are calculated. Furthermore, regression analysis is used to explore the influence of major diversion attitude and course perception on learning gains. Finally, bootstrap sampling method is used to test the mediating effect of course perception, and further explores the relationship between undergraduate major diversion attitude, course perception and learning gains.

The Basic Level and Correlation Analysis of Major Diversion Attitude, Course Perception and Learning Gains.

Make descriptive statistics on major diversion attitude, course perception and learning gains (Table 3). The mean values of major diversion attitude, course perception and learning gains are 3.544, 3.901 and 3.661, all of which are located at "3-4" level of the five-point scale higher than the "general" level. In terms of major diversion attitude, the mean degree of satisfaction (M=3.690) is relatively high, followed by degree of identify (M=3.488), and mean degree of consensus on the rationality of diversion policy (M=3.454) is the lowest. In terms of course perception, the average of course content perception (M=3.962) is relatively high, followed by course teaching perception (M=3.888), and course structure perception (M=3.699) is the lowest. In terms of learning gains, the mean value of interdisciplinary literacy (M=3.724) is relatively high, and the mean value of general knowledge gains, professional knowledge and literacy are the same, all of which are 3.634. Overall, undergraduates' attitude towards major diversion attitude, course perception and learning gains in the sample schools are higher than the "general" level.

Table 3 Mean and standard deviation of each variable

Variables and Dimensions	Mean	SD
Major diversion attitude	3.544	0.756
Consensus degree of the rationality of diversion system	3.454	0.909
Satisfaction with the diverted major	3.690	0.874
Major identity after the diversion	3.488	0.946
Course perception	3.901	0.675
Course teaching perception	3.888	0.774
Course content perception	3.962	0.770
Course structure perception	3.699	0.802
Learning gains	3.661	0.675
General knowledge gains	3.634	0.749
Professional knowledge and literacy	3.634	0.749
Interdisciplinary literacy	3.724	0.727

After controlling grades, institutional types and discipline categories, correlation analysis finds that there is significant positive correlation among major diversion attitude, course perception and learning gains (Table 4). It indicates that there is a strong correlation among three variables. In addition, among background variables, there is a certain correlation between performance and class rank in high school, major diversion attitude, course perception and learning gains. This background variable is treated as control variables in subsequent analysis.

Table 4 Correlation analysis among variables

Variables	Major diversion attitude	Course perception	Learning gains
Major diversion attitude	1		
Course perception	0.535***	1	
Learning gains	0.461***	0.698***	1
Performance and class rank in high school	0.176**	0.129*	0.107*

* represent p<0.05, ** represent p<0.01, *** represent p<0.001, similarly hereinafter

The Influence of Major Diversion Attitude and Course Perception on Learning Gains: Hierarchical Regression Analysis

In order to analyze the influence of major diversion attitude and course perception on learning gains relatively accurately, this study adopting hierarchical regression analysis method analyzes data. Learning gains is set as predicted variable, grades, institutional types, discipline categories, and performance and class rank in high school are set as control variables, major diversion attitude and course perception are set as predictive variables (Table 5). Four control variables are included in model 1. In model 2, on the basis of controlling personal background variables, major diversion attitude is included, and the determination coefficient R^2 of the regression equation increases from 1.8% ($p < 0.05$) to 21.6% ($p < 0.001$). The standard regression coefficient shows that major diversion attitude has a significant positive impact on learning gains ($\beta = 0.457$, $p < 0.001$). Indicating that major diversion attitude is the key factor affecting learning gains. Model 3 is incorporated into course perception, and the explanatory power of the model increases to 49.8% ($p < 0.001$). The standard regression coefficient shows that course perception has a significant positive impact on learning gains ($\beta = 0.630$, $p < 0.001$). In addition, the influence of major diversion attitude on learning gains decreases with the addition of course perception. Based on the above analysis, we can see that undergraduates' major diversion attitude and course perception have significant positive impact on

Table 5 Hierarchical regression results

Predicted variable	**Learning gains**					
Model	**Model 1**		**Model 2**		**Model 3**	
Control variable	**β**	**t**	**β**	**t**	**β**	**t**
Grade	-0.088	-1.603	-0.081	-1.639	-0.067	-1.696
Institutional types	-0.074	-1.337	-0.106	-2.129*	-0.080	-2.011*
Discipline categories	0.053	0.962	0.033	0.684	-0.005	-0.127
Performance and class rank in high school	0.111	2.029*	0.028	0.559	0.004	0.098
Predictive variable						
Major diversion attitude			0.457	9.551***	0.123	2.729**
Course perception					0.630	14.161***
F	2.631*		20.884***		60.604***	
Adjusted R^2	0.018		0.216		0.498	

learning gains, so H1, H2 are assumed to be true.

The Mediating Role of Course Perception: Structural Equation Modeling Analysis

In order to further verify H3, this study takes major diversion attitude as predictive variable, course perception as mediating variable, learning gains as predicted variable, grades, institutional types, discipline categories and performance and class rank in high school as control variables. Structural equation model is constructed. The result of goodness-of-fit index of the model is as follows: $\chi 2/df=2.725$, RMSEA=0.069, IFI=0.914, TLI=0.902, CFI=0.913, which accords with the statistical standard, and the degree of fit is ideal.

As shown in figure 2, after the course perception variable is included, the influence of major diversion attitude on learning gains is still significant ($\beta= 0.123$, $p < 0.01$). At the same time, major diversion attitude has significant positive effect on course perception ($\beta= 0.530$ $p < 0.001$), and course perception positively predicts learning gains ($\beta= 0.630$ $p < 0.001$). It shows that there is significant mediating effect among major diversion attitude, course perception and learning gains. Course perception plays a mediating role between major diversion attitude and learning gains, so H3 is assumed to be true.

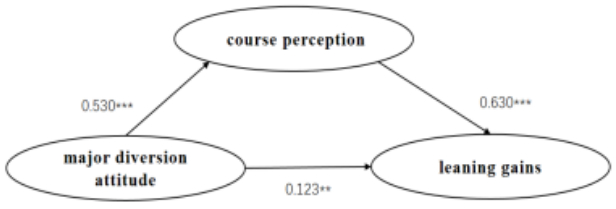

Figure 2 The mediating role of course perception

In order to further understand the mediating effect value of course perception, this research tests the mediating effect by bootstrap methods (Table 6). The results show that the total effect value of major diversion attitude on learning gains is 0.408 (CI= [0.309, 0.507]), and the confidence interval doesn't include 0, indicating that major diversion attitude has a significant positive effect on learning gains. The direct effect of major diversion attitude on learning gains is 0.110 (CI= [0.015,0.205]), the confidence interval doesn't include 0, so the direct effect is significant. The indirect effect of course perception between major diversion attitude and learning gains is 0.298 (CI= [0.216,0.390]), and the confidence interval doesn't include 0, so the effect is significant. Results show that there is not only the direct-action path of "major diversion attitude-learning gains", but also the indirect-action path of "major diversion attitude-course perception-learning gains". Course perception plays a mediating role between major diversion attitude and learning gains. The direct effect accounts for 26.96% of total effect, and the indirect effect accounts for 73.04% of total effect.

Conclusion and Discussion

This study analyzes the relationship and influence mechanism among undergraduates' major diversion attitude, course perception and learning gains under the large-category student enrollment and training model, and draws the following conclusions.

Firstly, major diversion attitude positively predicts learning gains. The better the undergraduates' major diversion attitude, the better the learning gains.

Table 6 Test results of mediating effect

Effect category	Effect value	SE	Bias-Corrected95%CI		Proportion (%)
			BootLLCI	BootULCI	
Direct effect	0.110	0.049	0.015	0.205	26.96%
Indirect effect	0.298	0.044	0.216	0.390	73.04%
Total effect	0.408	0.050	0.309	0.507	100%

This is not only consistent with the researches of Zhao (1999), Zhang (2018) and Chen (2014), but also in line with John Biggs' "3P" model theory. The high degree of the rationality of diversion policy reflects that the policy effectively meets the needs for students to understand, choose and enter the major, and fully considers the school-running conditions and the practical needs of society. This helps undergraduates making better major decision and students can be more active in major learning, more willing to adopt deep learning methods, and thus have better learning gains (Lu, 2010). Satisfaction with the diverted major reflects whether undergraduates enter the major they are interested in or expected, which affects undergraduates' learning involvement (Chang, 2004). As Confucius said, "those who know are not as good as those who are good, and those who are good are not as good as those who are enjoy." Ideal major can make undergraduates devote more enthusiasm and energy to study (Yu et al., 2021). Major identity after diversion reflects whether undergraduates identify with and like their majors after a period of study. Relevant study has pointed out that there is a correlation between professional identity and teaching evaluation (Wang & Liu, 2007). This study shows that whether undergraduates' can enter their favorite major does have a decisive impact, and whether they agree with the teaching and management of their major plays an important regulatory role too.

Secondly, course perception positively predicts learning gains. The better undergraduates' course perception, the more conducive to learning gains. Undergraduates' positive experience in course teaching, course content arrangement, and course structure, help to form high level of learning gains. This is consistent with the researches of Lizzio (2002), Lu (2013) and others. Undergraduates' positive feedback on course teaching process, experience of the breadth and professionalism of the course content, and reflection on the courses connection and logical order will affect undergraduates' learning behavior, towards more active and open in-depth learning strategies, as well as high quality learning gains (Lu, 2013; Prosser & Trigwell, 1999; Ye, 2011; Marton & Säljö, 1976; Li &Pan2022).

Thirdly, course perception plays a mediating role in the influence of major diversion attitude on learning gains. Previous studies have found that the results of major diversion and course perception affect the learning results of undergraduates (Li & Chen, 2014; Wang et al., 2022). But this study further finds that the relationship and influence mechanism of major diversion attitude and course perception on learning gains is more complex. Major diversion attitude not only directly predicts learning gains, but also has an impact on learning gains through course perception. It means that improving the diversion system and satisfactory major diversion results can make undergraduates forming a good major diversion experience and have a strong sense of identity and learning motivation to their major. However, undergraduates' poor experiences in course teaching, content arrangement and structure setting may result negative impacts on learning gains. Another aspect, the poor major diversion attitude of undergraduates caused by the early stage, as well as its negative impact on learning gains, can be reconciled and compensated by optimizing course system and improving teaching effect. On the whole, good major diversion attitude and optimal combination of high-quality course perception are most conducive to the learning gains of undergraduates.

Implications

Improve the Major Diversion System and Optimize the Major Diversion Experience of Undergraduates

Colleges and universities should improve the whole major diversion system from three aspects: the

formulation of major diversion system, the guidance of major selection and the promotion of professional identity.

As far as the formulation of major diversion system is concerned, there should be a scientific and reasonable basis for diversion. Major diversion involves not only the choice of students' majors, but also the distribution of students' sources of different majors, the proportion of resources, as well as the scale and layout of disciplines. So, colleges and universities should fully understand the interests of students, coordinate all aspects of demand, coordinate students' willingness to choose majors and professional deployment needs. Besides, relatively weaken the simple diversion basis, such as "achievement-only" and "ranking-only". Colleges and universities should combine with students' interest in major, the popularity of different majors, professional potential matching and other aspects to determine the basis of multi-comprehensive diversion (Chen et al., 2018). In addition, it is necessary to set a flexible shunt period. The purpose of major diversion is to promote the connection of general knowledge, subject knowledge and professional knowledge learning. However, due to the differences in the type of discipline, the nature of knowledge and the goal of personnel training, the time demand for different knowledge learning is different. Accordingly, the setting of major diversion time node needs a certain flexible space. So, colleges and universities should set flexible diversion periods according to the practical needs of knowledge learning and ability growth of undergraduates in different disciplines (Tan, 2017; Shan & Chen, 2021; Du & Tong, 2021).

In terms of the guidance of major selection, undergraduates are not only the main body of major selection, but also the object of diversion. This "double subject" status determines that major diversion should be done on the basis of helping undergraduates to make adequate preparation for diversion. Major diversion should respect the independent selection of undergraduates and guide them to make major selection rationally. For this, colleges and universities should strengthen and consolidate the interpretation of diversion policy, publicity of major information, education of major cognitive and other works. Besides, all-round, multi-type and immersive preparatory activities can be held, such as professional lectures, practical experience learning, experience sharing and exchange, consultation and talks. In addition, colleges and universities should provide a variety of professional self-service for undergraduates, including interest matching, career evaluation, professional matching prediction and so on. The purpose is to help undergraduates have a more comprehensive understanding of themselves, clarify professional interests and personality characteristics, and comprehensively choose a suitable major.

As far as the promotion of professional identity is concerned, on the one hand, it depends on whether undergraduates enter their favorite major, on the other hand, it depends on the feeling after entering the professional study. As for the former, it can be realized by formulating a scientific major diversion system and strengthening the guidance of major choice. As for the latter, multi-faceted coordination is needed. The relevant subjects such as colleges and universities should understand premise factors, that is, to understand the reasons for undergraduate majors' choice, the reserve of professional knowledge and professional interests. Colleges and universities should also create a good major learning atmosphere, such as good classroom learning atmosphere, teacher-student relationship atmosphere, major identity atmosphere, improving undergraduates' study motivation and willingness.

Reasonably Plan and Set Up the Course and Strengthen the Construction of the Course System

Colleges and universities should attach importance to the construction of major courses

under the large-category student enrollment and training model, optimize the course perception of undergraduates, and further improve their learning gains.

First of all, colleges and universities should enhance the logical connection and content coupling of different types of courses. Under the large-category student enrollment and training model, general courses, disciplinary courses and professional courses carry different training objectives. The general courses aim at enhancing the core literacy of undergraduates, improving general knowledge and interdisciplinary literacy. The disciplinary courses aim at helping undergraduates to consolidate the knowledge foundation in professional fields, accumulate the history of disciplinary development, basic theories and disciplinary methodology knowledge. The professional courses aim at promoting the deep development of undergraduates in professional fields. One aspect, colleges and universities should accurately grasp the criteria and characteristics of course content selection and arrangement according to the differences in the cultivation objectives of different courses. Another aspect, promote the gradual progression of difficulty and depth of content of different types of courses, focus on the backward and forward correlation, and help undergraduates form a logical and continuous knowledge system.

Secondly, colleges and universities should properly deal with the relationship among course proportion, primary and secondary and sequence. Under the large-category student enrollment and training model, colleges and universities should weigh the proportion of different types of courses such as general courses, disciplines courses and major courses, as well as compulsory courses, public elective courses and professional elective courses. According to the requirements of knowledge and ability, on the basis of grasping the relationship between the contents of different courses, colleges and universities should arrange the primary and secondary status and order of different courses.

Finally, optimize the allocation of course resources. A good course system not only pays attention to the guidance, the connection and the hierarchy of course, but also emphasizes the high-quality supporting resources. Relevant subjects need to combine the classroom characteristics and the objectives of different types of courses to ensure the allocation of hardware resources such as learning materials and learning platforms. In addition, optimizing the allocation of software resources, such as general education teachers, lectures, general cultural experience, subject discussion and exchange, so as to provide high-quality resources for improving undergraduate course perception.

Limitations

This study tries to clarify the actual feelings of undergraduates in the process of major diversion and course perception, as well as the specific impact and mechanism on learning gains. However, due to the pursuit of a holistic perspective of analysis, it relatively ignores the differences between different undergraduate groups in major diversion attitude, course perception and learning gains. In addition, due to the difficulty of data acquisition, the sample size of the study is relatively small and unevenly distributes in terms of grades, institutional types and discipline types.

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