

Research on the Influential Factors of Bilingual Teaching Based on Colin Baker Model Case Study of Macroeconomics

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ABSTRACT

Bilingual teaching is the manifestation of the internationalization of high education and the key index of undergraduate teaching evaluation. Based on the modified Colin Baker model and the questionnaire of two universities in Zhejiang, this paper discusses the influential factors of bilingual teaching effectiveness in economics from the theoretical and empirical aspects and puts forward corresponding teaching suggestions. The main results are the foreign language level of teachers is not the main factor restricting the effectiveness of bilingual teaching at present and the professional ability and attitude of teachers are the most important factors for the improvement of teaching effectiveness. Objectively, students' interest in English has no obvious effect on bilingual teaching. Interest on English is not the key to being able to learn bilingual courses better.

KEYWORDS

Artificial Intelligence, Economics, Bilingual Teaching Effectiveness, Colin Baker Model, Personalized Adaptive Learning, Questionnaire

INTRODUCTION

Bilingual education requires teaching academic content in two languages, in a native and secondary language. Bilingual teaching refers to the systematic and planned use of a foreign language (the second language) in the teaching of specialized courses (Li Gang, et al, 2017). Bilingual teaching is of great significance to cultivating students' foreign language thinking ability, enhancing students' awareness of international competition, and nurturing international professionals with the intercultural understanding ability (Tan DuoJiao, 2012). The report of the 19th National Congress of the Communist Party of China clearly points out that "we must give priority to education, deepen educational reform and accelerate educational modernization." Bilingual teaching is both an important path of higher education reform and an important measure to accelerate the modernization and internationalization of higher education. In 2001, the Ministry of Education of China issued "Several Opinions on Strengthening Undergraduate Teaching in Colleges and Universities to Improve Teaching Quality", which put forward that bilingual teaching is a crucial means to improve the teaching quality of colleges and universities in China and to promote the integration of domestic higher education and international

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advanced standards. The “Several Opinions on Further Deepening the Reform of Undergraduate Teaching and Comprehensively Improving Teaching Quality” issued by the Ministry of Education in 2007 also encouraged bilingual teaching to improve the professional English capability of college students. In 2010, the Ministry of Education and the Ministry of Finance approved the construction of 151 bilingual teaching model courses to promote the comprehensive implementation of bilingual teaching with the radiation effectiveness of these model courses. Based on the importance of bilingual teaching in improving the teaching quality of our universities and cultivating international talents, the proportion of bilingual teaching has become the main measure index of undergraduate teaching evaluation. Most of the teaching materials of economics courses in Chinese colleges and universities come from western developed countries. Therefore, economics courses have become the key field of bilingual teaching reform. At present, most of the economics courses, especially the macro and microeconomics courses, have started to implement bilingual teaching. The research on bilingual teaching practice is also becoming more and more abundant, mainly focused on some aspects of bilingual teaching of economics, such as teaching materials selection curriculum design, teaching mode, teaching effectiveness etc., (Haiyan et al., 2017; Shumin, 2008; Tan Duoqiao, 2010; Ren, W., 2015; Ying, 2017) However, the research on the teaching effectiveness is lack sufficient theoretical support, and the sample has limitations when we take bilingual teaching practice of some course in a certain college as an example. The term “statistical analysis” refers to the use of quantitative data to investigate trends, patterns, and relationships. Scientists, governments, corporations, and other organizations use it as a valuable research tool. You may next use inferential statistics to explicitly test hypotheses and make population estimates. Based on the modified Colin Baker model and the questionnaire of macroeconomics bilingual teaching in two universities in Zhejiang, this paper explores the relevant factors affecting the effects of bilingual teaching in Economics and provides suggestions and references for improving the teaching effects in Economics by comparative analysis and statistical analysis. In education, a policy in which two languages are employed as mediums of instruction. Depending on the purpose, there are numerous models of bilingual education, the most prevalent of which are additive and subtractive models.

Factors of Bilingual Teaching Effectiveness in Economics Based on the Colin Baker Framework

The improvement of bilingual teaching effectiveness is influenced and restricted by multiple factors, such as students’ initial English capability, teachers’ bilingual teaching level, and students’ attitude towards bilingual teaching, bilingual teaching materials and teaching mode (Feng Chenyu, et al, 2009) (Shi Liying, et al, 2010) At present, there are abundant studies on the effectiveness of bilingual teaching. Mature theories include the threshold theory, the balance theory, the interdependent hypothesis, the attitude-motivation model, the society-education theory, the input-output-context-process model, etc. (Liu Yanyu, 2010) Among them, Colin Baker’s IOCP model is a perfect and systematic approach to the bilingual teaching mode, which is the most ideal theoretical framework for studying the effectiveness of bilingual teaching (Mao Fangfang, 2004). According the threshold theory, intelligence is needed but not sufficient for creative potential and achievement, with such a minimum of g capacity required to produce creative outcomes irrespective of other criteria. Instructional balance refers to the ideal that educational organizations and people who receive education receive equal treatment in educational activities, as well as the educational policy and legal system to ensure its actual operations, based on the ideas of fair education and educational equity. Cummins’ Linguistic Interdependence Hypothesis asserts that certain first-language (L1) information can be favorably transferred during the acquisition of a second language (L2). Motivating others by influencing their thoughts and behaviour is known as attitude motivation. Attitude and motivation are inextricably intertwined, and they can serve as powerful motivators for a team’s ability to collaborate effectively and meet its business objectives on time. The idea underlying social learning theory is that children learn by observing others. This learning can be applied, such as when a child observes a sibling nicely ask for a reward and receives

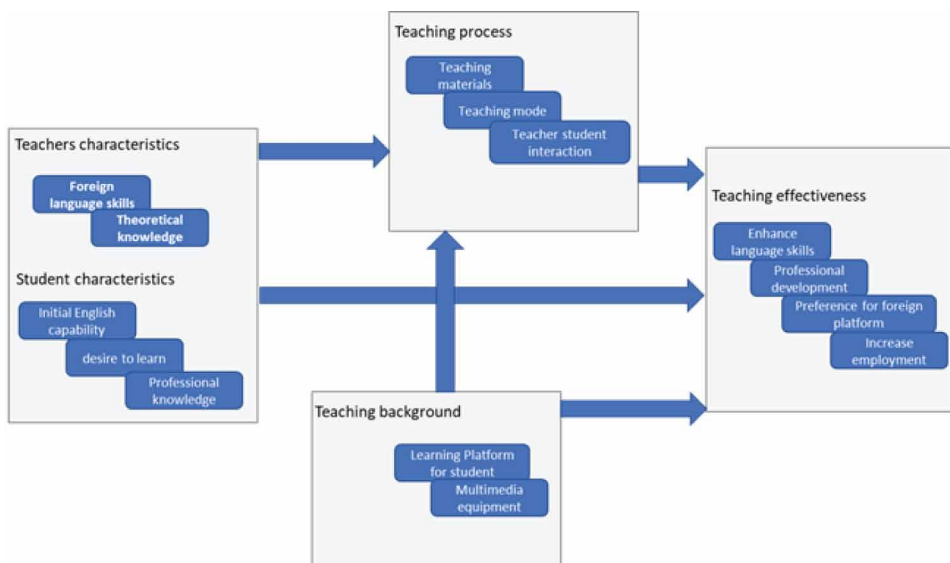
one, or can be ignored, such as when a teenager overhears a buddy discussing how to open a lock and learns something new but does not try it themselves. The context-input-process-output (CIPO) model is a basic systems model of school functioning that may be applied at three levels in education: system, school, and classroom. In addition, the model serves as an analytical framework for assessing educational quality (Wang Yan, et al, 2021).

This paper combines the practice of bilingual teaching of economics to modify the IOCP model. Further based on the modified model, it explores the impact on the output variables (promotion of professional level and foreign language level) from three aspects of macroeconomics bilingual teaching: the input variables (teacher characteristics and student characteristics), teaching process, and teaching environment. Namely from variables such as teacher characteristics, student characteristics, teaching process, teaching environment, this paper analyzes the main factors that affect the improvement of teaching effectiveness (Figure 1). The teaching process has two inputs namely; teacher's characteristics, students' characteristics and teacher background. The output of this process was teaching effectiveness. the teacher student characteristics and teaching background also process through the teaching effectiveness.

Teachers' Foreign Language Skills and Their Professional Background are the Main Factors That Affect Bilingual Teaching Effectiveness in Economics

In the bilingual teaching of economics, the characteristics of teachers that affect the teaching effectiveness include four aspects: teacher's foreign language skills, professional level, cultural knowledge, teaching ability, and attitude, etc. (Wang Yan, et al, 2021). At present, most universities in China has carried out bilingual teaching reform and explored the best teaching mode for their own characteristics. However, through interviews with bilingual teachers in different colleges and universities, we found that, teachers' insufficiency of bilingualism and the shortage of bilingual teachers are the main factors hindering the improvement of teaching effectiveness (Yang Xiangyun, et al, 2007). Take our university as an example, less than 50% of the bilingual teachers have overseas study experience. Most of the professional teachers in bilingual teaching have good English foundation, with basic professional English reading and writing skills. They have strong professional research ability, but weak in oral expression. They can only give lectures in English according to the book,

Figure 1. Factors of bilingual teaching (the modified Colin Baker model)



and it is difficult to express their professional ideas and opinions fluently in English. At the same time, most of the professional teachers have not received systematic training about English language or bilingual teaching. Teachers in Bilingual Education offer education in two languages. The teacher concentrates on teaching content in both languages, such as geography, history, math, and other disciplines. While English is used as one of the languages of instruction, students are not taught English as a distinct language. They lack bilingual teaching skills and sufficient understanding of the cultural background of English teaching materials. Thus, it's difficult to interpret textbooks based on the foreign market environment thoroughly and motivate the enthusiasm of students. In conclusion, among the characteristics of teachers, foreign language ability and professional theoretical background are the main factors affecting the bilingual teaching effectiveness in economics.

The Characteristics of Students, Such as Language Foundation, Professional Foundation and Subjective Initiative, Will Affect the Learning Effectiveness of Bilingual Courses

Students are the main body of bilingual teaching. According to Colin Baker's research, the student factors that affect the effectiveness of bilingual teaching include language potential, language learning motivation, professional background, etc. Combined with the current situation of macroeconomics bilingual teaching, we generalize that the main factors influencing the effectiveness of bilingual teaching are students' initial English level, learning desire and attitude, and professional knowledge reserves. According to the threshold theory of Cummins (2008), only when students' second language level reaches a certain threshold level can they avoid the cognitive disadvantage in professional learning. Sharing the Risk Is the Threshold Advantage. We are first and foremost investors, and we invest a significant amount of capital in each transaction, Experience, Deal Flow, Access to Capital, Strategic Planning, Added Layer of Protection. Higher foreign language level enables students to deal with complex and abstract professional knowledge taught in foreign languages. Therefore, students' initial English level is one of the core factors that affect professional knowledge learning in bilingual teaching (Yu Liming, et al, 2011). Besides the language level, students' desire and necessity to learn will also have a great impact on learning effectiveness (Feng Xiaoyi, et al, 2007). If students are more interested in bilingual teaching and believe that bilingual teaching can improve their ability to understand the world and provide better prospects for their future development, students will spend more time and energy on bilingual courses. Even if the initial foreign language level is low, they can also improve their professional level and language ability through catch-up effect. The catch-up effect is a theory that suggests that all economies would eventually converge in terms of per capita income, based on the observation that developing economies grow faster than developed economies. In addition, students' professional knowledge reserve will have some impact on the learning effectiveness of their later bilingual courses. According to the theory of interdependence, students' professional knowledge and concepts acquired in their native language will be transferred, which can promote the cognition and acquisition of other professional knowledge in the later stage. Interdependence theory is a social exchange theory in which interpersonal relationships are characterized by personal interdependence, which is defined as "the mechanism by which interacting people influence one another's experience." Take macroeconomics as an example, if students are familiar with microeconomics theory and pay close attention to financial news, it will be helpful for them to learn bilingual macroeconomics courses.

Teaching Process is the Key to Improve the Bilingual Teaching Effect, and Teaching Materials and Teaching Mode Adapted to the Current Situation of Students are the Main Ways to Improve the Bilingual Teaching Effectiveness

The teaching process includes teaching materials selection, teaching mode selection and the interaction between teachers and students. In bilingual teaching, teachers are the initiators of teaching action, students are the receivers of teaching, and teaching process is the key to combine them together. Teaching materials are the main carrier of knowledge while teaching mode and teacher-student

interaction are the main forms to deliver the knowledge to students. (Liu Dongfeng, 2007). At present, there are four types of bilingual teaching materials: original textbooks in English, photocopied textbooks in English without translated versions, photocopied textbooks in English with translated versions and self-edited loose-leaf handouts. Based on the rule of reducing cost and improving students' acceptance, the sample universities selected photocopied textbooks in English compiled by well-known American economists and commonly used by American colleges and universities, with translated versions. It can not only guarantee students access to the original professional foreign language, but also ensure the timeliness and international features of professional knowledge.

Bilingual teaching mode including full English teaching mode ("PPT in English + Teaching in English + Examination in English"), "English as the main, Chinese as the auxiliary (PPT in English + Teaching in Chinese + Examination in English)" teaching mode, and "Chinese as the main, English as the auxiliary (such as: PPT in English + Teaching in Chinese + Examination in Chinese)" teaching mode, etc. According to the survey on students majoring in financial engineering in the sample, the macroeconomics courses choose "Chinese as the main, English as the auxiliary" teaching mode. With the improvement of students' English level, most of professional courses in the junior and senior years choose "English as the main, Chinese as the auxiliary" teaching mode.

In the process of teaching, the interaction between teachers and students or the interaction within students is a process of knowledge deepening and internalization. Therefore, the effective interaction between teachers and students or within students is also the main factor affecting bilingual teaching (Liang Hong, 2016) (Maguire Meg, 2016). Because professional textbooks in English are difficult for Chinese students, the frequency of students' questions and teacher-student interaction is significantly lower than that of other courses that taught in Chinese. We should pay more attention to this process variable if we want to improve the effect of bilingual teaching.

The Construction of a Personalized Adaptive Learning Platform, The Use of Artificial Intelligence, and Other Teaching Background Factors are the Basis of Improving Bilingual Teaching Effectiveness

The environment is the basic factor affecting the input of teaching content. A good teaching background and environment can ensure that students receive enough language and professional knowledge, so as to improve their learning effectiveness (K-12 Education Team 2014).

The (K-12 Education Team 2014) provides an online educational background and environment. The students can get the required information through the platform, By the teachers uploading relevant teaching resources to sharing websites, information updates will be timelier and more transparent, which can improve students' interest and arouse their enthusiasm to learn, and the platform has elements that are student characteristics, students' performance, individual development, and adaptability. Personalized adaptive learning is a software platform technique that allows each student to have an individual learning experience by allowing them to progress through the course content on their own unique learning path based on their knowledge, skills, and learning needs. This system that controlled by the real-time monitoring control of the teacher. On this fundament, a framework of personalized adaptive learning is constructed. Learning platform construction includes the networking of courseware, case base, a question bank, homework, etc., and digitalization of teaching interaction. Therefore, students can receive enough input of language and professional knowledge and the effectiveness of bilingual teaching will be improved. (Wu Jingjie, et al, 2008). One of the most recent methods is the bilingual technique. When two languages are employed, the first is the pupils' native tongue, and the second is the target language (English). The target language is achieved in the classroom by using the students' mother tongue. This method falls in between the grammar translation method and the direct method.

The purpose of using artificial intelligence in the learning platform is to understand the student's requirements which means the student's search for something may provide similarities of searched things or provide a solution for them. The learning platform includes learning patterns and time

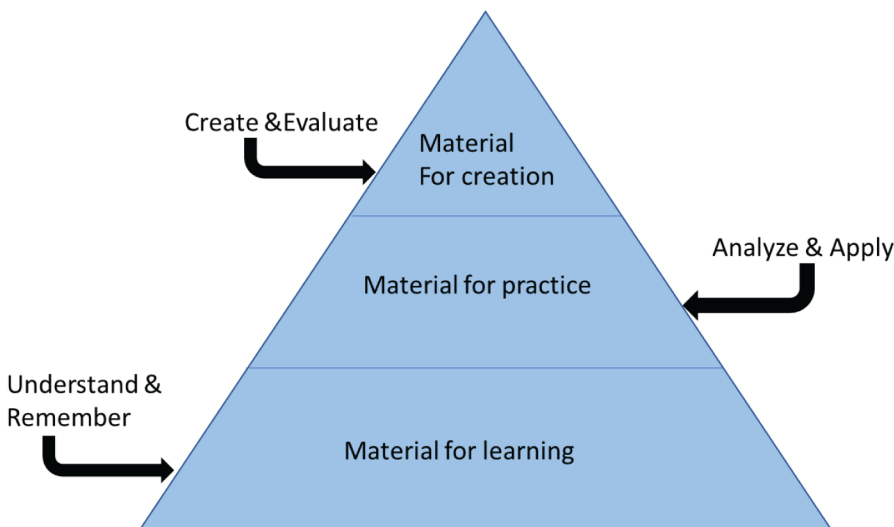
sequence learning. the learning pattern is directly composed of each learning cell. The time sequence learning represents the time spent on one learning cell and the side shows the time taken for starting a new cell after the last one. The time gap can represent the learner's learning motivation. Artificial intelligence has a number of advantages. Knowledge assessment that is automated. No one needs to watch employees, issue reminders regarding material updates, or remind employees that their training needs to be renewed thanks to AI. There are fewer resources involved. Profits have increased. If the time is smaller, it is motivating to learn stronger. the content is to clarify the doubt of "what to learn", "how to learn" and it contains websites, learning resources, and materials for practices, etc., The materials are created based on higher-order thinking skills. (HOTS). Higher-order thinking talents come in a variety of shapes and sizes. The ability to think critically. Using your best judgement to understand and assess other people's ideas is what critical thinking entails. Metacognition, Comprehension, Application, Evaluation, Synthesis, Inference, Metacognition is the awareness of how you think.

In the figure 2 beginning level of material for learning is provide understanding the material such as websites, audio recording, video etc. the next level provides analyze and apply the information from the material which you already known. the last level creates and evaluate the material. bilingual teaching of economics, the construction of a learning platform, and the use of multimedia equipment are the environmental or background factors that affect its teaching effectiveness (Yao Fang, 2011).

Meanwhile, the effective application of multimedia equipment is also conducive to displaying course content intuitively and vividly. Here, the multimedia equipment's are Video Camera, Video Recorder, Audio Microphone, and Keyboards, based on the requirements of students we can implement this multimedia equipment into the learning platform. Teachers can link some foreign original programs or teaching videos in the courseware to increase the classroom information capacity and improve students' interest in learning. At present, the bilingual teaching of each major in the sample has completely adopted multimedia teaching, but the construction of a bilingual teaching platform still needs to be improved. In general: Higher-order thinking, also known as higher-order thinking skills, is a learning taxonomy-based school reform concept. The concept is that some types of learning necessitate more cognitive work than others, but that they also provide more widespread advantages.

Bilingual teaching effectiveness is an output variable of bilingual teaching. For the macroeconomics bilingual teaching, these output variables mainly include up-to-standard foreign language performance, professional level improvement, preference for bilingual learning, and positive effect on employment.

Figure 2. The structure of learning content was constructed



Empirical Analysis Based on Questionnaires of Two Universities in Zhejiang Province

Based on the theoretical analysis of influencing factors on bilingual teaching, we designed a questionnaire that included several questions on bilingual teaching such as teacher characteristics, student characteristics, teaching process, teaching background, and teaching effect, etc. We make an empirical study of the relevant factors in the theoretical framework, so as to provide feasible suggestions for improving the effectiveness of bilingual teaching (Zhang Yuxiang, et al, 2016).

Questionnaires and Sample Description

We designed 20 questions in the “Questionnaire on the Bilingual Teaching Practice of Macroeconomics”. We subdivided and quantified teacher characteristics, student characteristics, teaching process, teaching background and teaching effectiveness respectively in the questions. The samples participating in the questionnaire survey are students of grade 2015 and grade 2016 from two universities in Zhejiang, who have received macroeconomics bilingual teaching. These students’ majors include financial engineering, marketing, and public service management. A total of 350 questionnaires were distributed in the survey, of which 322 were valid questionnaires, with an effective rate of 92%.

ANALYSIS OF QUESTIONNAIRE SURVEY RESULTS

Teacher’s Characteristics and Teaching Effectiveness

Among the teacher’s characteristics, regarding the question of “teacher’s characteristics that have the greatest impact on the effectiveness of bilingual teaching”, 46.27% of students think teachers’ ability and attitude are the most important, 27.95% of the students think teacher’s professional level is the most important, 19.88% of the students think teachers’ foreign language ability will be more important effects on the effectiveness of bilingual teaching, only 5.59% of the students believe teachers’ cultural knowledge is the most important. Therefore, from the perspective of students, teachers’ foreign language proficiency is not the main factor restricting the current bilingual teaching effectiveness, and teachers’ professional ability and attitude are the most important factors. This may be due to the fact that the current bilingual teaching in the two universities is still dominated by teaching in Chinese. Because of the low frequency of oral teaching in foreign language, foreign language level of teachers, especially their oral ability, does not have a great impact on the teaching effectiveness. As for whether the current bilingual macroeconomics teachers’ foreign language ability is adequate for bilingual teaching, 36.24% of students think it is very adequate, 42.55% of students think it is basically adequate, and 12.11% of students think it is not adequate, which indicates that the foreign language teaching ability of teachers engaged in macroeconomics bilingual teaching still needs to be improved. 64.29% of students say that teachers will analyze the domestic and international market environment in the lecture, and 23.29% of students think teachers occasionally to do so. This means that our bilingual macroeconomics teaching needs to further improve the integration of theory and practice, and use theory to interpret the various current macroeconomic events. Bilingual teaching should not be the reason that affects the connotation and extension of students’ knowledge learning.

Among the student characteristics, the proportion of students who keen on English very much is 9.94%, the proportion of “like” and “a little like” are 24.84% and 51.24% respectively, and 13.98% of students say they don’t like English at all. The comparison of two or more processes, papers, data sets, or other items is known as comparative analysis. Comparative analysis is used in healthcare to analyse vast numbers of medical records, documents, photographs, sensor data, and other information in order to determine the effectiveness of medical diagnoses. Through a comparative analysis of bilingual teaching effectiveness among the four groups of students, we find that the average score of Macroeconomics (bilingual course) is highest for students in “like” and “a little like” group, the score is 79.5 and 79.3 respectively. The average score in group of “keen on” and “don’t like” are similar,

Table 1. Teacher's characteristics and teaching effectiveness

The most influential characteristics on bilingual teaching		Whether foreign language skills are adequate for bilingual teaching		Personalized Adaptive learning platform for student teacher interaction		The frequency of combing domestic and international environment in teaching	
Teacher's Foreign language skills	19.88%	Very adequate	36.34%	adequate	27.33%	Often	64.29%
Professional level of teachers	27.95%	Basically adequate	42.55%	adequate	29.43%	Occasionally	23.29%
Teacher's ability and attitude	46.27%	Not adequate	12.11%	No opinion	3.50%	No	2.80%
Teacher's cultural background	5.59%	No opinion	8.07%	other	9.02%	Other	8.70%

which is 77.8 and 77.7 respectively. At the same time, the more the students are interested in English, the more they believe bilingual teaching can improve their English level, make English learning fun and help them find a job in the future. In general: The use of desktop computers, mobile devices, the Internet, software applications, and other types of digital technology to teach students of all ages is known to as digitalization in education. The use of digital technology to teach students is known to as digitalization in education. The above statistical results show that, objectively, interest in English has no obvious influence on bilingual teaching effectiveness. Whether you like English is not the key to learn bilingual courses well. Subjectively, the students with higher interest in Learning English tend to think that the bilingual teaching effect is better (Peng, et al, 2019).

In terms of the English level of students in the sample, 30.43% of them have passed CET-6, 53.73% have passed CET-4, 1.24% have passed other English tests, and 14.6% have failed the above tests. Through the analysis of the correlation between English level and teaching effectiveness (Table 3), we can find that the students with a higher English level have higher average scores in macroeconomics courses. Good and effective teaching is determined by a variety of factors. A personable demeanor and a strong interest in the subject. Demonstrated a thorough understanding of the subject. Willingness to own up to your mistakes. Receptive to other people's viewpoints. Being truthful and transparent. The average score of students who have past CET-6 and CET-4 is 81.1 and 78.7 respectively, while the average score of students who failed tests is 71.5. As for whether bilingual teaching can improve English level, enhance interest in English learning and help employment, students with higher English level will have a higher degree of agreement on these problems. Students with a higher English level will have a higher degree of agreement on these problems, and bilingual teaching can raise English

Table 2. Students' interest in English and bilingual teaching effectiveness

English interest	Average score macroeconomics (points)	Improve English level	Improve English learning interest	Help to find a job
Keen on	77.8	40.63%	71.88%	71.88%
Like	79.5	21.25%	57.50%	77.50%
A little like	79.3	9.09%	23.03%	63.03%
Don't like at all	77.7	4.44%	17.78%	53.33%

level, increase interest in English study, and aid employability. They believe that bilingual education would help them improve their English skills and interest in learning English, as well as help them in obtaining future employment. They believe that bilingual teaching can help improve their English level and interest in English learning, and will also help them find jobs in the future. These results show that students' English level is very important to improve the bilingual teaching effectiveness.

Students' acceptance of bilingual macroeconomics teaching will also have some impact on teaching effectiveness. According to the results of the questionnaire, 17.39% of students think it's very necessary to set up bilingual courses, 55.10% of students think it's necessary to set up bilingual courses, 13.98% of students think it doesn't matter whether or not to set up bilingual courses, 12.73% of students oppose setting up bilingual courses. Macroeconomics is a discipline of economics concerned with an economy's overall performance, structure, behaviour, and decision-making. For instance, interest rates, taxes, and government expenditure can all be used to control an economy's development and stability. This encompasses the economics of the region, the country, and the world. From the perspective of teaching effectiveness, the students who think it is very necessary to set up bilingual courses have the highest average score (80.7 points) in macroeconomics course, and their acceptance of bilingual courses' role in improving English level, enhancing English learning interest and contributing to employment is also the highest among all groups, with 42.86%, 69.64% and 80.36% respectively. In the group of students who think it is not necessary to set up bilingual courses, their average score of macroeconomics course is only 76.9 points, and only 2.44% of students think that bilingual courses can improve their English level, 9.76% of students think it can enhance their English learning interest, 39.02% of students think it is helpful for employment, which is far lower than the former group. The above results demonstrate that the higher the students' acceptance of bilingual courses, the better the teaching effectiveness of bilingual courses.

As for whether students like their major or not, only 15.53% of them say they like it very much, while 59.01% say they like it generally, 16.77% do not like it and 8.70% are not sure whether they like it or not. The degree of students' interest in their major has obvious influence on the average score of their bilingual course. The average scores of students in the three groups of "like very much", "a little like" and "dislike" are 79.7, 78.7 and 78.3 respectively, which indicates that the more students

Table 3. Students' English level and bilingual teaching effectiveness

English level	Average score macroeconomics (points)	Improve English level	Improve English learning interest	Help to find a job
CET-6	81.1	19.39%	45.92%	68.37%
CET-4	78.7	14.45%	33.53%	65.90%
Other English test ¹	70	0.00%	25.00%	100.00%
Fail to pass above test	71.5	6.38%	23.40%	59.57%

Table 4. Bilingual teaching acceptance and bilingual teaching effectiveness

Necessity of bilingual teaching	Average scores macroeconomics (points)	Improve English level	Improve English learning interest	Help to find a job
It's very necessary	80.7	42.86%	69.64%	80.36%
It's necessary	78.9	10.56%	35.56%	73.33%
It doesn't matter	78.9	6.67%	17.78%	44.44%
It's not necessary	76.9	2.44%	9.76%	39.02%

like their major, the higher their scores of bilingual courses will be². At the same time, the distinction between these three groups on the questions as, “improve English level”, “improve English learning interest” and “help employment” is also very obvious (Table 5). The students who are more interested in their major have a greater proportion to agree with the role of bilingual teaching in these three aspects. The above analysis shows that, on the whole, the students who are more interested in their major have a better learning effectiveness of bilingual courses.

We conduct a regression analysis on the correlation between the quantifiable initial English level, professional level and teaching effectiveness. Using regression analysis, you can forecast how the independent variable will affect the dependent variable. A linear regression model, for example, can be used to describe age and height. Because a person’s height rises in lockstep with their age, they have a linear relation. The initial English level is denoted by the English score of college entrance examination, the professional level is expressed by the score of the pre-course microeconomics, and the teaching effectiveness is represented by the final grade of macroeconomics. The results show that the initial English level and professional level only explained 33.22% of macroeconomics score, which indicates that efforts and other factors in the learning process are more important. The correlation coefficient between professional level and teaching effectiveness is 0.52, which is significant at 1% level, while the correlation coefficient between initial English level and teaching effectiveness is only 0.08, indicating that the initial English level has little influence on the bilingual teaching effectiveness and its importance is far less than that of the professional level.

Teaching Process and Teaching Effectiveness

For the question of “which type of teaching materials are beneficial to improve the teaching effectiveness”, 64.60% of students choose the original English photocopied textbooks with translated versions, 22.98% choose the original English photocopied textbooks without translated versions, 4.04% choose the original English textbooks and 8.39% choose the loose-leaf textbooks compiled by teachers. In consideration of students’ comprehension ability and textbook price, the macroeconomics course of the two universities in the sample have chosen the photocopied textbooks in English with translated

Table 5. Major interests and bilingual teaching effectiveness

Major interests	Average score macroeconomics (points)	Improve English level	Improve English learning interest	Help to find a job
Like very much	79.7	38.00%	46.00%	76.00%
A little like	78.7	10.00%	35.79%	68.42%
Dislike	78.3	10.71%	32.14%	53.57%
Not sure	81.4	10.71%	21.43%	53.57%

Table 6. Major interests and bilingual teaching effectiveness

Independent variable	Dependent variable: score of macroeconomics	
	Correlation coefficient	P-value
Score of microeconomics	0.518	0.000
English score of college entrance examination	0.075	0.063
constant variable	30.682	0.000
$R^2 = 0.3222$	F-test:43.07	Obs. 178

versions. According to the survey results, this is the most conducive type to improving teaching effectiveness. According to the survey of satisfaction with the teaching materials of macroeconomics, 89.75% of the students are very satisfied or basically satisfied with the current teaching materials.

In terms of teaching mode, the proportion of students who choose “English as the main, Chinese as the auxiliary (PPT in English+ Teaching in Chinese + examination in English)” teaching mode and “Chinese as the main, English as the auxiliary (PPT in English+Teaching in Chinese+Examination in Chinese)” teaching mode are 45.43% and 45.03% respectively. It indicates that the current students hope that teachers can use Chinese and English comprehensively in the teaching process, and the test form in Chinese or English does not have much impact on teaching effectiveness. As for the influence of teacher-student interaction and student-student interaction on improving bilingual teaching effectiveness, 45.65% of students think it has a great influence, and 46.89% think it has some influence, which indicates that more than 90% of students agree that teacher-student interaction is conducive to the improvement of bilingual teaching effectiveness. Improving students’ relationships with instructors has significant, positive, and long-term consequences for both academic and social development of students. The student is more likely to trust her teacher, to be more engaged in her study, to behave better in class, and to attain greater academic goals. However, according to the survey on the teacher-student interaction and the frequency of student-student interaction in macroeconomics course, only 50.95% of students believe that the current teacher-student interaction is adequate, and another half of the students believe that the current teacher-student interaction is insufficient and the degree of interaction should be increased. Therefore, while maintaining the current teaching mode, teachers should increase the frequency of interaction between teachers and students in class and after class, thus improve the effectiveness of bilingual teaching. In math, science, reading, history, and other topics, bilingual teachers must ensure that their students keep up with their English-only classmates. This, like in a typical classroom, necessitates extensive outside-of-class planning and curriculum creation.

Teaching Background and Teaching Effectiveness

Teaching resources and teaching conditions can also affect the result of bilingual teaching. Regarding the correlation between the availability of teaching resources and bilingual teaching effectiveness,

Table 7. Teaching process and teaching effectiveness

Teaching materials selection		Teaching mode		Teacher-student Interaction through the personalized adaptive learning platform		Teacher-student interaction	
Original English textbook	4.04%	Full English	5.90%	Influence	35.65%	Great influence	45.65%
Original English photocopied textbooks without translated versions	22.98%	“English as the main, Chinese as the auxiliary”	45.43%	Have some influence	37.87%	Have some influence	46.89%
Original English photocopied textbooks with translated versions	64.60%	“Chinese as the main, English as the auxiliary”	45.03%	Little influenced	8.87%	Little influence	5.59%
Loose-leaf textbooks compiled by teachers	8.39%	other	3.11%	other	3.54%	No influence	1.86%

40.37% of students think the availability of teaching resources have a great influence on the bilingual teaching effectiveness, 54.66% of students think there's some influence. It illustrates the importance of building a teaching platform that contains resources such as courseware, case base, question bank, etc. Regarding whether multimedia teaching is beneficial to improving the bilingual teaching effectiveness, 84.78% of students give an affirmative answer. It indicates that multimedia teaching plays an important role in the teaching input. Therefore, multimedia teaching should be fully utilized in displaying materials such as pictures, audio, and video, to improve bilingual teaching effectiveness.

CONCLUSION AND TEACHING SUGGESTIONS

Theoretical analysis and empirical research results show that, first, from the perspective of students, teachers' foreign language proficiency is not the main factor restricting the current bilingual teaching effectiveness, however, teachers' professional ability and attitude are the most important factors. Teachers should further improve the combination of theory and practice in bilingual macroeconomics teaching. Second, objectively, students' interest in English has no significant influence on bilingual teaching effectiveness, and whether they like English is not the key to learn bilingual courses well; subjectively, the higher the students' interest in English, the more they tend to believe that bilingual teaching is more effective. At the same time, the higher the English level of students, the higher their acceptance of bilingual courses, the more students love their major, the more conducive they are to improving bilingual teaching effectiveness. By comparison, it is found that the effect of initial English level on bilingual teaching is much less than that of the professional level. Third, photocopied textbooks in English with translated versions are currently the most beneficial type to enhancing teaching effectiveness. The best teaching mode is synthesizing Chinese and English in class teaching, and the examination format in Chinese or English has little impact on teaching effectiveness. Fourth, teacher-student interaction and student-student interaction have a great influence on improving bilingual teaching effectiveness. The current teacher-student interaction is still insufficient. The availability of teaching resources and multimedia teaching are conducive to knowledge input and the improvement of bilingual teaching effectiveness.

Based on the results of theoretical and empirical studies, we believe the following points are essential to improve the effectiveness of bilingual teaching. First, we should further improve the awareness of the importance of bilingual teaching, provide sufficient incentives to teachers of bilingual courses, compensate bilingual course teachers for the extra time and effort they need to spend on implementing bilingual teaching, and increase teachers' enthusiasm. Second, the teachers of bilingual courses should exert their initiative and improve their professional level and bilingual teaching ability through self-study and training, so as to improve bilingual teaching effectiveness. Third, at the beginning of bilingual courses, teachers should explain the importance and practical significance of bilingual courses first, so as to increase students' enthusiasm and acceptance of bilingual courses and promote the improvement of teaching effectiveness. Fourth, the construction of teaching platforms such as courseware, case base, and question bank

Table 8. Teaching background and teaching effectiveness

The availability of teaching resources		The role of multimedia teaching	
Have a great influence	40.37%	Have a great influence	84.78%
Have some influence	54.66%	Have some influence	11.49%
Have a little influence	4.35%	Have a little influence	2.80%
Have no influence	0.62%	Have no influence	0.93%

should be strengthened to improve the accessibility of teaching resources and make full use of the advantages of multimedia teaching. Fifth, we can promote communication and interaction between teachers and students or within students through after-school homework explanations, case discussions, classroom presentations, and other forms, so as to increase knowledge input in various ways and enhance learning effectiveness.

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ENDNOTES

- ¹ Since only four students have passed the other English test, the statistical result of this line can be ignored.
- ² The only exception is that those students who are not sure whether they like their major have the highest score of bilingual courses. This is inconsistent with the previous theoretical analysis. This may be related to the fact that there are fewer people in the group (only 28) and the English level of all students are all above CET-4. Although they don't know whether they like this major, a good English level helps them understand bilingual courses, which leads to the highest score.