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The CLIL model of teaching in the College English curriculum in China: policies, perceptions, and practices

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# Special Issue

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# **Abstract**

Adopting a CLIL perspective, this study investigates the policies, perceptions, and practices concerning the courses that claim to integrate content learning and language learning in the Chinese College English context by using both a quantitative research method and a qualitative research method. The quantitative study focuses on both learners' and teachers' motivation intensity, motivation types, gains in participating in the CLIL courses, and their general attitudes toward the courses. A questionnaire is conducted with 2513 College English students and 230 College English teachers from 45 universities that fall into three different levels and three major types. The qualitative study examines the current state of the CLIL-type College English curricula mainly through the analyses of the College English syllabi provided by 24 universities of different levels and other documents, and also explores the notions of the policy-makers at the university level in regard to CLIL courses through an interview with 15 College English teacher-administrators.

**Keywords:** College English; curriculum development; teaching model; CLIL; motivation.

#### 1. Introduction<sup>1</sup>

### 1.1. Research background

Chinese College English courses or public English courses offered before the 1980s in China's mainland (Wang, 2008) were primarily designed under the requirements and guidance of the national College English syllabi, aiming to achieve certain teaching objectives (Wu & Han, 2010). The syllabi kept evolving with instructional objectives being more diversified and curricula more mature. Since 2000, the Ministry of Education (2001) has paid more heed to bilingual teaching and thus advocated that key universities first integrate it in English courses and gradually employ this approach completely (Zhang, 2002b). Then courses that claim to integrate content learning and language learning were increasingly introduced into the college curricula, including English for Special Purposes, English for Academic Purposes, English for Intercultural Communication, etc., and changed into compulsory ones from the previous elective courses. Colleges and universities all set off a new round of curricula reform for courses that attempt to integrate content teaching and language teaching in a transitional stage for the final goal of bilingual education, after the adjustments of their own English curriculum according to Guidelines to Chinese College English Teaching (2015), which proposed its principles of three language proficiency levels (basic, advanced, and developmental levels) and three content categories (English for General Purposes, English for Special Purposes, and English for Intercultural Communication). However, there is a dearth of systematic studies on the current status of these courses nationwide, related policies, and general attitudes of teachers and students towards them.

Abroad, CLIL (Content and Language Integrated Learning), which emerged in Europe in the 1990s, is an education model with "dual focus" that aims to cultivate citizens who acquire both multilingual skills and subject knowledge in a competent and efficient way through a school curriculum that teaches subject content and an additional language simultaneously (Marsh & Martin, 2013). Since English has become an international lingua franca, the CLIL model that uses English as the language of instruction or vehicular language has gained increasing influence outside of Europe (Graddol, 2006). It allows for relatively adequate language instruction without taking up extra class time (Eurydice, 2006).

This model bears a close resemblance to the Chinese College English context. First, the language practice is confined to the classroom (Lasagabaster & Sierra, 2010; Dalton-Puffer, 2017). Second, there is an absence of a favorable acquisition context for foreign language communities outside of the classroom. Third, most teachers are non-native English speakers.

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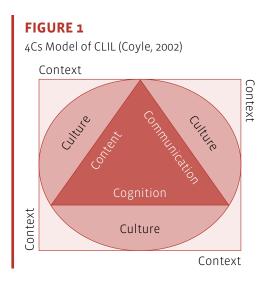
### 1.2. Research questions

Adopting a CLIL perspective, this study attempts to examine the content and language integration of College English courses, both compulsory and optional, that involve specific subject content or general education and are offered by college English teachers, including English for Special Purposes, English for Academic Purposes and English for Intercultural Communication. Courses that take English as a Medium of Instruction (EMI) and General English courses using the Content-based Instruction (CBI) approach are excluded. In order to provide some suggestions for the reform of College English teaching in the period of connotative development as regards optimizing curriculum, improving teaching methods, enhancing students' learning motivation, and promoting teachers' professional development, the present research employs questionnaires, interviews, and document analyses and is guided by the following questions: 1) What are the differences in the setting of the CLIL-model College English courses among different levels and types of universities? In particular, what are the differences in course content? 2) Does the attitude vary of College English teacher-administrators, teachers, and students from different universities towards this kind of course? 3) What are the gains of learners and teachers at these universities based on this teaching model? 4) What are the impacts of this model on the motivation and self-confidence of students and teachers from different institutions?

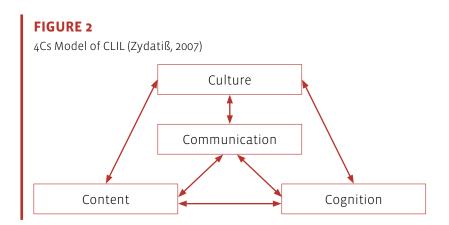
# 2. Theoretical framework and methodology

#### 2.1. Theoretical framework

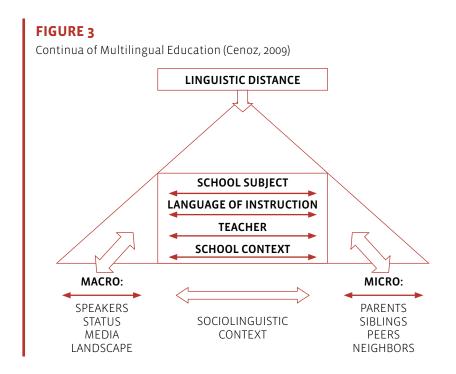
CLIL is designed to systematically integrate contextualized content, cognition, communication, and culture into its instructional practices (Coyle, 2002). This provides a theoretical framework—the 4Cs model for understanding integration (see Figure 1).



This pedagogical approach regards language as both an instrument and component of learning, through which students use language as a medium for learning and discussing subject content while progressively improving their language skills (Dalton-Puffer, 2007). It places greater demands on the linguistic and disciplinary literacy of instructors, as well as on the design of language teaching. Therefore, a new 4Cs model is created by Zydatiß (2007) modifying Coyle's (2002) original one, and language as communication is put at the center of these relationships (see Figure 2).



To implement a specific CLIL-based programme, such factors as educational, sociolinguistic, and linguistic factors in different educational contexts (see Figure 3) must be taken into account (Cenoz, 2009).



Learners' personal factors such as motivation often exert a significant role in the outcome of second language acquisition (Ellis, 1994). Gardner (1985) sees motivation as a combination of 1) the effort and desire to achieve a purpose of language learning and 2) positive attitudes toward language learning. It can be divided into two categories: integrative motivation and instrumental motivation. The former means people learn the target language in order to understand the relevant culture and integrate themselves into it, and the latter indicates that one learns the language for some functional reasons, such as passing a particular exam, hunting for a job, or obtaining a certificate.

The above constitutes the theoretical framework on which this paper relies, in an attempt to investigate the perception and practice of the CLIL model in the College English curricula in China.

### 2.2. Methodology

This study uses both a quantitative and a qualitative research method.

### 2.2.1. Questionnaires

A self-designed Likert scale questionnaire is administered to teachers and students involved in CLIL-based English courses from 45 universities nationwide. It is employed to examine both learners' and teachers' attitudes and motivation, along with gains and changes in self-confidence throughout the course. The questions are set for students and for teachers respectively.

The data are analyzed through SPSS 20.0. First, descriptive statistics are conducted with questionnaires for both groups. Then one-way ANOVA is used to analyze the variables such as motivation intensity, motivation type, and self-confidence. Based on the statistical analysis, the differences are compared among universities of different levels: Project 985 universities (Level-1), Project 211 universities (Level-2) and non-Project 985/211 institutions (Level-3), and among universities of different types: comprehensive universities (Type-1), universities of science & technology (Type-2), and universities with industry characteristics (Type-3). The reliability and validity of the questionnaire reaches 0.885 for students and 0.843 for teachers (see Table 1).

#### 2.2.2. Interviews

15 College English teacher-administrators from 15 universities are interviewed with the same outline regarding courses that integrate content learning and language learning. Eight of them are from Level-1 universities, three from Level-2, and four from Level-3. Six are from Type-1, five from Type-2, and four from Type-3. A thematic analysis of the interviews is carried out.

# 2.2.3. Document analyses

This research collects and analyzes the transcripts of the College English syllabi provided by 24 universities that have been published or exchanged at conferences before August 2017.

**TABLE 1**Number and distribution of questionnaires collected

THE LEVEL OF UNIVERSITY	PROJECT 985	PROJECT 211	NON-PROJECT 985/211	TOTAL
Questionnaire for students	817	812	884	2513
Questionnaire for teachers	73	76	81	230
THE TYPE OF UNIVERSITY	COMPREHENSIVE UNIVERSITY	UNIVERSITY OF SCIENCE & TECHNOLOGY	UNIVERSITIES WITH INDUSTRY CHARACTERISTICS	TOTAL
				<b>TOTAL</b> 2513
<b>UNIVERSITY</b> Questionnaire	UNIVERSITY	SCIENCE & TECHNOLOGY	INDUSTRY CHARACTERISTICS	

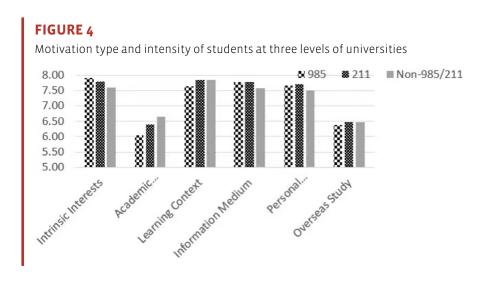
Special stress is laid in this paper on the teaching objectives and courses offered. In terms of the university level, these universities consist of nine Level-1, eight Level-2, and seven Level-3 universities. In terms of the university type, they include ten Type-1 universities, nine Type-2, and five Type-3.

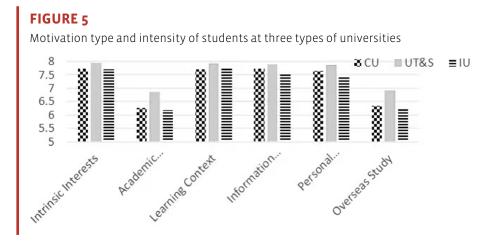
## 3. Results and analyses

# 3.1. Results of questionnaires for students

The 5-level Likert scale questionnaires of 2513 students who have taken a CLIL-type English course in the college show that the overall evaluation of the course by students from Level-1 and Level-2 universities is much higher than that of Level-3 institutions. But the differences between universities of each type are not significant. Students of Level-2 universities score higher than those of Level-1 institutions on the gain of learning and remarkably higher than those of Level-3 universities, while the differences in the same factor between students of Level-1 universities and those of the other institutions are not obvious. The gain of students in Type-2 universities are notably higher than those of Type-1 and Type-3 institutions. In addition, in the dimension of motivation intensity, students at Type-2 universities score greatly higher than those at the other two types of universities, and the differences among the three levels of universities are not obvious. The change in self-confidence of students at Level-1 and Level-2 universities is remarkably higher than those at Level-3 universities. The variation of the same factor of students at Type-2 universities is more noticeable than those at Type-3 institutions (see Appendix 1).

Six prominent types of motivation have been identified for students in the taking of CLIL-type courses: intrinsic interests, academic performance, learning context, information medium, personal development, and overseas study. The comparison of the mean values for different levels and types of universities is shown below (Figures 4 & 5).





The two figures above show the characteristics of the students' motivation type and intensity as follows. 1) Students at Level-1 universities have greater intrinsic interests motivation. 2) Contextual motivation is higher among students at Level-2 and Level-3 universities. 3) Students at Level-1 and Level-2 universities have higher information medium motivation. 4) Students at Level-2 universities possess stronger personal development motivation. 5) Desire for greater academic performance of students from Level-3 universities is stronger. 6) The motivation for overseas study among students at Level-2 and Level-3 universities is higher. 7) Students from Type-2 universities earn the highest grade in all six motivation types.

# 3.2. Results of questionnaires for teachers

The 5-level Likert scale questionnaires of 230 College English teachers show that teachers working for Level-1 universities perform much better than those at Level-3 institutions in terms of overall evaluation, gain, self-confidence, and motivation intensity. Teachers at Type-1 universities make more positive overall evaluations and have higher motivation intensity than those at Type-2 universities (see Appendix 2).

Teachers' motivations for offering CLIL-type courses can be roughly divided into four categories: teaching effectiveness, research achievements, peer pressure, and salary, among which the first two types are more prominent in comparison. According to the ANOVA test, universities of each type do not perform much differently in all four categories of motivation. Among different levels of universities, only the motivation for salary of teachers at Level-1 universities turns to be remarkably higher than that of those at Level-3 universities.

**TABLE 2**ANOVA of teachers' motivation among various levels of universities

		985	211	NON- 985/211	F	DF	POST HOC TEST (BONTERRONI/ DUNNETT T3)	MD
Salary -	Sum	5.91	5.51	5.53	3.092 ***	2,	Data of Project 985 universities is higher than that of ordinary ones.	0.20***
	SD	0.77	1.37	1.10		*** 227		0.38***

<sup>\*\*\*</sup>p<0.001, DF = degree of freedom, SD = standard deviation

# 3.3. Results of interviews with teacher-administrators

Interviews with 15 College English teacher-administrators who participate in the establishment of the school's teaching policy show that they are positive, open-minded about the notion or methods connected with CLIL. The CLIL model is regarded as an effective language teaching mode with a scientific view of language learning, which takes into account both humanistic and instrumental characteristics of language. It is thus believed to enhance students' learning interests and efficiency through a language learning process where "rich thoughts or practical professional content are taught". In addition, this model can enable students to "participate earlier and more naturally in international exchanges in English", and therefore adapt better to the social environment of education internationalization and economic globalization. It can also help students to broaden their horizons, think in depth, and improve their comprehensive capability. At the same time, new opportunities are provided for teachers' professional development in teaching, research, and academic qualifications. In a word, CLIL signifies the direction of the new round of College English teaching reform in China.

The universities where interviewees work all offer CLIL-type courses of different kinds and different levels, with selection rate ranging from 5% to 50%. These universities either offer courses that "integrate general content and language learning" to serve the goal of "cultivating students' cultural and scientific literacy" or run courses that "combine professional content and language learning" in order to "develop students' academic and professional ability" or with both purposes.

Policy-makers in universities generally believe that the main obstacles to running CLIL-type courses are poor professional knowledge and teaching ability of teachers. At present, a majority of College English teachers receive only a single subject training and thus are only qualified for traditional basic English courses. A small number are capable of teaching general education or intercultural communication courses based on the subject content of humanities and social sciences. However, it is still difficult for them to instruct other disciplines. So is the transformation of teaching mode into CLIL. Although the CLIL model has been introduced into the College English syllabi of most universities, there is a lack of systematization and consistency in the curricula. The setting of specific courses depends largely on the individual teachers available. What's more, teachers who offer courses that integrate subject content and language learning have different educational backgrounds. Some have only gained a professional training of a certain subject, without adequate language proficiency. Some are foreign teachers with relevant subject backgrounds but no pedagogic training. A part of them are College English teachers who later learn (or study for a degree) related subject knowledge.

It also varies among universities in students' access to CLIL-type courses. Some institutions do not set a criterion for course enrollment or grade such courses according to academic challenges so that students with various degrees of language proficiency have an opportunity to learn subject content in English, which reflects a view of "learning by doing" where learning is integrated with application as much as possible. Many universities still choose to rank this kind of course as an intermediate or advanced one. Separating application from learning, their curricula focus more on learning in the early stage and on application later.

Other challenges include inaccurate course positioning, vague teaching objectives, unclear assessment scope, and lagging teaching materials.

# 3.4. Analysis of official documents

In 2001, The Ministry of Education issued Some Advice about Addressing Undergraduate Teaching and Improving its Quality in Higher Education Institutions (No. 4 Document for short) and "encouraged undergraduate education (in key universities) to combine English or other foreign language teaching with public and specific content teaching. For majors such as biotechnology and information technology in high-tech fields, as well as finance and law, that will be highly needed; since China's accession to WTO, it is necessary to take a step forward and strive to make 5-10% of relevant courses integrated with foreign language teaching within three years".

Zhang (2002b) emphasized in his article that bilingual education is the future and priority of English courses for specific purposes in colleges and universities. Institutions are encouraged to pay increasing attention to bilingual teaching, in a transition from public English teaching complemented by and integrated with bilingual education to ultimately employing this mode completely. In *Guidelines to Chinese College English Teaching* (draft, 2015), three content categories are proposed among which English for Special Purposes and English for Intercultural Communication are supposed to integrate both content learning and language learning.

Case study is employed as well. From a sample of College English syllabi of nine universities at three different levels—each level with three institutions—strong relationships are found between their overall teaching objectives and the College English courses offered. On the one hand, for the courses that integrate content learning and language learning such as English for Specific Purposes (including English for Special Academic Purposes) and English for Intercultural Communication, which are the focus of this study, it is certain, through the analysis and comparison of these syllabi, that universities at three different levels all support these courses with favorable policies. On the other hand, they have designed the curricula on their own, with different levels of access and different degrees of popularity.

The three Level-1 universities tend to offer CLIL-type courses at various levels and give them compulsory credits. As a result, all students have opportunities to take a CLIL-type course. In terms of the course type, English for Specific Purposes occupy the least proportion (6.8%, 16.2%, and 9.8% respectively), and intercultural communication courses occupy the most, accounting for 59.3%, 24.3%, and 11.8% respectively. The three Level-2 universities tend to rank these courses as intermediate and advanced, allowing students who have completed the basic English courses to choose what they like from a certain range for compulsory credits. This implies a prerequisite such as basic General English courses or test scores that demonstrate language proficiency, so that CLIL-type courses are only available to a portion of the student body. At the three Level-3 universities, prerequisites are clearly set, and most CLIL courses are optional. Only those who have first acquired a certain level of language proficiency can take them as elective courses for extended learning. In addition, these courses merely account for a small amount of credits.

#### 4. Discussions

# 4.1. Major findings

# 4.1.1. Policy

College English courses with CLIL have always received support from national and university-based policies. CLIL elements have already been present in the national documents of the new millennium. Both the No. 4 Document issued by the Ministry of Education in 2001

and Zhang's (2002a) article stress bilingual education, and expect a gradual transition to EMI through CLIL. The College English syllabi provided by 24 universities, which are documents of institutional policy, illustrate that universities and teachers take CLIL-type courses as an effort to achieve the national goal of improving higher education quality. At the same time, it is also an attempt to adapt actively to economic globalization, education internationalization, students' improving language proficiency, and diversified and individualized goals of language learning.

According to the study by Coyle (2010), there is not a universal CLIL model around the world. Universities at different levels in this study choose various CLIL-type curricula to fit different environmental variables, such as teaching language, teacher quality, students' language proficiency, university environment, class schedule, sociolinguistic context, etc., according to their own talent development goals and educational environments. Meanwhile, College English courses with CLIL take language learning (communication) as the core and combine other components (content, cognition, and culture) of the 4Cs framework to achieve their educational goals.

The analysis of the status quo of College English curricula construction reveals that Level-1 universities pay more heed to English for Academic Purposes and English for Cross-cultural Communication, Level-3 universities focus more on English for General Purposes and English for Specific Purposes, while Level-2 universities are in between.

### 4.1.2. Perception

There are also perceptual foundations for the running of CLIL-type courses. Policy makers of College English teaching working for various universities strongly agree with each other on the "content-based" nature of CLIL courses. Their opinions, however, vary on "how to integrate content and language". In fact, in their point of view, the content of CLIL-type courses can cover all things but the basic knowledge of language and language skills. Yet they do not think it a good choice for these courses to address highly professional content; instead, EMI is more suitable for this. They believe the teaching methods of CLIL should be different from traditional ones, and attention should be paid to both content learning and language learning in the teaching process. It is generally believed that CLIL-type courses are part of a wider trend since they can empower students to adapt better to globalization, but at present, they are more suitable for students with excellent language proficiency or high-level institutions with good source of students. Furthermore, this model is also believed to provide new insights into teaching research and to create new opportunities for College English teachers to improve themselves. However, the dearth of qualified teachers is still the biggest obstacle in the construction of this kind of courses.

Teachers at universities of different levels hold various attitudes towards the CLIL-type courses. Those at Level-1 universities performed the best in terms of motivation intensity, gains,

changes in self-confidence, and overall evaluation of the course, which indicates that their willingness and efforts to offer the course are closely related to the requirements of the university, needs of the students, and qualifications of the teachers.

Students' evaluations of CLIL-type courses differ among different levels of universities. All learners that are surveyed in this study welcome the courses with enthusiasm. Students at Level-1 universities display the biggest change in self-confidence and the greatest motivation intensity in participation, which indicates that the willingness to take such courses and their efforts are closely related to students' command of the language. However, students at Level-2 universities score much higher than learners from the other two tiers of universities on the variable of learning gain, which reveals that students from Level-1 universities are not as satisfied with their achievements in learning as they should be. The lack of challenge in content and language may provide an explanation.

Among different types of universities, learners and teachers at Type-2 universities show contrasting characteristics. Students at these universities put much more effort into CLIL-type courses than those at Type-1 universities, while teachers of these two types of institutions display the opposite trend. Perhaps it is because the status of foreign language teachers at such universities of science & technology is relatively lower. At the same time, English appears more instrumental than liberal and academic in these institutions. As a result, the personal development of teachers and their enthusiasm for CLIL-type courses are dampened.

The particular CLIL-type courses a university develops depend not only on operating elements such as the qualifications of teachers, students' language competence, time availability, integration approach, evaluation method, etc. (Coyle et al., 2010), but also on students' needs such as their learning motivation. The type of students' motivation can provide some explanations for their choices and a reference for the design of College English curricula. This study finds, for instance, that college students at Level-1 universities have the strongest intrinsic motivation. So are their thirst for literary and cultural content and their pursuit of broadening their cultural horizons. Learners at Level-1 and Level-2 universities have stronger information medium motivation, indicating the expectations of students at research universities for CLIL courses to improve their literature reading ability and their grasp of the frontiers of science and technology, and to strengthen their learning ability and academic research competence.

Teachers' motivation can also provide some references for policy makers. Among all types of motivation stands out the teaching effectiveness, which shows that the main purposes of all teachers offering such courses are to increase students' interests in English learning and improve the effectiveness of College English classroom teaching. Motivation for scientific research achievements ranks the second, manifesting teachers' research awareness of and interest in CLIL-type courses. Among all extrinsic motivations, peer pressure is greater than salary, which implies that the pursuit of professional development exceeds that of material benefits.

In terms of teacher qualifications, universities and colleges tend to choose 1) College English teachers who have gained professional competence through learning, research, or further study, offering College English courses for academic purposes or cross-cultural communication courses with CLIL-model that are based upon the subject content of humanities and social sciences; and 2) professional teachers with high language proficiency or professional foreign teachers with English as their first language, offering courses for specific purposes or EMI courses.

#### 4.1.3. Practice

Despite policy supports and its deeply-rooted notion in the hearts of people, the practice of CLIL-type courses is still in its infancy. The 45 universities that replied to the questionnaire, the 24 institutions that provided syllabi, and the 15 involved in the interviews in this study all offer a certain number of CLIL-type courses, ranging from 5% to more than 50%.

Universities at different levels vary in the number and type of courses offered. Level-1 and Level-2 universities perform better in both the quantity and quality of the courses than Level-3 ones. Additionally, Level-1 universities prefer English for Academic Purposes and Cross-cultural Communication, while Level-2 institutions prefer English for Specific Purposes and Cross-cultural Communication. Level-3 universities are more inclined to English for General Purposes (non-CLIL) and English for Specific Purposes.

### 4.2. Suggestions for teaching

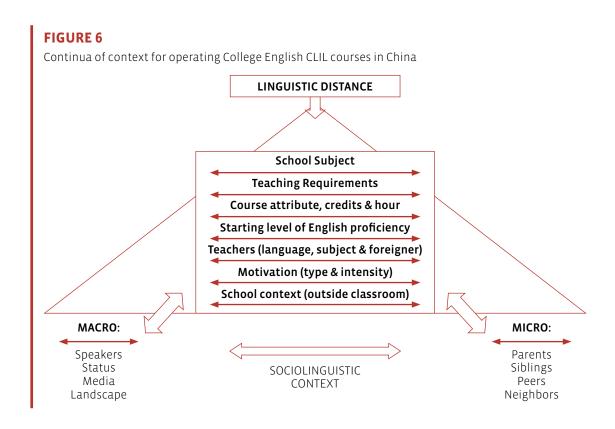
#### 4.2.1. Course orientation

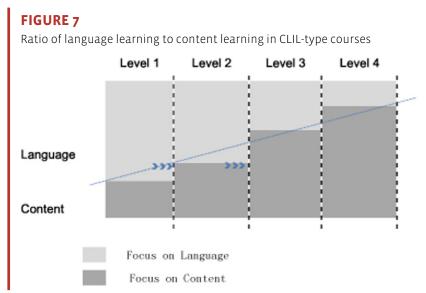
In the establishment of College English CLIL-type courses, colleges and universities are supposed to position the type and theme of courses according to their own educational resources, educational objectives, teaching requirements of the department, qualifications and abilities of English teachers and students' language proficiency, interests, and individual needs.

Based on the previous research and adapting from the "Continua of Multilingual Education" put forward by Cenoz (2009), this study attempts to propose a continua of context for operating College English CLIL courses in China as is shown in Figure 6.

# 4.2.2. Further integration

College English CLIL-type courses are supposed to include dual teaching objectives of content learning and language learning, and to integrate cognitive and cultural elements. In practice, however, it is almost impossible for the two objectives to be exactly equal in quantity. A more realistic approach would be to adjust the ratio of language learning to content learning according to different starting levels of English proficiency of students (see Figure 7), rather than postponing enrollment until they acquire a good command of language.





# 4.2.3. Teaching qualification and relevant research

CLIL, as a content-driven language education model, poses a challenge to the traditional practice of language teaching and requires teachers to make adjustments in curriculum design and teaching methods. As CLIL signifies the future of education, it should be a top priority

of colleges and universities to improve teachers' qualifications, enabling them to avoid the predicament where language teachers do not master the subject content and professional teachers are not proficient at language.

Multifaceted efforts are necessary to improve teachers' competence for college English CLIL courses. Traditional English teachers with strong desire for self-improvement and interests in this new teaching mode should be encouraged to acquire qualifications through interdisciplinary learning and training. For those with overseas working/learning experience or local teachers who have gained professional knowledge of a particular subject, they should be offered training in language teaching. Foreign teachers who have both academic education background and language teaching experience are encouraged to develop cross-cultural awareness. Moreover, all teachers should be encouraged to do research on CLIL-type courses, especially on effective classroom interaction and the design of language teaching in the classroom.

#### 5. Conclusion

Through a combination of questionnaires, interviews, and documentary research, this paper has investigated the status quo, major types, students' and teachers' motivations, students' and teachers' gains and changes in self-confidence, problems, and difficulties concerning the CLIL-type courses in the Chinese College English curricula, and achieved some meaningful results that will hopefully shed light on the future development and operation of such courses and decision-making on the parts of administrators, teachers, and students at universities of different levels and types.

However, this research has two major limitations. First, the questionnaires are designed only to inquire those teachers and students who have offered or taken the CLIL-type courses, so fail to obtain opinions of those who have not taught or learned such courses but are potential participants in the future. Second, this study is concentrated on teachers' and students' gains and emotional factors in CLIL contexts but neglects taking opinions and soliciting insights concerning the forms and criteria for assessment in CLIL courses, which has been frequently mentioned and considered a critical issue in the interviews with the 15 teacher-administrators.

Now that the CLIL-type courses are supported by national and local education policies, and welcomed by students and teachers alike in various universities and colleges, it is advisable that more research should address the problems now encountered in the present CLIL courses regarding classroom teaching techniques, assessment tools, teaching materials, and so on.

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# 7. Appendixes

**APPENDIX 1**ANOVA results of questionnaires for students

		COMPRE- HENSIVE	SCIENCE & TECHNOLOGY	INDUS- TRY	F	DF	POST HOC TEST (BONTER- RONI/DUNNETT T3)	MD
Gain	Mean	3.74	3.85	3.74	5.412 ***	2, 2510	Data of universities of science & technology is higher than that of universities with industry characteristics.	0.11
	SD	0.75	0.77	0.72				***
Self-	Mean	3.57	3.64	3.52	6.633	2, 2510	Data of universities of science & technology is higher than that of universities with industry characteristics.	0.11
confidence	SD	0.59	0.65	0.61	***	2, 2310		***
Motivation	Mean	3.51	3.62	3.5	8.458	2, 2510	Data of universities of science & technology is higher than that of comprehensive universities.	0.10
intensity	SD	0.56	0.64	0.6	***	2, 2510		***
		985	211	NON- 985/211	F	DF	POST HOC TEST (BONTER- RONI/DUNNETT T3)	MD
Overall evaluation	Mean	4.18	4.1	4.02	. 11.489 ***	2, 2510	Data of Project 985 universities is higher than that of ordinary ones. Data of Project 211 universities is higher than that of ordinary ones.	0.15 ***
	SD	0.7	0.69	0.64				0.07 ***
Gain	Mean	3.78	3.84	3.69	7.949 ***	2, 2510	Data of Project 211 universities is higher than that of ordinary ones.	0.14
	SD	0.76	0.76	0.71				***
Self- confidence	Mean	3.64	3.61	3.47	19.023 ***	2 2510	Data of Project 985 universities is higher than that of ordinary ones.  Data of Project 211 universities is higher than that of ordinary ones.	0.16 ***
	SD	0.63	0.61	0.59		2, 2510		0.14 ***

<sup>\*\*\*</sup>p<0.001, DF = degree of freedom, SD = standard deviation

**APPENDIX 2**ANOVA results of questionnaires for teachers

		COMPRE- HENSIVE	SCIENCE & TECHNOLOGY	INDUS- TRY	F	DF	POST HOC TEST (BONTER- RONI/DUNNETT T3)	MD
Overall evaluation	Mean	4.13	3.79	3.86	6.091 ***	2, 227	Data of comprehensive universities is higher than that of universities of science & technology.  Data of comprehensive universities is higher than that of universities with industry characteristics.	0.34
	SD	0.52	0.75	0.64				0.27 ***
Motivation	Mean	4.20	3.97	4.10	3.163 ***	2, 227	Data of comprehensive universities is higher than that of universities of science & technology.	0.23
intensity	SD	0.56	0.48	0.54				***
		985	211	NON- 985/211	F	DF	POST HOC TEST (BONTER- RONI/DUNNETT T3)	MD
Overall	Mean	4.09	3.98	3.77	4.848 ***	2, 227	Data of Project 985 universities is higher than that of ordinary ones.	0.31
evaluation	SD	0.58	0.68	0.63				***
Gain	Mean	3.69	3.57	3.38	4.758 ***	2, 227	Data of Project 985 universities is higher than that of ordinary ones.	0.31 ***
	SD	0.66	0.65	0.60				
Self- confidence	Mean	3.88	3.84	3.62	6.109 ***	2, 227	Data of Project 985 universities is higher than that of ordinary ones. Data of Project 211 universities is higher than that of ordinary ones.	0.26 ***
	SD	0.50	0.54	0.49				0.22 ***
Motivation	Mean	4.23	4.10	3.99	3.698	2, 227	Data of Project 985 universities is higher than that of ordinary ones.	0.23
intensity	SD	0.56	0.50	0.54	***			***

<sup>\*\*\*</sup>p≤0.001, DF = degree of freedom, SD = standard deviation