

Content and Language Integrated Learning: An Initial Case Study for Mold Engineering Courses at the Industrial University of Ho Chi Minh City, Vietnam

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Abstract: The purpose of this study is to assess the applicability and effectiveness of the content and language integrated learning (CLIL) method applied for the mold engineering subject at the Industrial University of Ho Chi Minh City (IUH). Given that traditional engineering programs place emphasis on developing the technical knowledge of students while overlooking the critical roles of English skills, engineering graduates tend to lack the wide scope of spoken and written communication skills in English that are necessary for working in a professional environment. In light of the limited length of the curriculum, integrating content and language is likely to be a real solution to the problem. Nonetheless, scant scholarly attention has been paid to the applicability of the CLIL method in engineering courses in Vietnam, notwithstanding that Vietnam has become a dynamic emerging country demanding a highly skilled engineering labor force.

Following the quasi-experimental design, students have been assigned into two groups, the treatment group and the control group. A pre-test has been

conducted to assess the equivalence of the levels of English proficiency of students between groups before the intervention, the CLIL method. A post-test has then been performed with both groups to compare their levels of English proficiency after the intervention. Likewise, another post-test has also been performed with both groups to assess the effectiveness of the CLIL method in conveying the subject knowledge. A mini-survey has also been conducted to measure the satisfaction of students with the CLIL method. Implications for academicians and practitioners are provided.

Keywords: CLIL, English teaching, Technical English, Mold engineering, Second language (L2), Quasi-experimental design

1. Introduction

Due to globalization and the popularity of the international business, English has become a lingua franca [1]. It is estimated that in 2021, roughly 1.35 billion speakers worldwide using English as their first or second language [2]. English is also the most spoken language in the world compared to other common languages such as Chinese, Hindi, or Spanish [2]. Likewise, technical English is also becoming increasingly important [3-6]. Because of its popularity, English has been incorporated into the traditional educational programs and as a result, several modern educational approaches have been introduced to learners in which the most popular approach is the Content and Language Integrated

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Learning (CLIL) [7, 8] CLIL has been widely adopted as a language-learning method for students in two recent decades [9].

CLIL was first introduced in Europe in the 1990s and has become a popular approach in educational institutions [10] in which “non-language subject is taught with and through a foreign language” [11] and “seeks to develop proficiency in both the non-language subject and the language in which it is taught, attaching the same importance to each” [11]. However, CLIL is different from the traditional goal of English-medium instruction (EMI) in Asian higher institutions. Regarding EMI, the content of the subject is conveyed through an English environment mostly aiming to promote the subject content ignoring the fact that several students lack basic English skills to understand the subject in English [12]. Whilst CLIL aims to promote both the subject content and English proficiency, it is quite a new approach to Asian universities [9].

Whilst research on CLIL was normally conducted in European countries [13, 14], research on CLIL in Asian countries, especially in Vietnam is exceedingly rare [15]. Particularly, to the best of our knowledge, there has not been any research ever conducted to evaluate the effectiveness of CLIL for engineering classes in Vietnam. Given that Vietnam is an emerging country with a significant average growth rate [16], English has a critical role to play in higher education, especially with the increasing internalization and globalization [17]. Nonetheless, many universities in Vietnam are still reluctant to apply CLIL, ignoring its benefits such as enhancing motivation to learn foreign languages, improving cognitive ability, and boosting cultural awareness [14, 15]. This study, therefore, aims at filling this gap by exploring the role of CLIL in facilitating the learning processes of mechanical students towards both understandings of the content of the subjects and honing foreign language skills.

2. Literature Review

Content and Language Integrated Learning (CLIL) refers to an umbrella term involving learning a subject in a foreign language, thereby promoting that foreign language proficiency through learning the content of the subject [7, 18]. CLIL, therefore, aims to simultaneously improve both the content of the subject and English proficiency [19]. The critical role of CLIL in facilitating linguistic capability for second

language (L2) learners has been broadly examined by past research [20, 21]. The emphasis of these studies, however, has been largely on the language proficiency of learners rather than the content of the subject, given that they are normally conducted by the language educators [10]. Accordingly, the language efficiency of L2 learners tends to be enhanced due to the application of the CLIL approach [22].

In the higher education setting, nonetheless, a newer term, Integrating Content and Language in Higher Education (ICLHE), has also been used. ICLHE denotes the courses in higher education with “explicit and integrated content and language learning aims” [23]. In Europe, CLIL, ICLHE, and EMI can be used interchangeably without much distinction. Nonetheless, it is worth noting that in Asian universities, the concepts of EMI and CLIL are different in which the first one focuses on teaching the content of the subject by using English whilst the second one places emphasis on improving both the subject content and the English skills [24, 25].

A review of the literature has shown that CLIL has been applied in engineering courses. Indeed, Zeidmane and Cernajeva [26] have recommended the use of CLIL in engineering courses to enhance students’ levels of competence in using foreign languages. Students were found to be more interested in classes when CLIL was being applied. Kanoksilapatham and Khamkhien [27] examined the roles of CLIL in a research methodology class in engineering courses in an EFL context. They found that CLIL is able to help improve both the reading skills and vocabulary knowledge of students. Haapanen et al. [28] examined the use of CLIL in mechanical engineering courses in Finland and found that CLIL could be able to enhance lecturers’ knowledge on the subject and reduce the dropout rate. Pancheva and Antove [14] also investigated the use of CLIL in engineering courses at the University of Forestry, Bulgaria and found that CLIL enhances students’ motivation in learning English, cognitive ability, and cultural awareness. CLIL was also suggested to be integrated into traditional EMI classes aiming at the teaching not only the content of the subject but also foreign languages in engineering classes [29]. Another stream of research has particularly looked at the perceptions or reactions of both teachers and students towards the CLIL method integrated into engineering classes [13, 30]. Accordingly, while lecturers found the CLIL method interesting, students

considered CLIL as a positive approach to improving English skills [30]. An obstacle to CLIL, however, was the low levels of English skills of lecturers [30]. Besides, students are also afraid of the difficulties that emerged from the use of English in teaching those courses which were already difficult when learning in such first languages of them as Spanish [13]. Nevertheless, research on CLIL for engineering classes has normally been conducted in European countries [14, 26] and empirical research on the effectiveness of CLIL in engineering classes in Asian countries is still scarce.

The use of CLIL in Vietnam has received scant attention from scholars, except for some effort from pedagogues or institutions [15]. The focus of these studies, therefore, was not aimed at understanding the learning processes in the CLIL method involving cognitive, social, and cultural interactions. Especially, studies on teaching foreign languages through subjects in Vietnam normally place emphasis on the EMI instead of the CLIL method [31-33]. Among some limited research on the CLIL approach, some were conducted to assess the effectiveness of the CLIL approach for primary students [34]. Nevertheless, research on the use of the CLIL method for engineering courses in Vietnam has been very limited.

3. Method

Several methods were used to assess the necessity of English at large and the CLIL method, in particular. These methods were described as follows.

A. Content and Language Integrated Learning (CLIL)

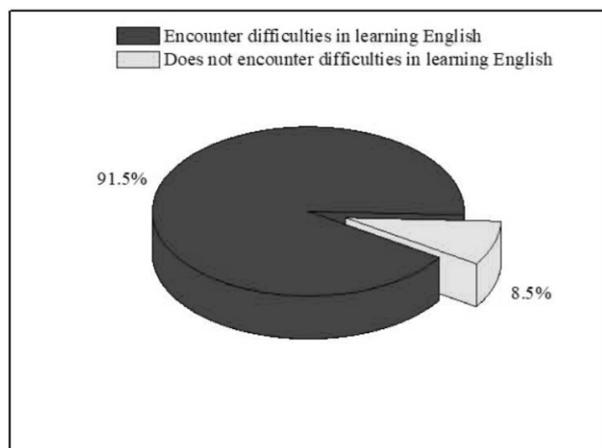


Fig. 2: Difficulties in learning English

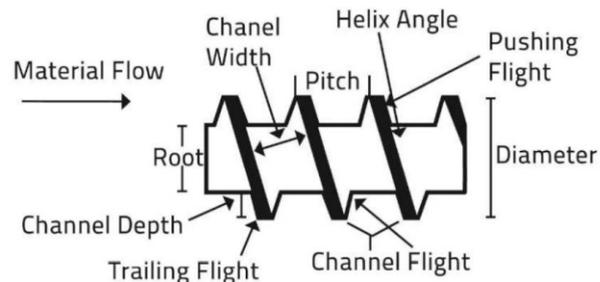


Fig. 1: Illustration of technical English in molding engineering

The CLIL method is considered a pedagogical approach that focuses on combining the learning of an L2 language with studying a guided subject area in that language. It helps students to learn content (in the L2 language) and the language itself naturally. In our case, the CLIL method is partially applied to the Mold Engineering subject. English is the L2 language in the current courses. Most lessons are taught in Vietnamese, however, terminologies are taught in English, and explanations are provided in Vietnamese, if necessary. Figure 1 shows some terminologies in the Mold Engineering course. It illustrates the construction of a screw in an injection molding machine. These terminologies are then tested in the examination along with the engineering knowledge to make sure students pay attention to learning them.

B. Descriptive Statistics

Online questionnaires were sent to 47 final-year students who had attended the mold engineering class at the Industrial University of Ho Chi Minh City (IUH). 47 complete responses were then received.

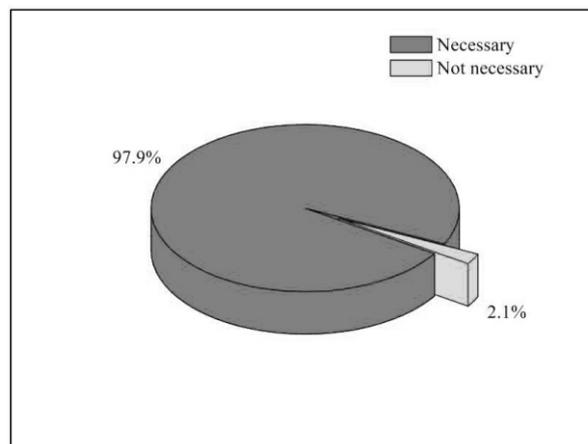


Fig. 3: The integrating English into courses

Table 1: Group statistics

1 CLIL; 2 No CLIL		N	Mean	Std. Deviation	Std. Error Mean
Score	1	32	6.7813	7.41287	1.31042
	2	27	6.6667	8.96575	1.72546

Table 2: Independent sample t-test for english proficiency (CLIL not applied)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Score	Equal variances assumed								Lower	Upper
		.004	.952	.054	57	.957	.11458	2.13182	-4.15431	4.38347

Among 47 respondents, 83% (39) of students consider English to be extremely important and 14.9% (7) of students consider English to be important to their lives and work. Notably, as shown in Figure 2, up to 91.5% of students are struggling to learn English. This suggests a promising avenue for such new and fruitful approaches as the CLIL approach.

In addition, Figure 3 illustrates that 97.9% of students agree that integrating English into courses is necessary for students for their future. More specifically, as shown in Figure 4 and Figure 5, 97.9% of students suppose that the CLIL approach is necessary for overall English proficiency while 97.9% reckon that the CLIL approach is essential for their future work.

C. Quasi-Experimental design

We followed the quasi-experimental design as suggested by Cook, Campbell, and Shadish [35] to assess the effectiveness of the CLIL approach. Though randomization was not employed, two mold engineering classes include those students most of the same age and educational level.

A pre-test had been performed to evaluate the levels of English proficiency of both classes before the CLIL approach was applied. The instrument was designed to include 100 mold engineering-related English vocabulary words. The outcomes of the independent sample t-test in Table 1 and Table 2 show that there is no significant difference between treatment group (N = 32; Mean = 6.78) and control group (N = 27; Mean = 6.67) regarding English

proficiency ($p = .957 > .05$; CI [-4.15;4.38]) before the CLIL approach was applied.

Another post-test was then conducted to collate the Grade Point Average scores between the treatment group and the control group after the CLIL method had been applied. The instrument was designed by the Faculty of Engineering, the Industrial University of Ho Chi Minh City to capture the achievement of students towards mold engineering subject examination. The outcomes of the independent sample t-test in Table 5 and Table 6 illustrate that there is no significant difference between treatment group (N = 41; Mean = 4.77) and control group (N = 37; Mean = 5.54) regarding English proficiency ($p = .142 > .05$; CI [-1.80;.265]) after the CLIL approach had been applied.

4. Discussions

This investigation makes a contribution to the literature by examining the applicability and effectiveness of the CLIL method in engineering courses in Vietnam. Most of the interviewed students relate that they are having trouble studying English. This provides us the rationale and motivation to perform this research, hoping that by evaluating the effectiveness of the CLIL method, schools and universities would introduce more effective policies to support students in learning English through teaching subjects. In addition, 97.9 percent of students think that the CLIL approach is necessary for both foreign language skills and future work. This revealing is in line with the findings of some other investigations performed in European countries [26,

30] regarding the positive opinions of students toward the CLIL method. This signifies a good start for the application of the CLIL approach in engineering classes in Vietnam.

One pre-test and two post-tests following a quasi-experimental design have been conducted to figure out the effectiveness of the CLIL approach in terms of English proficiency and the requirements regarding the content of the subject. With respect to English proficiency, a pre-test confirms that two classes have the same level of English beforehand. After the CLIL method has been applied, the treatment group significantly improved their levels of English. At the same time, the knowledge of the course was similar between the two groups because there was an insignificant difference in the Grade Point Average scores between the treatment group and the control group. This output is consistent with the results of some other research [27, 28]. Hence, the CLIL method is likely to improve both foreign language proficiency and content knowledge. Vietnamese universities are therefore advised to adopt the CLIL method to their programs, especially for engineering courses. Engineering courses in Vietnam are traditionally taught in Vietnamese. Additionally, all books are written in Vietnamese. This could hinder the ability of both lecturers and students to broaden their knowledge by using more up-to-date sources that are written in English.

5. Conclusions

This study aims to examine the applicability of the CLIL method, a popular method used to teach both the

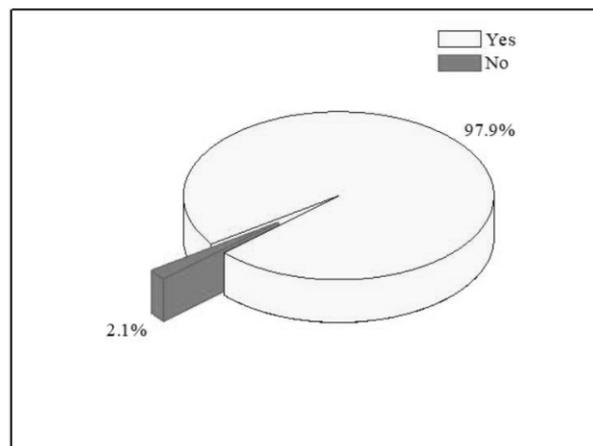


Fig. 4: CLIL and English proficiency

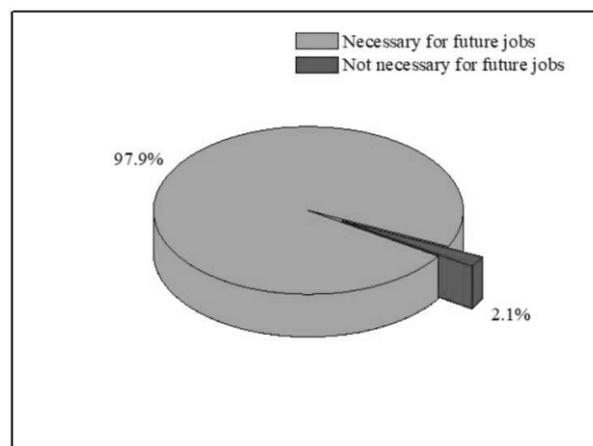


Fig. 5: CLIL and future jobs

contents and the foreign language, in Vietnam, an emerging country. Whilst Vietnam has achieved remarkable growth rates in the last decades;

Table 3: Group statistics

1 CLIL; 2 No CLIL		N	Mean	Std. Deviation	Std. Error Mean
Score	1	18	29.2222	21.57765	5.08590
	2	11	16.1818	10.27442	3.09785

Table 4: Independent sample t-test for english proficiency (CLIL applied)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
Score	Equal variances not assumed	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
				2.190	25.895	.038	13.04040	5.95509	.79713	25.28368

Table 5: Group statistics

1 CLIL; 2 No CLIL	N	Mean	Std. Deviation	Std. Error Mean
Score	1	41	4.7683	2.67268
	2	37	5.5378	1.87503

Table 6: Independent sample t-test for grade Point average (GPA) scores (CLIL applied)

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score	Equal variances assumed	16.58	.00	-1.457	76	.149	-.7695	.52814	-1.82	.282
	Equal variances not assumed			-1.483	71.799	.142	-.7695	.51889	-1.80	.265

surprisingly, such innovative English teaching methods as the CLIL method have not widely been applied in higher education, especially for engineering courses. A quasi-experimental design was applied with two groups studying mold engineering courses at the IUH university, Vietnam. The results revealed that the CLIL method could be able to improve the English skills of engineering students while they could also help students achieve satisfactory achievements for the final examination. This suggests a bright future for the application of the CLIL method in Vietnam.

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References

- [1] Balakrishnan S., Abdullah N. L. & Linda Khoo M. S. (2020). English Language Learning Anxiety and its Relationship with Language Achievement: A Study on Learners in a Technical University. *Journal of Technical Education and Training*, 12, 161-170.
- [2] Szmigiera M. (2021, 15 February). The most spoken languages worldwide 2021. Available: <https://www.statista.com/statistics/266808/the-most-spoken-languages-worldwide/>
- [3] Abellán-Nebot J. V. (2018). Project-based experience through real manufacturing activities in mechanical engineering. *International Journal of Mechanical Engineering Education*. 48, 55-78.
- [4] Barbosa F. V., Lobarinhas P. A. M., Teixeira S. F. C. F., and Teixeira J. C. F. (2022). Project-Based Learning in a Mechanical Engineering Course: A new proposal based on student's views. *International Journal of Mechanical Engineering Education*. p. 03064190221078259.
- [5] Bhar S. K. and Abu Bakar N. A. (2013). Language Barriers: Feedback from the IT Industry. *Journal of Technical Education and Training*, 4, 9-20.
- [6] Sanmugam S. T. and Raja Harun R. N. S. (2013), Technical Instruction in English: Voices of Technical Lecturers, *Journal of Technical Education and Training*. 5, 1-13.
- [7] Coyle D., Hood P., and Marsh D. (2010). *Content and Language Integrated Learning*. Cambridge, United Kingdom: Cambridge University Press.
- [8] Goris J. A., Denessen E., and Verhoeven L. T. W. (2019). Effects of content and language integrated learning in Europe A systematic review of longitudinal experimental studies. *European Educational Research Journal*. 18, 675-698.
- [9] Kim E. G., Park S., and Baldwin M. (2021). Toward Successful Implementation of Introductory Integrated Content and Language

- Classes for EFL Science and Engineering Students. *TESOL Quarterly*. 55, 219-247.
- [10] Cenoz J., Genesee F., and Gorter D. (2014). Critical Analysis of CLIL: Taking Stock and Looking Forward. *Applied Linguistics*. 35, 243-262.
- [11] C. European, Y. S. Directorate-General for Education, and Culture. (2006). Content and Language Integrated Learning (CLIL) at school in Europe: Publications Office.
- [12] Byun K., Chu H., Kim M., Park I., Kim S., and Jung J. (2011). English-medium teaching in Korean higher education: policy debates and reality. *Higher Education*. 62, 431-449.
- [13] Dafouz E., Núñez B., Sancho C., and Foran D. (2007). Integrating CLIL at the tertiary level: teachers' and students' reactions. *Diverse contexts, converging goals: CLIL in Europe*. vol. 4, D. Marsh & D. Wolff, Eds., ed: Peter Lang Frankfurt. 91-102.
- [14] Antov P. and Pancheva T. (2017). Application of content and language integrated learning (CLIL) in engineering education. XIXth International Scientific Conference "Management and Sustainable Development. Yundola, Bulgaria. 36-40.
- [15] Nguyen T. B. N. (2019). Content and language integrated learning in Vietnam: evolution of students' and teachers' perceptions in an innovative foreign language learning system. PhD Thesis, University of Paul Sabatier-Toulouse III.
- [16] O'Cass A. and Ngo L. V. (2011). Winning through innovation and marketing: Lessons from Australia and Vietnam. *Industrial Marketing Management*, 40, 1319-1329.
- [17] Van H. V. (2013). The role of English in the internationalization of higher education in Vietnam. *VNU Journal of Foreign Studies*. 29(1), 72-80.
- [18] Coyle D. (2007). Content and Language Integrated Learning: Towards a Connected Research Agenda for CLIL Pedagogies. *International Journal of Bilingual Education and Bilingualism*. 10, 543-562.
- [19] Tamilselvi A. (2018). Smart communication app (Roach) clil for better language acquisition. *Journal of Engineering Education Transformations*. 31(4), 15-21.
- [20] Cenoz J. (2015). Content-based instruction and content and language integrated learning: the same or different?. *Language, Culture and Curriculum*. 28, 8-24.
- [21] Ouazizi K. (2016). The Effects of CLIL Education on the Subject Matter (Mathematics) and the Target Language (English). *Latin American Journal of Content & Language Integrated Learning*. 9, 110-137.
- [22] Dalton-Puffer C. (2011). Content-and-Language Integrated Learning: From Practice to Principles?. *Annual Review of Applied Linguistics*. 31, 182-204.
- [23] Unterberger B. and Wilhelmer N. (2011). English-Medium Education in Economics and Business Studies: Capturing the Status Quo at Austrian Universities. *ITL - International Journal of Applied Linguistics*. 161, 90-110.
- [24] Dearden J. (2017, 16 March). EMI (and CLIL) – a growing global trend. Available: <https://oupeltglobalblog.com/2017/02/02/emi-and-clil-a-growing-global-trend/>.
- [25] Bradley J. P. N. C. C., Cole D. R. K., and David H. P. J. (2018). From Which Point Do We Begin? On Combining the Multilateral and Multiperspectival. *J Eng Tech Movie Media*. 19, 65-93.
- [26] Zeidmane A. & Cernajeva S. (2011). Interdisciplinary Approach in Engineering Education. *Global Engineering Education Conference (EDUCON)*, 2011 IEEE. 1096-1101.
- [27] Kanoksilapatham B. & Khamkhien A. (2022). CLIL implemented and scaffolded in an EFL higher education context: Engineering research methodology course. *Indonesian Journal of Applied Linguistics*. 11, 502-514.

- [28] Paula H., David E., Harri E., Jorg W., & Juha V. (2012). Development and analysis of a professional-oriented CLIL model for university level mechanical engineering education. SEFI 40th Annual Conferences - European Society for Engineering Education, Thessaloniki, Greece. 146-147.
- [29] Moncada-Comas B. and Block D. (2021). CLIL-ised EMI in practice: issues arising. The Language Learning Journal. 49, 686-698.
- [30] Aguilar M. and Rodríguez R. (2012). Lecturer and student perceptions on CLIL at a Spanish university. International Journal of Bilingual Education and Bilingualism. 15, 183-197.
- [31] Tri D. H. (2021). Ideologies of English-medium instruction in Vietnam. World Englishes. 1-17.
- [32] Huy N. V., Van K. V., and Le H. P. N. (2021). English as medium of instruction in Vietnam higher education: A study of students' attitudinal aspects from disciplinary perspective. Journal of Social Sciences and Humanities. 130.
- [33] Galloway N. and Sahan K. (2021). An investigation into English Medium Instruction in higher education in Thailand and Vietnam. British Council.
- [34] Hoang T. N., Tran T. L., and Nguyen N. (2019). Teaching English for 5th grade student in primary school via science topics on approach of STEM education: a case study of learning outside school activities. HNUE Journal of Science. 63, 61-69.
- [35] R. Shadish W., Cook T. D., and Campbell D. T. (2002). Experimental and quasi-experimental designs for generalized causal inference. Boston, MA, US: Houghton, Mifflin and Company.