

Article

Survey of English Use and Coping Strategies in Discipline-Specific University Courses in Taiwan

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Abstract

Before enacting a full implementation of English Medium Instruction (EMI), instructors have made attempts to integrate English as a component of instruction in discipline-specific university courses in Taiwan. However, little is known about the implementation of this practice. The purpose of this study was to investigate the extent to which English was used in discipline-specific university courses, what reading strategies students used to cope with their language challenges, and what techniques instructors used to support students' reading. Data were drawn from a survey of more than 2,600 freshmen and sophomores, regarding their learning experiences in discipline-specific courses, in six colleges of one comprehensive university in Southern Taiwan. The results showed that the majority of students could not understand required reading of English textbooks or complete reading assignments. Lecturing in English and answering exam questions in English were not widely practiced. Although reading English textbooks was still challenging to students, the ways teachers helped students and how students read on their own were reported, as food for further thought. Study findings support recommendations for ways in which EFL practitioners, subject instructors, and curriculum designers can take into account students' English needs in their content courses.

Keywords

English textbooks, lecturing in English, assessment in English, reading strategies, teaching techniques

1 Introduction

In Taiwan, as well as other Asian regions, the citizenry's overall proficiency in English as a lingua franca has been a main indicator of overall development in terms of promoting its internationalization and competitiveness. Thus, English use has increased in professional and academic communications (A. Cheng

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& Anthony, 2014). In the Challenge 2008: National Development Plan to be implemented in the period 2002-2007, the Ministry of Education (MOE) encouraged tertiary institutions to provide discipline-specific courses using English Medium Instruction (EMI) (MOE, 2002). The government extended this educational policy in the plan Bilingual Nation by 2030 (National Development Council, 2018).

Prior to full implementation of EMI, instructors may partially employ English in discipline-specific courses by using English textbooks with some lecturing or all lecturing in English. Also, instructors may lecture in English or in Chinese with some code-switching (Mak, 2018). Other approaches include administering discipline-knowledge exams in English; requiring students to write reports, proposals, abstracts, and journal articles in English; and having students prepare oral English conference presentations.

Instructors adopt English textbooks not only to enforce the government policy but also to provide students with up-to-date information, which is almost always published in English. However, in addition to having difficulties comprehending EMI lectures, students are often not ready to read English texts with the same level of comprehension as that of native English speakers, for whom they are written (Cheng, 2010). Hung and Good (2016) reported widespread English textbook use but low levels of students' comprehension. Current courses of English for general academic purposes may not include the specific language skills needed in particular disciplines (Hassan et al., 2019). Hence, ways to support learners' ability to comprehend English in discipline courses warrant further exploration.

To address the issue, current practices of English use in discipline-specific courses need to be examined, in order to determine instructional strategies being implemented and suggest additional ways to meet students' needs. Therefore, this study is an investigation of the extent to which, as well as how, English textbooks, lectures, and assessments have been used and the learning and instructional strategies have been adopted by students and content teachers at one comprehensive university in Southern Taiwan. The following research questions are addressed:

1. How is English used in the target discipline-specific courses in terms of medium of instruction, language of reading materials, and language of examinations?
2. What strategies do students use to read English language materials?
3. What techniques do instructors use to present content in the English language?

Understanding the current situation of English use in university discipline-specific courses is the first step in encouraging students, discipline-specific instructors, and EFL instructors to adopt practices that will lead to more effective use of English in such courses. In this process of seeking understanding, possible teaching techniques and learning strategies can be identified and provided as references, if any, for content teachers and English for Special Purposes (ESP) instructors to help learners to cope with language challenges and reap the benefits from immersion in the target language.

2 Review of the Literature

Learners' needs refer to the support they need in order to achieve (Hutchinson & Waters, 1987) within the demands of a target situation (Benesch, 2001). Therefore, as Brown (1995) has pointed out, it is vital to conduct needs analyses in order to systematically collect and analyze the information "necessary to define and validate defensible curriculum purposes that satisfy the language learning requirements of students" (p. 36). In relation to such analysis, the literature relevant to the use of English use in discipline-specific courses is reviewed below.

2.1 English use in discipline-specific courses

2.1.1 Use of English reading materials

Reading is one of the most important skills university students need in order to fulfill their academic

literacy requirements (Bilikozen, 2018). For L2 learners experiencing EMI practices, reading to learn presents particular challenges to academic success at the tertiary level (N. J. Anderson, 2014; Celce-Murcia, 2001). Thus, becoming proficient in reading English language materials is considered a top priority for EFL/ESL university students (Liu et al., 2011).

While the volume of reading varies across majors, it is generally high, particularly for ESL students in USA. Anderson, N. J. (2015) surveyed 157 students across five majors in 30 institutions with regard to the amount of weekly reading assigned in the first course in their selected majors and found that it ranged from about 38 to 85 pages. The highest average number of pages was reported by Business majors (84.74 pages), which was not statistically different from that reported by the next highest, Psychology majors (61.21 pages), but did differ significantly from the average numbers reported by Biology majors (44.52 pages), Engineering majors (41.68 pages), and Computer Science majors (37.5 pages). Among faculty expectations of students' reading, the top three were facilitating their understanding of course content, supporting their application of new knowledge, and preparing them for lectures or labs. The author recommended helping students become strategic readers by providing opportunities for them to practice reading in discipline-specific genres and develop strategies for dealing with extensive reading. In a subsequent study, Hartshorn et al. (2017) investigated the amount of reading across majors from the first-year to upper-division major courses and found similar results across majors but a significant decline in the reading volume along with an increase in reading depth from the first-year to the upper-division courses, suggesting the need for more intensive reading skills as students progressed toward graduation. In addition to explicit reading strategy instruction, ESL students needed ongoing linguistic support for dealing with discipline-specific vocabulary and course content.

With regard to English language reading requirements in content courses in EFL contexts, Chia et al. (1999) conducted a survey eliciting perceptions of students' English language needs from 20 faculty members and 349 students at a medical school in central Taiwan and found that 80% of the content teachers reported that at least 70% of their textbooks were in English. In a later survey of 24 faculty members and 378 students at the same medical school, Hwang and Lin (2010) found that 80% of the faculty reported that more than 50% of their course readings were in English. Moreover, whatever the amount of English reading assigned in class, students generally did not complete it, as exemplified by Huang's (2006) finding that only 26.48% of students completed all assigned readings in English. Huang (2006) and Chia et al. (1999) suggested that some students might have stopped reading, whereas others might have used Chinese translations as an alternative or resource to help them read the English textbook.

Similarly, Hung and Good (2016) investigated the use of English textbooks by 1,098 freshmen at the same university as in the current study, though no data were shared between the studies. The results indicated that more than 80% of the students had one or more courses using English textbooks, but only half of them completed at least 60% of the required readings, and only half of these reported that they could understand the readings. These findings showed that while English textbooks were in widespread use across the university, the students reported low rates of comprehending them, which provided the impetus for the current investigation involving a larger sample of freshmen and sophomores and expanding the scope of the inquiry to look at areas other than textbook use.

2.1.2 Medium of instruction and examination

In comparison with reading, English is used as the language of instruction and examinations to a far lesser extent. Chia et al. (1999) found that all of the 20 instructors in their study presented all of their course lectures in Chinese but gave medical terms in English, that is, they code-switched using English only minimally. Chang (2010) found that English was used as the medium of instruction more than 90% of the class time in fewer than 20% of 12 putative EMI courses taken by 370 sophomores and seniors in the College of Management, the College of Engineering, and the College of Informatics at a private

Taiwanese university. Despite their moderately positive attitudes toward the EMI courses and their language improvement outcomes, the students expressed difficulty in comprehending English lectures.

With regard to writing, about 40% of the faculty in Hwang and Lin's (2010) study required their students to give answers in English on written exams. When asked about writing reports in English, 29.2% of the faculty, 58.7% of the upper-class students, and 37.4% of the lower-class students reported writing reports in English, indicating the students' need for some English writing ability to fulfill course requirements. Alsamadani's (2017) study of 200 engineering students and 25 ESP and subject-matter instructors in Saudi Arabia found that only 3% of class time was allocated to writing activities. The instructors identified reading as the most important English skill and speaking and writing skills as least important, which resulted in the students' perceptions of improvement of their English writing as their most important target need, particularly for writing field-specific reports and writing for class quizzes and exams.

Thus, previous studies have indicated that the greatest emphasis in EMI has been on the use of content textbooks written in English, whereas lecturing and administering tests on content knowledge in English are still practiced to a less extent. Even though English reading has been the focus in ESP and content courses, students continue to struggle with it (Boakye & Mbong, 2016; Hung & Good, 2016).

2.2 Challenges and reading strategies

Anderson, N. J. (2015) identified three challenges associated with L2 English reading: the students' lack of ability to comprehend discipline-specific genres, their lack of motivation, and their inability to be strategic readers. Students' lack of readiness to read content textbooks in English is an important issue (Cheng, 2009, 2010). While the use of English textbooks begins in the first year of university studies, the level of English acquired by general and vocational high school graduates does not prepare them to learn from textbooks written in English, as shown by freshmen's English language proficiency and vocabulary knowledge. At one medical university in Taiwan, Cheng (2009) found that 209 freshmen tested below the level of ninth graders in an English-speaking country in terms of English vocabulary knowledge, which plays a vital role in successful reading, particularly college level textbooks, which are usually written at Grade 13 level or above (Singer & Donlan, 1989). In another study, Cheng (2010) found that around 80% of 247 freshmen at a Taiwanese medical school scored below Grade 9 in an evaluation of their cognitive reading readiness and concluded that the college level English textbooks they were required to read were far above their current ability. Similarly, Hsu (2014) found that while knowledge of the 5,000 most frequent English word families was needed for EFL engineering majors to comprehend English textbooks in their field, students in Taiwan secondary schools learned only 2,000 English words.

Boakye and Mbong (2016) found that the reading challenges of first-year sociology students were in cognitive-oriented areas such as vocabulary, comprehension, and conceptualization. Also, affective issues and quantity and length of reading were indicated. The students usually consulted dictionaries for unfamiliar vocabulary, which made reading slow, laborious, and boring. After initially expecting instructors to guide them step by step as in high school, they realized they were expected to be autonomous learners at the tertiary level but lacked independent reading skills. The researchers recommended that they be explicitly taught reading strategies and provided frequent and constructive feedback. In the same vein, Ruegg and Naganuma (2019) found three sub-skills that were significant predictors of the overall reading comprehension proficiency of students at an EMI university in Japan: language comprehension proficiency, high-frequency vocabulary knowledge, and mid-frequency vocabulary knowledge.

These and related studies indicate that many college students are under-prepared for independent English reading, primarily because of lack of reading strategies and inadequate vocabulary knowledge, which usually lead to low motivation for reading. Research is needed to determine how students cope with their reading difficulties other than by relying on dictionaries.

2.3 Teaching techniques

To address the above-mentioned challenges, researchers have recommended the explicit teaching of reading strategies and vocabulary. Boakye and Mbong (2016) advised providing scaffolding, such as giving students a summary prior to reading so they have an initial understanding and background information. Another strategy for supporting both language and discipline content learning is translanguaging, which involves explaining new concepts in students' home language, so they understand the English terms for the concepts while reading. Mak (2018) found that judicious use of Chinese in EMI courses in Hong Kong enabled students to better comprehend course content and express complicated ideas, which motivated them to actively participate in class and engage in collaborative learning. Atai and Fatahi-Majd (2014) explored Iranian ELT and subject area instructors' teaching, both of whom were in an EAP program, and concluded that ELT instructors implemented activities for developing reading strategies, while subject teachers emphasized learning subject-specific terminology.

Although reading strategies and vocabulary instruction are highlighted in reading research, they are not often put into practice in classroom settings. For example, Alimorad (2019) found that four Iranian ESP reading teachers were not teaching metacognitive strategies for reading comprehension but rather utilizing a skill-based approach. They taught reading through translating the texts for the students, giving definitions, discussing factual meanings, and explaining grammatical structures. Likewise, for vocabulary instruction, they focused on defining words and phrases instead of teaching vocabulary learning and coping strategies.

Most studies have focused on courses in which EMI was fully implemented and have been limited by small numbers of participants. Although some shed light on coping strategies, few investigated how students and instructors dealt with challenges of English use in real content course contexts. To examine a broader range of majors, the present study involved more than 2,600 freshmen and sophomores with various majors at a comprehensive university. As the research questions indicate, we were interested in the amount of English reading materials used and of the English lecturing to which students were exposed, as well as whether their mid-term exams were written in English. We also aimed to identify students' reading strategies and instructors' teaching approaches.

3 Method

Data were elicited via an online survey for freshmen and a paper survey for sophomores. The following subsections provide a brief description of the participants, survey instrument, and methods of data collection and analysis.

3.1 Participants

Table 1

Participants

| | Freshmen | | Sophomores | | Total | |
|-------------------|----------|------|------------|------|-------|------|
| | N | % | N | % | N | % |
| School Population | 1,895 | 100% | 1,909 | 100% | 3,804 | 100% |
| Surveys Completed | 1,649 | 87% | 1,028 | 54% | 2,677 | 70% |
| Valid Surveys | 1,281 | 68% | 932 | 49% | 2,213 | 58% |
| Invalid Surveys | 365 | 19% | 96 | 5% | 461 | 12% |

Participants in this study were freshmen and sophomores in six colleges of one comprehensive university

in Southern Taiwan. Table 1 shows that 2,677 of the 3,804 targeted students participated in the study. After incomplete or otherwise invalid surveys were discarded, a total of 2,213 were included in the analysis. Proportionately, participants were distributed as follows: Teachers College (14%), Humanities and Arts (14%), Management (18%), Agriculture (20%), Science and Engineering (22%), and Life Sciences (12%).

3.2 Survey instrument

The questionnaire used in this study was adapted from Hung and Good's (2016) study of English textbooks in university discipline-specific courses. Students responded to questions in Chinese, providing information about their majors, courses that adopted English textbooks, instructors' expectations concerning textbook use, textbook use in class and outside of class, instructors' techniques for presenting content, English lecturing in class, and use of English in assessment.

The main modifications concerned the focus on the use of Chinese or English in classroom activities, their estimated proportions of class time using each language, the support they received, and their strategies for dealing with English. For example, Item 11 asked how much of the class was taught in English. For Item 13, "How does your professor help you understand the English version textbook in class," various options were listed, from which students selected any number relevant to their experiences, or they could list their own in the "other" option. Item 23, which elicited the strategies students used outside of class when they did not understand the reading, also listed a variety of reading strategies based on the researchers' experiences and observations, from which respondents could choose any number as well as add their own.

3.3 Data collection and analysis

The survey was administered online to freshmen and on paper to sophomores as a required part of their evaluation in their English for General Purposes (EGP) courses, which encouraged a high participation rate. The resulting large sample size can be reasonably assumed to reflect the discipline-based English language practices at the university. After invalid questionnaires were filtered out, numbers and percentages of responses were tabulated using Excel and analyzed for differences between freshmen and sophomores and among colleges. Students' reading strategies and instructors' teaching techniques were ranked in order of frequencies.

4 Results

4.1 English use in discipline-specific courses

4.1.1 English textbooks use

English textbooks were found to be in widespread use at the university. As Table 2 shows, 77% of freshmen and 78% of the sophomores reported having at least one course with an English textbook, and most had two or more, with some having up to as many as five within that semester.

Table 2

Number of Discipline-Specific Courses Adopting an English Textbook

| | Freshmen | | Sophomores | |
|---|----------|-----|------------|-----|
| | N | % | N | % |
| 0 | 294 | 23% | 206 | 22% |
| 1 | 107 | 8% | 177 | 19% |

| | | | | |
|--------|------|------|-----|------|
| 2 | 285 | 22% | 168 | 18% |
| 3 | 296 | 23% | 130 | 14% |
| 4 | 263 | 21% | 130 | 14% |
| >5 | 36 | 3% | 121 | 13% |
| Totals | 1281 | 100% | 932 | 100% |

As shown in Table 3, percentages of students reporting use of at least one English textbook in a course differed across the colleges. Teachers College and Humanities and Arts students reported the lowest percentages, 25/36% and 48/38% respectively, suggesting that the majority of courses in these fields used no English texts at all. Students in the other disciplines all reported high percentages of courses using at least one English text, ranging from 78% (Agriculture sophomores) to 97% (Management freshmen and Life Sciences sophomores). These results indicated that courses in technical disciplines are more likely to use reading materials written in English.

Table 3

Distribution of Courses with at Least One English Textbook in the Six Colleges

| | Freshmen | Sophomores |
|-------------------------|----------|------------|
| Teachers College | 25% | 36% |
| Humanities and Arts | 48% | 38% |
| Management | 97% | 86% |
| Agriculture | 86% | 78% |
| Science and Engineering | 95% | 95% |
| Life Sciences | 93% | 97% |
| Totals | 77% | 78% |

Tables 4 and 5 show students' estimates of the amounts of assigned reading in English language textbooks they completed and how much they understood. As seen in Table 4, freshmen reported higher levels of completing reading assignments than sophomores. While 44% of the freshmen said they read at least 60% of the required reading, only 27% of the sophomores did so. Conversely, 27% of the freshmen and 47% of the sophomores reported completing 40% or less of the assigned reading.

Table 4

Percentage of Assigned English Textbook Reading Completed by Students

| | Freshmen | | Sophomores | |
|----------|----------|------|------------|------|
| | N | % | N | % |
| 81%-100% | 162 | 16% | 46 | 7% |
| 61%-80% | 275 | 28% | 145 | 20% |
| 41%-60% | 281 | 29% | 185 | 26% |
| 21%-40% | 147 | 15% | 169 | 24% |
| < 20% | 122 | 12% | 162 | 23% |
| Totals | 987 | 100% | 707 | 100% |

In a similar pattern, 53% of the freshmen and 33% of the sophomores claimed to understand 61%

to 100% of what they read (see Table 5). On the other hand, 16% of the freshmen and 34% of the sophomores reported understanding 40% or less of what they read. Taken together, these two results reveal an unexpected decline in students' ability to cope with texts written in English between their freshman and sophomore years though a longitudinal study needs to be conducted to support this claim.

Table 5
Percentage of English Textbook Understood

| | Freshmen | | Sophomores | |
|----------|----------|------|------------|------|
| | N | % | N | % |
| 81%-100% | 158 | 16% | 48 | 7% |
| 61%-80% | 364 | 37% | 182 | 26% |
| 41%-60% | 308 | 31% | 236 | 33% |
| 21%-40% | 106 | 11% | 151 | 21% |
| <20% | 51 | 5% | 90 | 13% |
| Totals | 987 | 100% | 707 | 100% |

4.1.2 Medium of instruction

Table 6 shows students' reports of the extent to which instructors lectured in English in the course in which they experienced the highest usage of an English textbook. Overall, the reported percentages of English lecturing were lower than those of English textbooks. For those reporting only one textbook in English, 32% of the freshmen and 51% of the sophomores experienced less than 20% English lecturing. Among those reporting the three highest percentages of English lecturing, freshmen reported more English lecturing than sophomores, and for the top two ranged more than twice as much. The finding that freshmen overall reported notably higher levels of English medium instruction was unexpected.

Table 6
Percentage of Lecturing in the Course Using English Textbook Most

| | Freshmen | | Sophomores | |
|----------|----------|------|------------|------|
| | N | % | N | % |
| 81%-100% | 145 | 15% | 50 | 7% |
| 61%-80% | 163 | 17% | 48 | 7% |
| 41%-60% | 213 | 22% | 91 | 13% |
| 21%-40% | 148 | 15% | 160 | 22% |
| <20% | 318 | 32% | 358 | 51% |
| Totals | 987 | 100% | 707 | 100% |

4.1.3 Language of examinations

Table 7 shows the extent to which a major assessment (i.e., the midterm exam) was administered and/or required to be written in English. The results indicated that 90% of the freshmen and 86% of the sophomores had a midterm exam administered partially or completely in English.

Table 7

Midterm Exam Administered in English

| | Freshmen | | Sophomores | |
|------------|----------|------|------------|------|
| | N | % | N | % |
| All of it | 598 | 61% | 483 | 68% |
| Part of it | 291 | 29% | 128 | 18% |
| None of it | 98 | 10% | 96 | 14% |
| Totals | 987 | 100% | 707 | 100% |

A much lower percentage of midterm exams required students to write some or all of their responses in English, though twice as many freshmen as sophomores reported this requirement: 48% for freshmen and 24% for sophomores (see Table 8).

Table 8

Midterm Exam Responses in English

| | Freshmen | | Sophomores | |
|------------|----------|------|------------|------|
| | N | % | N | % |
| All of it | 220 | 22% | 51 | 7% |
| Part of it | 258 | 26% | 117 | 17% |
| None of it | 509 | 52% | 539 | 76% |
| Totals | 987 | 100% | 707 | 100% |

4.2 Reading strategies

Table 9 shows the ranking of strategies students reported using to understand their textbooks. Unsurprisingly, note-taking in class was the most frequent response. As noted above, most lecturing was in Chinese, so the textbook content was being filtered through the teacher, who might have used techniques outlined in Table 9 to help students understand the course content. The next three most frequently reported strategies reflected the most traditional practice in second language reading: looking up words in a dictionary. Items 5 and 9 involved using a Chinese version of the English textbook either along with the English text (freshmen 23% / sophomores 24%) or instead of it (4% / 9%). Borrowing notes from senior classmates was another strategy which students used.

Table 9

Strategies Used by Students to Understand Their Textbooks

| Rank | | Freshmen | | Sophomores | |
|------|--|----------|-----|------------|-----|
| | | N | % | N | % |
| 1 | Read notes that you took in class in addition to trying to read the English textbook | 607 | 62% | 465 | 66% |
| 2 | Looked up Chinese meanings of some the words that you don't understand | 497 | 50% | 388 | 55% |
| 3 | Looked up Chinese meanings of only words that you thought might be important | 348 | 35% | 228 | 32% |

| | | | | | |
|----|--|-----|-----|-----|-----|
| 4 | Looked up Chinese meanings of all the words that you don't understand | 370 | 37% | 200 | 28% |
| 5 | Read the Chinese version of the textbook in addition to trying to read the English textbook | 230 | 23% | 169 | 24% |
| 6 | Read notes that you took in class instead of reading the English textbook | 122 | 12% | 118 | 17% |
| 7 | Read notes that you borrowed from senior students in addition to trying to read the English textbook | 180 | 18% | 109 | 15% |
| 8 | Skipped the parts that you don't understand | 83 | 8% | 64 | 9% |
| 9 | Read the Chinese version of the textbook instead of reading the English textbook | 41 | 4% | 64 | 9% |
| 10 | Read notes that you borrowed from senior students instead of reading the English textbook | 38 | 4% | 35 | 5% |

4.3 Teaching techniques

As shown in Table 10, students relied on instructors' explanations in Chinese to understand the content of their English textbooks (freshmen 73% / sophomores 75%) and important English terminology (60% / 63%). In addition, the use of PowerPoint slides in English was a highly reported technique (56% / 67%), though the use of PowerPoint slides in Chinese was not (31% / 29%).

Table 10

Instructors' Techniques for Making Textbook Content Accessible to Students

| Rank | | Freshmen | | Sophomores | |
|------|--|----------|-----|------------|-----|
| | | N | % | N | % |
| 1 | Used Chinese to explain the English content of some (or all) the textbook. | 719 | 73% | 531 | 75% |
| 2 | Used ppt slides containing important notes in English. | 555 | 56% | 474 | 67% |
| 3 | Explained important terms in Chinese. | 590 | 60% | 447 | 63% |
| 4 | Explained graphs, flow charts, or tables in the textbook in Chinese. | 490 | 50% | 423 | 59% |
| 5 | Translated content orally into Chinese. | 472 | 48% | 337 | 48% |
| 6 | Explained meanings of the content in English. | 294 | 30% | 213 | 30% |
| 7 | Used ppt slides containing important notes in Chinese. | 308 | 31% | 204 | 29% |
| 8 | Explained grammar in Chinese. | 268 | 27% | 139 | 20% |
| 9 | Explained important terms in English. | 264 | 27% | 136 | 19% |
| 10 | Explained graphs, flow charts, or tables in the textbook in English. | 249 | 25% | 110 | 16% |
| 11 | Essentially lectured in Chinese and did not refer to English textbook very much. | 197 | 20% | 100 | 14% |
| 12 | Explained grammar in English. | 156 | 16% | 37 | 5% |

5 Discussion

This investigation of the use of English in content-specific courses at a comprehensive university in Taiwan clearly confirms the widespread acceptance of English textbooks, especially in the disciplines of science, technology, and business, with less usage in humanities and arts as well as education. Students' reports of their uses of the textbooks, their ability or willingness to read them, and their levels of comprehension bring into question the effectiveness of using English textbooks in content courses. Second, the results indicated that lecturing in English was not widely practiced at the lower division levels. If EMI was an instructional goal of the university level instruction, not much was being done to make it happen in freshman and sophomore courses. Third, with regard to assessment, 90% of the freshmen and 86% of the sophomores reported that they had a midterm exam administered at least partially in English. The purpose for this discrepancy between lecturing and testing in English is not clear and suggests the need for further research. On the other hand, few students reported being required to answer exam questions in English, suggesting that reading was viewed as more important and reasonable to expect than writing in English. Fourth, students reported employing many language-related strategies to augment their limited language skills and other strategies to circumvent them. Finally, students reported that their instructors used a variety of techniques to make the content of their English textbooks accessible, indicating their awareness of their students' language limitations. Instructors' language related techniques included explaining in and translating into Chinese; a more general technique was the use of PowerPoint slides, more often written in English.

As shown in previous studies, reading is the English skill most emphasized in university discipline-specific courses (Ali & Salih, 2013), and the extent of its use varies across fields of study (N. J. Anderson, 2015; Hartshorn et al., 2017). This study showed that English textbooks were in widespread use at the target university, and business and technical disciplines were more likely to use them. This finding could be attributed to the globalization of business and the dissemination of rapid developments in science and technology mainly in English language publications. In contrast, the humanities and arts as cultural phenomena have been less affected by globalization and technology and often rely on texts and other materials unchanged over decades if not centuries.

The rates of freshmen's reading completion and comprehension are similar to those found in Hung and Good's (2016) study, in which half of the students read at least 60% of the required reading, and half of these understood the reading. However, sophomores in the present study reported less reading (27%) and comprehension (33%). These differences between the groups, indicating a decline in reading amount and comprehension, call for further investigation. Perhaps the participating freshmen, as newcomers to the university and unfamiliar with their new environment, took their instructors' requirements to read the textbook more seriously than the sophomores. The latter had already had one year of experience at the university and perhaps with some of the same teachers and older students in their departments and so might have found ways around reading their English textbooks.

As for EMI, the reported proportion of lecturing in English in this study is higher than in Chia et al.'s (1999) study of content courses in a medical school, in which all of the 20 instructors reported they presented all of their courses in Chinese, but it was still relatively low. About 32% of freshmen and 14% of sophomores in this study reported that more than 60% of their content courses were taught in English. While this finding indicates the need to investigate instructors' perspectives on the use of English for instruction and why freshmen might experience more instruction in English than sophomores, we can offer speculations. For instance, instructors may overestimate the ability of their freshman students or wish to implement EMI from the beginning, or the perceptions of students who are new to EMI and not used to any instruction in English may be different from those of students a year ahead of them.

The majority of freshmen (90%) and sophomores (86%) reported being given exams written all or partially in English for reasons that still warrant investigation, perhaps by examining actual exams and

interviewing instructors who administer exams in English. Instructors may use English in writing exams to motivate students to read English textbooks or even as a way to expose students to written English. On the other hand, only 48% of freshmen and 27% of sophomores reported being asked to give exam responses at least partially in English, which suggests that writing is less emphasized than reading in content courses in EFL contexts (Alsamadani, 2017). Also, Hwang and Lin (2010) found that English writing might be more prevalent in the medical field, which was not included in this study.

Students reported a range of strategies for dealing with their English textbooks, either directly looking up words in a dictionary or using workarounds, such as notetaking in class, using Chinese versions of the textbook, and getting notes from senior classmates; such strategies gave students access to content knowledge while avoiding problems arising from their inadequate English proficiency. While these strategies were useful for helping students achieve their goal of learning content knowledge, their range was limited. Three of the top four reading strategies entailed looking up meanings of unknown words. This reliance on dictionaries may reflect the greater use of English texts in courses with technical terminology as well as students' need to increase their English vocabulary.

The results indicated that instructors were aware of the language limitations of their students and that they adopted supportive practices, such as explaining course content and important terms in Chinese as well as English. PowerPoint slides, which many instructors made available on their course websites, provided useful summaries of important points from lectures that students could download and incorporate into their notes for the course. As suggested by Boakye and Mai (2016), giving summaries can be a useful teaching technique to provide students an initial understanding and background information. Instructors also used translanguaging as another strategy to help students understand important concepts (Boakye & Mbong, 2016; Mak, 2018). However, students may need further instruction in strategies they can use themselves (Alimorad, 2019; Atai & Fatahi-Majd, 2014) to become more autonomous readers and learners.

6 Conclusion

Whether the findings of this study conducted in one comprehensive university in Taiwan can be generalized to other sectors of the country's tertiary educational system is a question for further research, but we have confidence that our findings are broad enough in terms of sample size and range of academic fields to apply to other types of institutions. Inasmuch as this study furnishes an overview of current needs to be addressed in the areas of English reading, lecturing, and assessment, and given the likelihood that the importance of English in tertiary education in Taiwan and other EFL regions will continue to increase, we make the following recommendations to program administrators.

First, EFL professionals and language centers need to provide additional basic English instruction and support to give all students a firm foundation on which to build the language skills needed in their discipline-related courses. We understand the challenges of the extra workload for students if English course requirements are increased when there are competing demands in the majors. Needs analyses and realistic language-related goals for students in the various colleges should inform the process of setting priorities (Ali & Salih, 2013; Hassan, Ghani, Wasood, & Saba, 2019).

Second, EFL curricula need to expand to include more offerings in English for Academic and for Special Purposes (EAP and ESP) that provide more advanced language instruction beyond the basics (Arnó-Macià et al., 2020). These could be offered as elective courses which content instructors could strongly encourage their students to take in accordance with their needs.

Third, reading strategies and vocabulary instruction should be incorporated into ESP courses and discipline-specific courses. Students need to learn strategies that help them become analytical and critical readers who decipher meaning from texts, such as by identifying main ideas and supporting details, paraphrasing and summarizing, extrapolating and evaluating arguments, and working with numerical

and visual as well as linguistic forms of information (J. C. Anderson, 2000; Boakye & Mbong, 2016; Cliff et al., 2007). To reach the vocabulary coverage of 95% considered the threshold for reasonable comprehension (Laufer, 1989), students should learn high frequency academic words and discipline-specific vocabulary (Bi, 2020; Hsu, 2014).

Fourth, academic programs and content instructors need to make their reading instruction explicit and communicate concrete and realistic goals, such as the goal of learning to extract main ideas from texts rather than look up every unknown word, which interferes with comprehension and demotivates students (N. J. Anderson, 2015). Sterzik and Farser (2012) argue that “in order to teach students how to read, teachers need to be able to articulate what is required, but more importantly how to do it” (p. 104).

Lastly, disciplines emphasizing the use of English have to commit to achieving their goals and fostering buy-in from their faculty. The courses about which students reported in this study appeared to incorporate a certain amount of English, but the groundwork and commitment necessary to make it effective seemed to be lacking: Students did not read very much of their textbooks; they did not understand them at a very high level; they rarely heard lecturing in English (a little code-switching was usually what they got); and even if they had to read part or all of their tests in English, they did not have to write much English. If this situation does not accommodate the goals of the academic programs, practical steps must be taken.

If English is as important as government guidelines and educational policies suggest, neither students nor instructors and program administrators should settle for practices that fall short of the goal of adequate development of English instruction. All stakeholders should insist on accountable practices to make English learning an integral part of academic learning.

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