

Impacts of discipline-specific language instruction on the academic writing of civil engineering students

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This paper examines the impact of discipline-specific language instruction on student writing in an English for Academic Purposes (EAP) course offered to civil engineering undergraduate students at a university in Hong Kong. Textual analysis of student scripts and student interviews were used to investigate the effectiveness of the course in helping students to write better Introduction and Literature Review sections for their Final Year Project reports. The great majority of students were able to produce effective texts which conform to the discourse conventions of academic writing in civil engineering. However it is difficult to separate the impact of language instruction on student writing from other influential factors. Two major pedagogical implications are drawn: the need for more scaffolding of input tasks and for more teaching of academic reading skills.

Keywords: academic writing; English for academic purposes; discipline-specific language instruction; genre analysis; Hong Kong

Introduction

Many teachers and scholars working in the field of second language writing instruction have argued that as there are striking differences in language use across disciplines, to be effective and relevant to students, writing instruction should focus on analysing genres and instructing students in language features that are specific to an identified discipline (Fitzpatrick & Costley, 2017; Hyland, 2002, 2011, 2017). Such an instructional approach generally starts with an analysis of the needs of the student (Belcher, 2006) and makes use of authentic texts, grouped by theme or genre (Hyland, 2007). Rhetorical consciousness-raising, where students examine and report back on the language and organizational structure of authentic texts, plays a prominent role in the classroom (J. M. Swales & Feak, 2012) and leads to students eventually producing their own texts in the target genres.

Studies in this area indicate that such discipline-specific, genre-based instruction can help students to both read and write academic texts effectively (Cheng, 2007; Hyon, 2002; Turner & Bichener, 2008; Wingate, 2012). However in contexts where language instruction is offered in parallel with content courses which use English as the medium of instruction, it is difficult to determine how far student improvement in academic writing in the discipline can be ascribed to instruction in the language course.

Storch and Tapper (2009) found that post-graduate students who received discipline-specific instruction in writing showed improvement, particularly in rhetorical structure, but speculated that this might be attributable to their exposure to academic texts in their degree studies. Similarly, Tardy (2005) found that as her students developed knowledge of the discipline, they developed a better rhetorical understanding of texts. Wette and Hawken (2016) reported that a short course in English for Medical Purposes in New Zealand had significant impact, but that it was difficult to assess how much improvement was also due to clinical experience outside the language course.

Some researchers have compared the performance of students receiving discipline-specific instruction with a control group following a general EAP course. Carsten (2009) compared the progress of students following a discipline-specific course of instruction with the majority population who followed a general EAP course. Both groups showed measurable improvement in their writing after instruction but the discipline-specific group improved more than the control group. However the small number of students in the discipline-specific group ($n=11$) and other factors, such as the requirement that students pay a supplementary fee for the discipline-specific course, limit the validity of the findings.

A larger-scale study at a community college offering sub-degree programs, attached to a university in New York, also suggests that discipline-specific language instruction leads to superior outcomes compared with general EAP courses (Song, 2006). This study divided 770 ESL students into two equally sized groups. The control group followed a general EAP course while students in the other group were further divided into groups following discipline-specific courses. Students taking discipline-specific courses performed significantly better than the control group in the language proficiency exit tests from the college, and those who continued to degree programs at the university also maintained a higher GPA than the control group. Song concedes that other factors may have been influential, particularly the element of self-selection for those joining the discipline-specific group, and that the students often went on to form study groups which supported their academic studies through their degree programs.

These studies indicate that discipline-specific, genre-based instruction has a positive impact on student performance but that results have to be regarded with caution in contexts where improvement could be ascribed to multiple influential factors.

The study

Context

Educational reforms in the tertiary sector in Hong Kong have transformed undergraduate university education from a three-year to a four-year system (see Hyland, 2017 for a detailed account of this process). In response to these changes, the English language curriculum for students at the university where the study took place has been restructured (Figure 1).

This study examines the impact of one of the third-level, subject-specific courses offered to final year undergraduates in the Department of Civil and Environmental Engineering, which adopts a genre-based approach, focusing on tasks and texts specific to civil engineering. The undergraduates are nearly all local Hong Kong students and native Cantonese speakers, with a few students coming from the Chinese mainland

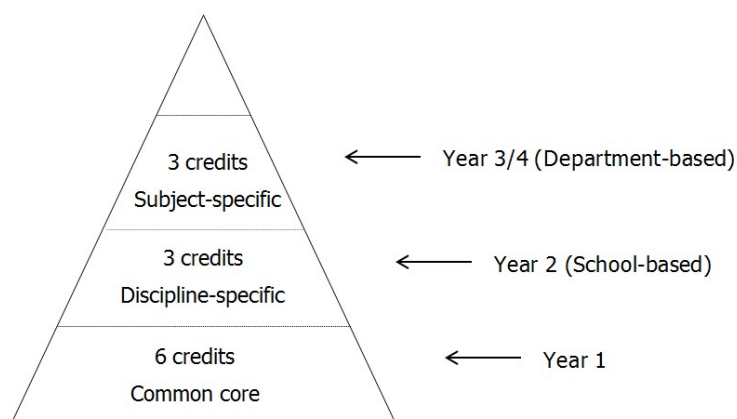


Figure 1. *New Structure of English language curriculum*

Discipline-specific instruction in the course

The students are all working on their Final Year Project (FYP), a major milestone in their degree program and a graduation requirement. A main focus of the course is teaching students how to write their FYP reports. Helping students to write this report is complicated by the fact that the discipline includes diverse subject areas, with a range of FYP topics (e.g. environmental, structural, and geotechnical) and text types (e.g. reviews, reports on experimental data, and accounts of software development).

Reports on such projects differ quite considerably from each other, but common features of all FYP reports are the Introduction and Literature Review. For this reason, the writing of the Introduction and Literature Review was chosen as the main academic writing assignment in the course. The content of the assignment was drawn from the FYP, and this piece of writing formed the first draft of the Introduction and the Literature Review for the FYP report for the students' department. Instruction for this task was given in class, while the writing was completed out of class and submitted via Turnitin. Students were required to write between 800 and 1,200 words.

Authentic texts were used as input materials, mainly examples of introductions and literature reviews in published papers, and text analysis was a major component of instruction (see Appendix 1 for an example of a text analysis task used in the course). IN addition to searching for relevant materials, engineering faculty were used as specialist informants (as proposed by Hyland, 2017), supplying information and input materials. FYP reports are generally much longer than journal articles, the samples collected range from 5,000 to 13,000 words. The FYP reports require students to write the introduction and literature review as separate sections, unlike journal articles which tend to subsume the review of literature into the introduction. However journal articles provide input in a genre relevant to the students' writing, at a manageable length to fit into an 80-minute lesson. Given the range of topics within the discipline, articles had to be chosen which were discipline-specific but comprehensible to all students. This avoided focusing on a very restricted range (a potential problem flagged by Basturkmen, 2010) but ran the risk that students might not always see the relevance of the materials to their project.

The writing of the literature review was expected to be more challenging for the students than the introductions, which are comparatively simpler and more familiar. The literature review requires students to construct a coherent argument, which summarizes

groups and evaluates the work of others, using an appropriate rhetorical structure (Turner & Bichener, 2008). Kakh, Rasid, Kalatehjari, Ali, and Mansor (2014) found that research articles by students of geological engineering tended to omit the critical evaluation of past research in relation to current research found in journal articles in the field and often simply provided summaries of past methodologies. In addition to using appropriate language, students need to position themselves in relation to experts within their discourse community and to critique their work which is a challenging role for novice engineers.

Studies of the impact of discipline-specific language instruction on university students in Hong Kong are few in number. This study aims to add to the body of knowledge about the impact of discipline-specific instruction, guided by the following research questions:

1. What is the impact of discipline-specific instruction on student writing of the Introduction and Literature Review of a Final Year Project Report?
2. How do students approach the writing of these sections of the report?

Methodology

Textual analysis and student interviews were employed to evaluate the impact of the course on student writing and to discover how students approach the writing of the report. Textual analysis focused on 30 student assignments (31,197 words in total) which were selected from a total of 150 scripts. The scripts had already been graded by the class instructors, using standard rubrics, following a standardization meeting in which instructors marked sample scripts together, and the marks had been inputted to the course database. Thirty scripts were then collected, including the 10 scripts with the highest grades (H), 10 scripts from the middle of the cohort (M) and the 10 lowest ranking scripts (L).

Analysis of the context, purpose and staging (moves and steps) of student writing involved the two researchers analysing each text separately and then discussing the texts to reach a consensus. The lexico-grammatical features of the students' texts were analysed using a multi-dimensional approach (Biber, 1988), which is used to reveal how people vary their language in response to communicative needs. The Multidimensional Analysis Tagger (Nini, 2015), a digital tool available on the internet, was employed to evaluate how effectively the students could make use of the appropriate academic language features in their reports.

Individual interviews were held with three of the students, all of whom were local Hong Kong Cantonese-speakers and individually representative of the three levels (H, M, L). The three selected were the only ones who replied to the researchers and were willing to be interviewed at a very busy point in their studies. The students were asked how they wrote their Introduction and Literature Review assignment, re-reading sections of their work on the spot and answering specific questions in a 1-hour discussion in Cantonese (see Appendix 2 for interview questions). This discussion was recorded and then transcribed into English and content analysed.

Analytical framework

The analytical framework used for textual analysis, based on the Swalesian tradition of genre analysis, operates at the macro and micro levels. At the macro level, the rhetorical organization of a text was analysed in terms of moves and steps. The micro level

analysis focused on the way certain lexico-grammatical features (e.g. first-person pronouns and nominalizations) were used in the students' assignments.

In order to analyse the rhetorical organization of student texts, Swales' (1990) Create a Research Space (CARS) Model was adapted to allow for the separation of the literature review from the introduction in the student assignments. The moves and steps for the Introduction section are summarized in Figure 2.

Move 1 Establishing a territory
Step 1 State importance of topic
Step 2 Summarize current state of knowledge
Step 3 Define key terms (optional)
Move 2 Establishing a niche
Step 1A Indicating a gap OR Step 1B Adding to what is known (continuing a tradition)
Move 3 Occupying the niche
Step 1 Announce present research
Step 2 State research/project objectives
Step 3 State contributions
Step 4 Outline article structure

Figure 2. Stages of the introduction (adapted from John M. Swales, 1990)

The CARS model was also adapted, with reference to Kwan's (2006) analysis of the literature review, Kanoksilapatham's (2015) analysis of journal articles in civil engineering and our observations of the typical features of literature reviews in civil engineering FYP reports, to create a model for analysing the literature review section of the students' assignments (Figure 3).

Move 1 Presenting an overview of the review
Step 1 Summarise main areas to be covered
Move 2 Summarising and reviewing current research
Step 1A Review current research by themes OR Step 1B Review current research chronologically OR Step 1C Review current research using another suitable structure
Move 3 Connecting current research with the topic
Step 1 Re-state the niche of project
Step 2 State how researching this topic will contribute to current research

Figure 3. Stages of the literature review
(adapted from Kanoksilapatham, 2015; Kwan, 2006; John M. Swales, 1990)

Results and Discussion

The objective of this study was to examine the impact of a discipline-specific EAP course on senior undergraduates' academic writing. In this section, to address the first

research question, the moves, steps and lexico-grammatical features identified in the students' assignments are analysed and the course survey results are discussed. Student interview results are examined to address the second research question.

Results of textual analysis: moves and steps

A comparison of the moves and steps in the introduction section of the reports of high- (H), medium- (M) and low-performing (L) students shows some interesting features (Table 1). Most of the students were able to apply their knowledge of the typical organization of this sub-genre to their own writing. In fact, the great majority of the H scripts included all the moves and steps expected in an introduction, though some made slight changes to the typical organization, e.g. putting Move 3 at the end of the literature review. Similarly, most of the M scripts included all the moves and steps expected in an introduction. However, unlike the H scripts, the M scripts tended not to vary the sequence of the moves. The L scripts missed some key moves in the introduction; in particular, 50% of them missed Move 2 by failing to carve a niche for their research projects. This omission may seem to be a serious flaw for an academic introduction, but the students were novice researchers who may not yet have a clear idea of the gap that their project is intended to fill. In brief, omission of Move 2 from an academic introduction may be ascribed to lack of familiarity with the content area.

Table 1. Structure of the introductions for the students' texts

	H scripts *	M scripts *	L scripts *
Move 1 Establishing a territory			
Step 1 State importance of topic	10	8	8
Step 2 Summarize current state of knowledge	7	8	7
Step 3 Define key terms (optional)	3	2	1
Move 2 Establishing a niche			
Step 1A Indicating a gap or	9	10	5
Step 1B Adding to what is known (continuing a tradition)	1	0	0
Move 3 Occupying the niche			
Step 1 Announce present research	8	8	6
Step 2 State research/project objectives	8	8	7
Step 3 State contributions	8	8	3
Step 4 Outline article structure	7	5	4

* The number of scripts with at least one instance of a particular move or step.

Table 2 summarizes the structuring of the literature review section in the scripts. While all the scripts included Move 2, only some included Move 1 and Move 3. These latter two moves orient the reader to the literature review and summarize the review respectively, and are arguably less crucial than the review itself. However, use of these two moves helps authors improve the communicative quality of their writing. Thus, it is not surprising that they were employed more frequently by the high-performing students than the average- and low-performing students.

Table 2. Structure of the literature reviews for the students' texts

	H scripts	M scripts	L scripts
Move 1 Presenting an overview of the review			
Step 1 Summarise main areas to be covered	7	8	4
Move 2 Summarising and reviewing previous research			
Step 1A Review current research by themes OR	6	4	3
Step 1B Review current research chronologically OR	1	3	1
Step 1C Review current research using another suitable structure	3	3	6
Move 3 Connecting current research with the topic			
Step 1 Re-state the niche of project	6	4	1
Step 2 State how researching this topic will contribute to current research	5	3	2

It is important to note that inclusion of the expected moves does not guarantee that the moves are realized effectively. This is evident from the way that three students, from the H/M/L groups respectively, critiqued the literature. In the first example, a high-performing student pointed out the limitations of a previous study and supported his argument with a convincing reason, making his critique a successful one:

H2: Script

Karimi and Singer (1991) proposed that controlling nutrient inputs to drinking water sources can tremendously reduce NOMs. Nonetheless, this strategy may only be functional in drinking water disinfection, but will be difficult to implement in wastewater treatment. The reason is that NOMs in wastewater come from everywhere, so it is almost impossible to restrict the NOMs input at the source.

In contrast, medium-performing student appeared to be unfamiliar with the related studies, and his writing gave the impression that he was critiquing the literature merely for the sake of including a required move. His comments amount to no more than empty evaluation:

M2: Script

[*A model for predicting structural response is summarized.*] However, this model cannot represent the failure of joint and it is difficult to describe the bond degradation problem. Therefore, the model is unable to predict early stage hysteretic response.

In the final example, a low-performing student did not even attempt any critique: he merely summarized the literature and described what his project aimed to achieve. His review was largely descriptive:

L3: Script

Michalowski et al. (2002) carried out a study on the strength anisotropy of fiber-reinforced sand. The result shows that fibers in the direction of largest extension have the most significant effect on the strength of the sand sample, while the stiffness of the fiber decreases when the sand is subjected to compression. Our study evaluated the importance of the orientation of fiber in fiber-reinforced sand.

The above findings show that disciplinary writing courses should not aim to help students use the relevant moves and steps only; instruction should be provided on how the moves can be realized effectively. On the other hand, effective realization of the moves may require content knowledge that the students currently lack.

Results of textual analysis: lexico-grammar

The students' use of lexico-grammatical features was analysed using a multidimensional (MD) analysis framework which was first developed by Biber (1988) to investigate linguistic variation across registers or genres. According to this framework, sets of linguistic features co-occur in specified groups of texts, and thus studying any one linguistic feature is not sufficient to identify the differences among them. Five dimensions were identified in Biber (1988), but only four of them are relevant to this study. These four dimensions are summarized in Table 3.

Table 3. Four major language dimensions (based on Biber, 1988)

Dimensions	Linguistic features	Characteristic registers
D1: Informational vs involved production	private verbs, THAT deletion, contractions, present tense verbs, second person pronouns, DO as a pro-verb, demonstrative pronouns, etc.	conversations, personal letters, official documents, academic prose
D2: Narrative vs non-narrative concerns	past tense verbs, third person pronouns, perfect aspect verbs, public verbs, etc.	fiction, expositions, broadcasts
D3: Explicit vs situation-dependent reference	wh-relative clauses, phrasal coordination, nominalizations, etc.	official documents, professional letters, conversations, personal letters
D4: Abstract vs non-abstract style	conjuncts, agentless passives, past participial clauses, by passives, adverbial subordinators, etc.	technical prose, fiction, public speeches

Table 4 presents the results of the MD analysis, with each score representing the mean score for the scripts in the H, M or L category. In addition, scores for general academic prose obtained by Biber (1988) are included for comparison purposes. The scores in Table 4 were interpreted following the guidelines presented in Table 5.

Table 4. Results of MD analysis

	Mean				Text type
	Dimension 1	Dimension 2	Dimension 3	Dimension 4	
H1 – H10	-20.09	-3.72	9.97	8.66	Scientific exposition
M1 – M10	-19.30	-4.02	11.26	7.01	Scientific exposition
L1 – L10	-17.02	-4.25	8.92	7.40	Scientific exposition
General academic prose (from Biber, 1988)	-14.90	-2.60	4.20	5.50	N.A.

Table 5. How MD analysis data is interpreted (based on MAT Manual, n.d.)

Dimension	Score interpretation
D1	Low scores mean the text is informationally dense. High scores mean the text is affective and interactional.
D2	Low scores mean the text is non-narrative. High scores mean the text is narrative.
D3	Low scores mean the text is dependent on the context. High scores mean the text is context-independent.
D4	High scores mean the writing is technical, abstract and formal. Low scores mean the opposite.

On Dimension 1, the mean scores for the H, M and L scripts are low (lower even than those in Biber's (1988) study). This shows that all the scripts are informationally dense. On Dimension 2, the mean scores for the H, M and L scripts are very low (lower than in Biber's study). This implies that all the scripts used a non-narrative style suitable for the assignment.

On Dimension 3, the mean for each category of scripts is high (considerably higher than Biber's). This suggests that the scripts all tended to be context-independent in meaning. On Dimension 4, the average scores are again high (also higher than Biber's). This shows that the scripts use language features typically associated with technical, abstract and formal writing. In the following example from one of the scripts, the writing is informational (e.g. numerous nouns and no first-person pronouns), context-independent (e.g. many nominalizations) and abstract (e.g. agentless passives and conjuncts):

H3: Script

Reinforced concrete has been widely used in construction due to its cost-effectiveness and ease of construction. It provides desirable mechanical properties while maintaining design flexibility for structural engineers. However, reinforced concrete's durability remains questionable. When concrete starts cracking, its water permeability increases significantly.

The MD Analysis Tagger also analysed the input text to determine whether it is close to any of Biber's (1989) text types. The results indicate that overall, the scripts across the H, M and L categories all resemble "scientific expositions" (i.e. informational expositions that are formal and very technical). As this was the target text type taught in the course, it can be said that students were able to apply what they had learned to their assignments.

Results of student interviews

Two themes emerged from the interviews conducted with three students (H8, M8 and L8). The first theme concerns students' approaches to the writing of their assignments. H8, a high-performing student, turned to the course book to revisit the writing suggestions. He then turned to the teaching assistants of his department for help, requesting references for his project and advice on writing about technical content. He searched for additional online sources, evaluated them, and finally synthesized all the information in his report. In contrast, M8, an average student, relied mainly on sample reports written by past students provided by his professor. He extracted key information from the report abstracts, but did not read the whole texts. L8, a weaker student, took yet another approach. She began with the suggested framework in the course materials, and as she started writing, she looked for content from research articles to fill the framework.

H8's approach seems to be the most effective. He realized that the generic textual model in the course materials was adaptable to match the requirements of his project, and took active steps to understand the specific conventions of his discipline. Guided by the suggestions he received, he modified the textual framework (e.g. by combining the introduction and literature review sections) in order to make a strong case for his project. M8 seemed to be more concerned about content knowledge. He asked for sample reports, but read the abstracts only. In this way, his understanding of his topic was limited. L8's approach constrained her in a different way. She thought that she had to follow the textual model very closely, not realizing that suitable changes could be made to suit her needs.

The three students' learning approaches shaped the quality of their assignments. H8's concern for synthesis and evaluation of the literature is reflected in the following excerpt in which he integrated two related studies and explained a shared limitation:

H8: Script

Mizuyama et al. (1988) considered the grain-trapping efficiency based on flume model experiments. They concluded that ... [*The results are summarized.*] Further studies on this area were conducted to obtain a better understanding of the grain retainage rate. For example, Lien (2003) proposed an analytic solution for the sediment outflow of a slit-structure. This study verified the observations of Mizuyama et al. (1988) ... [*Specific details are given.*] A limitation of both studies is that they were conducted by using flows with an insignificant volume of particles. It is not known if the findings may reflect the characteristics of real-life debris avalanches.

M8 had limited content knowledge, which explains why his discussion often lacked substance. In the example below, he failed to elaborate on the importance of a key finding:

M8: Script

The result of the analysis found that the SFS interaction is governed by six different aspects. This finding is particularly important for the further study or research in this field.

L8's tendency to adhere to the suggested textual model rigidly is illustrated below. She followed the suggested move structure closely, but did not seem to understand that she should explain *why* she had selected the methods for review:

L8: Script

Method I: Linear programing gradient (LPG)

Linear programing gradient was presented in 1977. Firstly, an objection function, which was a formula that indicating the total costs, would be set up. *[Further details are described in full.]*

Method II: Simulated Annealing Approach

Simulated Annealing Approach was first introduced in 1999 aimed to advance LPG. The methodology of Simulated Annealing Approach is similar to LPG. *[Further details are described in full.]*

The second theme that emerged from the interviews pertains to students' difficulties in writing their assignments, especially the literature review section. Most of these difficulties were content- rather than language-related. M8, for example, found it difficult to identify a gap for his research:

M8: Interview

"It's very difficult to find a gap. The experiments that most structural engineering students do are basically the same as past ones. The parameters are different but we follow the same procedures. So it's hard for us to identify a gap for our FYPs. Sometimes the gap identified is not really a gap. We just create one because we have to."

The students' FYP topics are assigned to them by their professors, and many FYPs are continuations of an extended research project. Thus, the students might not be familiar with the wider background knowledge around the topic or be able to see where exactly the niche of their project lies. Students are also typically required to finish their projects within a tight schedule, with little time for the literature. All this means that the task of identifying a research gap is fraught with problems, especially for weaker students. Difficulty in disciplinary reading was also mentioned by the students:

M8: Interview

"I have to find relevant research papers and identify the relationships among them. That's the most difficult part."

L8: Interview

“The literature review section was difficult as there was a lot of info to handle. I had to select the sources and then connect them to my project. ... Summarizing the previous studies was also difficult. The content of the research papers was difficult to understand.”

Most of the students were doing their first research project of this type at university, and it was natural that they found it difficult to cope with the demands for academic reading. Despite these problems, the students interviewed felt that the assignments they wrote met the requirements for an academic introduction and literature review. In fact, they submitted the same assignment, without major linguistic revision, to their department one month after the course.

Conclusion

This study has investigated the effectiveness of a discipline-specific EAP course on senior undergraduates' academic writing. The focus was on the introduction and literature review sub-genres. The first research question, concerning the impact of the course, was approached through data obtained from textual analysis. The results show that most students were able to organize their assignments using the expected moves and steps. Stronger students were able to use the expected moves and steps creatively, while others showed a tendency to take them as a template. Some weaker students omitted the move of indicating a gap not because they were unaware of its importance in an academic introduction, but because they lacked the content knowledge to include this move. MD analysis shows that most of the assignments were informational in content and technical in style, befitting the purposes of their reports. Thus, it can be concluded that the course was effective in helping students apply the target sub-genres to their writing, with stronger students being able to do this more successfully.

The small number of student interviewees made it difficult to give a thorough response to the second research question, concerning the students' approach to academic writing. However, the data sheds light on the writing process. In particular, the learning approaches identified, from seeking advice from members of the discourse community to relying on past students' samples to following the course book rigidly, seem to correlate with the relative success of the assignment. This hypothesis, however, needs to be confirmed with further work. The fact that the most successful student writer sought advice about the writing task from multiple content experts reinforces the difficulty of distinguishing between the influence of language course input and the influence of learning in the discipline when attributing improvement in student performance.

The study has some limitations. The number of texts analysed was restricted, although the texts were selected carefully to represent three levels of performance. Lack of a control group did not allow the impact of the course to be more exactly determined. The interviews necessarily involved a small number of students; a larger number may have made findings more robust.

Two pedagogical implications arise from the study. First, many students need more scaffolding activities than were provided in the course to help them to more successfully achieve an appropriate academic style. In addition to using journal articles, more samples of high-quality student writing could be included, to give students an achievable picture of good academic writing in the discipline. At the same time, EAP teachers also need to ensure that students are aware that they should avoid following a rhetorical model rigidly. The CARS model is relevant and helpful for the more

successful students who were able to adapt it to their own specific needs, while weaker students seemed to take it as a template to be completed, sometimes with meaningless content. The temptation to provide student-generated models as an alternative template should also be resisted as no single template is likely to be universally applicable to the all the projects undertaken as Final Year Projects.

Second, the literature review is a challenging section to write because it involves many skills, such as critical reading and the ability to relate previous studies to each other. There is a substantial gap between the critical reading abilities of some of the students and the requirements of the FYP. Weaker students may have problems in understanding disciplinary texts and may resort to reading only the abstracts of journal articles as some of the weaker students did in this study. As a result students' literature reviews will lack substance. Perhaps this can be tackled by giving critical reading skills more prominence in discipline-specific courses.

About the authors

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Appendix 1: Example of a text analysis task**Task 1: Analyzing the introduction to an academic article**

Work in groups. Each student will read one to two extracts from the introduction to an academic article on the design and construction of modern bamboo bridges¹. Then:

- Share your information with your group members.
- Arrange the extracts in an appropriate order.
- Answer the questions about the research project.

A. Bamboo, as a natural resource, has been used by mankind for thousands of years (Janssen 2000). However, modern structures using bamboo as a basic material could well represent a breakthrough in the civil engineering field. There are several key characteristics of bamboo-based structures. First, raw bamboo is widely available in many parts of the world, and grows much faster than trees. Bamboo can typically be harvested in less than four years, and regrows quickly. Second, bamboo has good mechanical properties and is relatively easy to process for different purposes. Third, the manufacturing process of bamboo products is essentially environmentally friendly, pollution free, and suitable for sustainable development.

B. This paper presents the research, design, and testing of the world's first modern bamboo bridge to carry vehicular traffic and reports on the writers' efforts to develop modern bamboo structures.

C. With social progress and economic development, the demand and consumption of conventional construction materials such as steel and concrete have reached an unprecedented level throughout the world.

D. Meanwhile, it is becoming increasingly obvious that conventional construction materials are causing a significant environmental burden to society. Particularly in developing countries, both steel and cement are high energy consuming and highly polluting industrial products because their production processes consume a large amount of energy, generating considerable waste water, gas, and residues, which gradually and seriously are affecting the ecological environment of the globe. Sustainable development has become a major theme of today's international community. It is important to develop environmentally friendly new materials and innovative structures, to gradually reduce and even to some degree replace steel and concrete as conventional building materials. This has become the new challenge for 21st century civil engineering.

E. In North America and many industrialized countries, timber is widely used in bridges and buildings. Despite the fact that North America still has significant

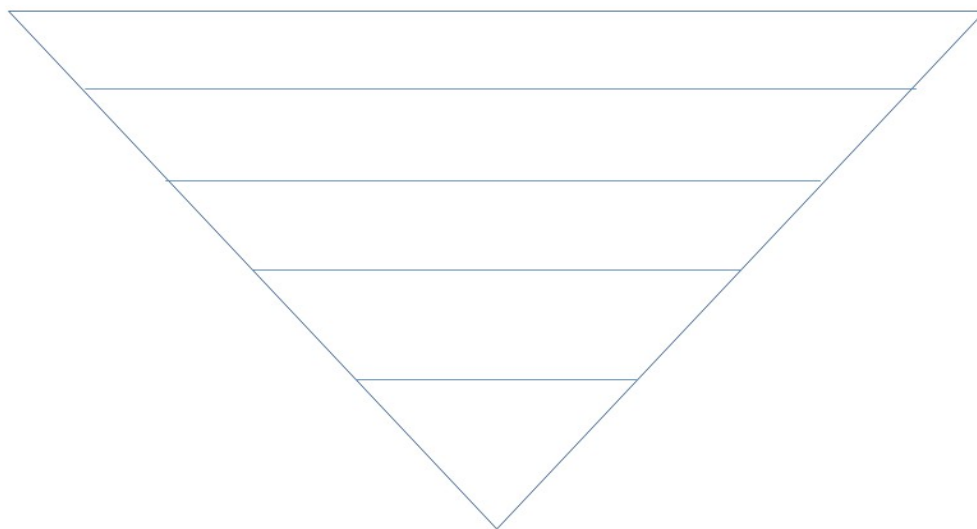
¹ Adapted from Xiao, Y., Zhou, Q., & Shan, B. (2010). Design and construction of modern bamboo bridges. *Journal of Bridge Engineering* [Online]. 15(5), 533-541. Available: DOI: 10.1061/(ASCE)BE.1943-5592.0000089

forest cover and is rich in forest resources, preserving these for future generations is an urgent task for society. Developing and using modern bamboo materials may provide an alternative in bridge and building construction in North America. As a direct return, the development of modern bamboo structures will not only benefit the bamboo-rich developing countries but will lead to the development of fast-growing and fast maturing bamboo forests in other parts of the world, contributing to a greener environment.

Questions:

1. What is an appropriate order for the extracts?
2. What is the real-world context of the project?
3. What problem was addressed by the project?
4. How will the solution benefit the community and the environment?
5. Complete the diagram below with a list of the features typically seen in an academic introduction.

(Students use their own language to list the major moves of an academic introduction, based on analysis of the authentic text which they have just read and discussed.)



Appendix 2: Interview questions for students

1. How did you write your Introduction and Literature Review assignment? Did you follow the course book checklist? Did you talk to your supervisor? etc.
2. How difficult was it to write the assignment (on a scale of 1-10)?
3. What was the easiest part?
4. What was the most difficult part?
5. Was your literature review *critical*? Why do you think so? Did you evaluate previous studies?
6. Did you revise your assignment before submitting it to your department? If yes, what changes did you make?
7. What additional language support would have helped you write a better Introduction and Literature Review for your FYP report?