

Familiarizing Postgraduate ESL Students with the Literature Review in a WAC/EAP Engineering Classroom

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Teaching Context and Students

The Faculty of Engineering, University of Melbourne, enrolls a culturally and linguistically diverse group of ESL students into its postgraduate coursework (M.A.) and Ph.D. research programs, many of whom also enroll in a semester-long (12 week) English for Academic Purposes (EAP) class called "Presenting Academic Discourse--Engineering." Enrollees include those who do not meet the minimum language requirements and others who are recommended to take the course by their thesis supervisors.

During the research period discussed here, a majority of students who completed the classes were from Southeast Asia, and EAP class size averaged twenty five students. Initially most were coursework masters students; as time passed, an increasingly significant number came from research (Masters and PhD) programs.[1] The combination of research and coursework students created a slight tension in that the first group had immediate need to write a literature review and the second did not.

These students arrive in Australia with varied levels of English proficiency, diverse cultural backgrounds, and prior educational experiences. Students from Asia often come not only with limited English proficiency but also with other academic practices that may be obstacles to good writing in a Western academic context, including conservative rather than critical learning approaches and issues with establishing an academic voice through writing (Ballard & Clanchy 1984; Ramanathan & Atkinson 1999). Ward (2001) notes that Engineering students in Thailand often learn strategies to avoid reading engineering texts in English in their undergraduate training, a practice which may perhaps extend to other Asian countries. Not surprisingly, a limited ability to read required texts is not conducive to learning to write a literature review.

These cultural dispositions may lead to challenges for students and reluctance to accept the value of extended reading and writing. A number of students in all four semesters studied for this paper (2002-2003) noted the EAP course was their first experience with critically evaluating and writing about sources, and several students referred to the challenges of reading extended texts alluded to by Ward (2001). Here are some comments.

The difficulties for me to write critical review are the professional knowledge is not enough and cannot understand the English professional articles well. I took a lot of time in reading for this course this semester (Chinese Student).

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It's difficult because there are several main ideas in one article. (Thai Student)

Some students rejected the value of critical review, arguing that engineering does not encourage this type of reading and writing, as can be seen from the comments below:

My view is that critical review is little relevant to my field. In my field, facts, such as experiments and experience are the most useful way to express a person's thinking. Without any facts, just giving critical review to an article is useless. (Chinese Student)

In another course, the project requires you to design a network solution for a company. You must select the best solutions to resolve the customer's requirements. (Telecommunications Student)

I had a group project in Internet Engineering. It is different from a critical review. The topic for the project is "Mobility". We needed to assume a customer and give a solution to solve the custom requirements. We had to research some different solutions for the requirements and choose a best one. (Internet Engineering)

To some extent I was able to accommodate these students by encouraging them to address problems and solutions while critically evaluating solutions in making their choice and position known. However, some student resistance to the genre-based agenda of the course continued through the four semesters discussed here. In addition to taking issue with the relevance of the genre, students also commented on their difficulties with critically appraising sources. Motivating these difficulties were a complex mixture of background factors, as illustrated in the following quotes:

It is difficult especially at the beginning of the semester because I never asked to question the information I was given before this. I am still not used to think critically and must keep remaining myself to practice that. (Chinese Student)

At beginning, I misunderstand what it is. I thought critical review requires us to identify some errors or inaccurate words in the original article. So I wrote it in the wrong way. After I took this course, I understood what it was. (Taiwanese Student)

Before I took this subject, I never do any critical analyze and writing in English. So I do not know what is it and how to do it. Finish this subject in this semester; I have gotten to know about the way to do that job, so I think my ability about it has been improved. (Chinese Student)

It was really difficult because in our education system we are not encouraged to think critically. We just follow some technical steps in order to write the paper our teachers ask for. (Latin American Student)

Another challenge in these assignments was attempting to critique experts, as these students note:

In the beginning, I find it difficult and lack the confidence to critique academics, because I think the articles that published from the standardization organizes, such as IEEE, are classical and authoritative. But after learning this course, I find very thing has its weakness, and we should have critical mind, especially to our engineers. And now I can more effectively think and write with critical mind. (Thai Student)

I grow up in Javanese culture. It is a bit "taboo" in Javanese culture to criticize people idea directly, especially older people's idea. Although I understand the meaning of critical writing and thinking, I still feel uneasy to criticize other people ideas, especially when they are more senior than me, for example, my supervisor. (Indonesian Student)

Undoubtedly there is a complex set of cultural, linguistic, personal, educational and other factors which affect the disposition and ability of students in engineering to critically appraise expert sources and integrate them into their writing. In addition to these factors, the contribution of composition approaches to discipline-specific writing is a potential obstacle WAC and EAP courses must face. Several writers have highlighted the vexed, albeit potentially productive, relationship between the discourses of engineering and composition (Norgaard 1999; Perleman 1999). Bergmann (2000), for example, contrasts WAC approaches to writing, which he describes as process oriented, recursive, and enhanced through collaborative learning, with engineering approaches, described as product oriented, written to templates, and produced in contexts of teamwork. A similar tension exists between engineering disciplines and traditional EAP approaches, particularly regarding the boundary of the language and content divide. EAP practitioners acknowledge the limits of their disciplinary knowledge and the consequences this has for teaching in the disciplines (Allison et al. 1998; Bruce 2002; Davies 1997).^[2] Approaching engineering texts as genres is a potentially useful teaching framework which can acknowledge both rhetorical and disciplinary practices and conventions.

Genre-based Approaches in WAC and EAP

Orr and Yoshida (2001) remark that WAC and EAP have many converging goals with respect to discipline specific teaching (see also Hailey & Hailey 2002; Hyland 2003). One difference between the two is the foregrounding of ESL/EFL issues and the linguistic consequences of cross-cultural learning in EAP. A key similarity is the enthusiasm among some in both fields for genre-based teaching as a pedagogical tool.

Swales (1990) identifies genres as a class of communicative events or activities with a shared set of communicative purposes informed by the discourses that currently construct the disciplinary community. Genre-based approaches are consistent with social constructionist analyses of disciplinary interaction and with socio-literate approaches to teaching writing (Johns, 1997).

Social constructionist approaches recognize academic and professional writing as a social practice (Brodkey, 1987), with ideological investments (Bizzell, 1992), and an evolving history (Bazerman, 1988). Text meaning is produced, in part, by social interaction and conventions of genres. Thus, in professional engineering communities "the meaning of a text is not specified outside communication in the abstract norms and conventions of a discourse community but is constituted or reconstituted within the process of social interactions between writers and readers" (Pogner 2003, p. 856). In engineering design processes, "participants with different responsibilities and interests—that is, working within different object worlds—must bring their stories into coherence" (Bucciarelli, 1994, p. 83). These aspects of textual production and meaning-making can be captured by genre-based approaches.

In addition to purely textual elements, engineering texts exploit the visual dimension, which is "an intrinsic and inseparable part of engineering" (Ferguson 1992, p. 47). As Markel (1994) observes: "many technical people, especially scientists and engineers, think visually rather than verbally" (p. 87). Visual language reflects an instrumental orientation to technology reflected in images and text (Killingsworth & Gilbertson, 1992; Ullman, 1997, p. 30; Ziman, 1984). It can be exploited in oral

presentations but also in the foregrounding of the integration of graphics in texts and other rhetorical 'staging' processes (Brown & Yule 1983).

Professional and academic spoken and written genres have been taken up in WAC and EAP engineering programs (e.g., Hailey & Hailey, 2002; Walker, 1999) as a way of teaching students the "unwritten rules of the game" (Aluisio, Barcelos, Sampaio, & Oliveira, 2001). Huckin & Olsen (1983; 1991), for example, exemplify the potential contribution of the applied linguistic EAP approach to engineering. Artemeva and Logie (1999) suggest that genre-based situated learning approaches can smooth the entry of students into professional discourse communities if writing assignments are connected to subject matter, there is a dialogic environment in the classroom community, and students can build cumulatively towards competence. For these reasons, a genre-based approach to the literature review was adopted for the EAP Engineering course described here.

The Literature Review as Framework for Critical Appraisal of Sources

The literature review is an academic sub-genre^[3] that has a natural place in theses, dissertations, and other genres such as the lab report. The typical final (fourth) year project in the engineering curriculum is an example where such an extensive review can take place (Krishnan & Kathpalia 2002). Given its academic ubiquity, the literature review can be taught as a discrete (Swales and Lindemann 2002), for it provides an opportunity for sustained attention to critical appraisal (Pally 1997) through the evaluation and incorporation of sources into text to make an argument.

Hyland (2000) notes, however, that conventions and practices of critical reviews are specific to disciplinary communities. Swales and Feak (1994) comment that "fairness" in terms of critique, i.e., the disposition to adversely critique others, varies from field to field and that "different fields are likely to impose different emphases on critiques" (p. 132). One example of discipline specific variation can be found in citation practices. Hyland (1999) has shown that sub-disciplines of engineering (mechanical and electronic) contain far fewer citations than social science and other "softer" disciplines, e.g., marketing, biology. The general lack of extended reading and writing experience among many students, their limited exposure to critical appraisal, and the priority accorded to instrumental approaches in engineering compounds disciplinary citation limits.

Second language students may have special challenges when attempting to write from sources appropriately. Levis and Levis (2003) note that some ESL engineering and science students have difficulties managing multiple references, defining a research question, and discovering "that articles may not overlap in obvious ways" (p. 214). Krishnan and Kathpalia (2002) note how second language students tend to employ plagiphrasing, i.e., plagiarize entire phrases and use other compensatory strategies in writing a literature review during their final year engineering project. Jones and Freeman (2003) argue that for many ESL students, copying is 'a natural process, with cognitive roots in imitative learning' (p. 168). Connor and Kramer (1995) found that some ESL students cannot go beyond summarizing to use sources critically in their writing. It should be noted, however, that Bloch and Chi (1995) contradict many of these findings, showing that although Chinese and English speaking have different citation strategies these are not significantly different in the physical sciences. They also found that Chinese writers are fully as "critical" as their English speaking counterparts. (See also Rich, this issue.)

Reflective comments by ESL students in the EAP program described here illustrate some of the cultural, cognitive, and linguistic difficulties alluded to in the literature:

In my mind, I think that it is not difficult to understand what critical thinking and writing is. But I found it difficult not to copy author's sentence or paraphrase it. (Japanese student)

When I wrote the first essay, I don't know how to use the critical thinking. Thus, I always repeated the author's issues in the whole paper. (Chinese Student)

The ability to summarize and paraphrase sources and develop a stance or voice on the issues discussed constituted a significant challenge to some Asian students. The difficulties not only resulted from importing culturally different approaches to critical appraisal but were also encouraged by lack of prior experience. As noted earlier some engineering sub-disciplines did not reinforce the need for such approaches.

It is argued here, however, that where the literature review is not written for engineering sub-disciplines or research (although it may and does contribute to developing theses), it can be considered a classroom or transitional genre. Johns (1995) argues that many faculty ask students to produce classroom genres, e.g., summary critique or annotated bibliography using primary research texts. Using these texts as the basis for writing is "entering into dialogue with their subject area reading" something which Belcher (1995) describes as fundamental to writing critically across the curriculum. Thus, our EAP program determined that classroom genres such as the literature review which are based on authentic primary research texts provide a context for legitimate learning for ESL postgraduate engineers.

The Sustained Critical Appraisal Framework

How was the literature review approached in class? The goals and processes for students are found in Table 1.

Table 1. Steps toward critical appraisal in a literature review

℞•	Select at least twelve appropriate articles from their sub-discipline related to the research topic they have chosen to focus on.
℞•	Integrate these sources in the text of a three thousand word review without over citing any particular source.
℞•	Correctly cite sources using APA or IEEE formats and correctly format the bibliography.
℞•	Evaluate the merits of (methodological, substantive) claims of these sources in their text.
℞•	Integrate these evaluations and descriptions in a text which develops a particular position or proposal on the chosen topic.

Four assignments (three written and one spoken), culminating in the literature review, constituted an environment of sustained critical appraisal (Pally 1997) for the students. It was suggested that students remain with the same research topic through the assessment tasks, so that research and writing could build cumulatively. Such thematic continuity helped to develop a mutual recognition between the student and teacher of the area of student focus. Choice of primary research sources for assignments came from the various student sub-disciplines and authentic research genres, such as refereed journal articles and conference proceedings, indexed on standard database sources, e.g., IEEE Xplore[4], were preferred. Assignments were given, and graded, as shown in Table 2.

Table 2: Engineering Assessment 2002-2003

Assignment 1 10% Week 4	Critical appraisal of one article (750 words)	Students choose an article from their fields and critically appraise text
Assignment 2 15% Week 7	Critical appraisal of two articles (1000 words)	Students choose two articles from their fields and review them.
Assignment 3 40% Week 13	Literature Review (3000 words)	Students choose at least twelve articles from field and review them.
Assignment 4 30% Weeks 11/12	Oral Presentation (500 words)	Students present a twelve minute oral presentation on topic of Assignment 3
Participation 5% Weeks 1-12	Participation in class activities	Students are assessed for participation in class tasks and discussion.

The first assignment (due in week four) asked students to summarize and critically evaluate in approximately 750 words an article from their field. This first assignment was preceded by readings (Ballard & Clanchy 1984, pp.44-61; Facione 1998), classroom discussion and practice tasks (Bartlett et al. 1999, pp. 28-34; Swales & Feak 1999, pp. 131-154), model assignments for student evaluation, and classroom clarification of assignment criteria. The discussions were intended to lead to a clear idea of the format and content of the first assignment. Students were required to attach the original article they had chosen to their papers and strike a balance between summary and evaluation in their text. A stumbling block for many students occurred when they selected an article which focused on a topic that they are unable to contextualize in terms of their own background knowledge. Selection of an article they can manage is essential, since the ability to synthesize and evaluate sources depends on a level of familiarity with topics, as the students noted:

To be critical, means we can not just correctly understand what we have read, particularly. We must have background for the topic. Or, if we don't have the background, then, we have to read other references, so that we can have more views for that particular topic. After that, then, we may have ability to be critical. So, the difficult thing is, we must prepare our selves the knowledge which sometimes we don't have at the moment.
(Indonesian Student)

Not very important to understand what critical thinking is, but more difficult to apply it into the specific knowledge area as a result of lack of well-knit foundation of my field.
(Chinese Student)

At first it was so difficult. Because if you did not have wide information about the topic, you could not critic it. In critiquing the first article, because I did not have information about the topic, I could not evaluate it easily. The same thing happened for the next article , but I think in the third assignment I could do my best , because I read 10 articles before and at that time I got the idea of the topic of the articles that I want to evaluate.
(Iranian Student)

The second assignment asked for two original articles on the same subject as the previous assignment. Some additional classroom tasks on the language of comparison (e.g., Swales & Feak 1999) and student uptake on feedback concerning their first assignment contributed to this exercise. Given the inclusion of two sources, this exercise required that students demonstrate their ability to accurately cite from the respective papers using acceptable formats, e.g., IEEE, APA within their sub-discipline.

The third written assignment was the literature review, discussed below, and the fourth assignment was a ten minute oral presentation on the same topic as the literature review. The oral presentation gave students an opportunity to develop the visual dimension of their literature review; most presentations had images and other graphics integrated.

Throughout the assignment process, students were urged to select work they were addressing in their coursework or research studies in engineering. In the case of the research students (Masters and PhD), the literature review task became the immediate preparation for thesis writing. With coursework students, it was often their first encounter with an extended critical piece of writing.

Students were provided with model assignments from previous cohorts that exemplify both good and bad practice. By the end of semester, students had developed a draft of their literature review and presented their oral presentation on the topic. Feedback on the limitations in the coherence and focus of the oral presentation were used to direct students to potential problems in their literature review. All students were offered the opportunity to submit and discuss draft literature reviews with the instructor in the final weeks of semester and in the following two weeks after the end of semester prior to final submission.

Written feedback from the instructor was given according to five main criteria: structure, content, vocabulary, grammar, and referencing. The three criteria for grading the final draft are in Table 3:

Table 3. Assessment criteria for literature review

Structure	<ul style="list-style-type: none"> • The introduction contains background to the issues, clear thesis statement (or rationale for the research), and an outline of the paper • There are clear links between the major sections, between and within paragraphs • Section headings, if used, are specific and appropriate • The conclusion summarizes the main points and highlights areas that need further research/investigation or the proposed research project
Content	<ul style="list-style-type: none"> • Main ideas/arguments are clearly developed • Ideas/arguments are supported by relevant research or reference to scholars • There is evidence of critical engagement with the ideas and /or the cited research • There is evidence of synthesis of sources
References	<ul style="list-style-type: none"> • There is a sufficient number of references used, i.e., no over-reliance on one text • Quotes, paraphrases and summaries of references are used appropriately • References used are correctly acknowledged in the text • References used are correctly set out in the list of references

The categories included under structure focus on both coherence and specific expectations of introductions and conclusions. Textual coherence is partly achieved by the inclusion of cohesive devices but also through careful 'staging' of the text by the use of moves, headers, and graphic elements, e.g., diagrams. The importance of specific moves in introductions and conclusions was based on Swales (1990), and was supplemented by models and discussion from teaching materials (Bartlett, Holzknecy, & Thom, 1999; Swales & Feak, 1994, pp. 173-194).

The two categories of content and referencing interact in that critical engagement requires citations and referencing. Students who scored highly in these two categories developed paragraphs with single ideas stated in topic sentences and supported by references. Elaboration of claims in paragraphs through claims and counter claims were also substantiated by citations and positions were taken with respect to the arguments that the literature makes with respect to the writer's position. Of course, taking a position posed problems for some students. A Middle Eastern student expressed the difficulty many students faced:

especially when you are going to do such work on article or white papers which are written by professional people and professors and require from you (I mean from the students) to write a critical review and find the weakness and strengths of this article.
(Middle Eastern Student)

In first drafts students often resorted to plagiphrasing, which was then reformulated as paraphrase or summary in later versions. Synthesis of sources through searching for and writing about consensus points among the texts included was also valued. The announced criteria for scoring encouraged students to distribute their claims to a variety of sources rather than repeatedly referring to a single source. This practice aims to encourage wider comprehension of all texts cited and avoid perfunctory citation of a majority of sources while relying on one or two for main arguments. The formal properties of citations were also important to the criteria.

The criteria above constitute the conventions of the literature review as a classroom genre for this classroom community. Through mobilizing and integrating primary research sources, students engaged with disciplinary content throughout the class. They were required to address an audience, eg. departmental group, who was not so familiar with the discipline that linguistic shortcuts were possible. Coherence efforts were to address and audience of non-specialists. The formal rhetorical techniques such as section headings and referencing formats complemented the integration of graphic images (photos, technical diagrams, process diagrams) explaining and representing engineering objects.

Discussion

Independently administered student evaluations for the four iterations of the program (2002-2003) regularly ascribed high measures of satisfaction to the teaching approach, averaging 4.5 on a five point Likert scale. Results of a complementary qualitative survey of students also highlighted the general appreciation students had for the course, though they also highlighted some disillusion among a minority of students that language proficiency, e.g., grammar and vocabulary, were not the focus.[5]. As noted earlier, some students questioned the need for critical appraisal in a field they see as characterized by reproduction not evaluation of sources. Others noted that the course constitutes their first encounter with any form of critical appraisal.

This paper has foregrounded the need for students to understand and engage in critical analysis through an assessment process that culminates in a literature review task and oral presentation based on discipline-specific research sources. The research students in the program had an opportunity within the course to begin drafting authentic literature reviews for their research projects and receive feedback on the communicative quality of the text. Many of the coursework students, for whom this was the first sustained encounter with critical analysis, were encouraged to develop their ability to communicate to informed peers about the strengths and weaknesses of the research literature they had just begun to explore.

Students come to EAP classes with varying expectations and proficiencies which affect the kind of engagement they can achieve with the genres and sub-genres used for assessment purposes. The balance between language and critical skills continues to be a subject of debate and will become increasingly important as research students participate in this EAP program. The pragmatic compromises on which the program described here were based have helped, I believe, to develop a learning community based on the principle of clearly communicating about authentic genres to an audience of peers from the disciplines of engineering and science.

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Notes

[1] In Australia, a Masters' Coursework student studies 12-16 subjects over an 18-24 month period. The students also may complete a minor thesis. A Masters by Research or PhD student does not complete coursework and only enrolls to present a thesis.

[2] What are the differences between the WAC and EAP/ESP Movements? WAC comes out of the rhetoric/composition disciplines and has been located primarily in English-speaking countries. English for Academic Purposes, a subset of the English for Specific Purposes Movement, originated in applied linguistics and generally relates to curricula for English as a Second Language (ESL) or English as a Foreign Language (EFL) students (see, e.g., Johns & Price-Machado, 2001).

[3] There is considerable debate among genre theorists about specificity. For example, are the literature review and abstract sometimes sub-genres because they are integral to a more complete, complex genre such

as the research article? (See e.g., Bhatia, 2004). This debate will not be pursued here. Suffice it to say that the literature review can appear across genres and is therefore useful for EAP literacy classes.

[4] IEEE is the Institute of Electronics Engineers, the professional organization that accredits many programs (<http://www.ieee.org/portal/site>).

[5] See Melles, 2003, for additional qualitative comments about the program of study.

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