Participant observation of the interaction in an engineering lab to improve materials design and writing support for graduate students and faculty publishing in English at a research university in Korea

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September 2012

Submitted in partial completion of the MSc Degree in Teaching English for Specific Purposes

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ABSTRACT

Research has established that many non-native speaking graduate students and faculty in EFL settings need language support to write for publication in English and are under increasing pressure to do so. However, the research is less clear on exactly how such support can be delivered effectively. This study seeks to better understand the writing practices of a single engineering lab to determine how materials and support could better scaffold the apprenticeship characteristic of co-authored research in engineering lab environments. The motivation is to improve the writing consultations, workshops and materials support at an English Writing Lab service for graduate students at a research university in Korea (www.hanyangowl.org). Ethnographic data was gathered from texts, interviews, informal interaction, and participant observation of meetings between graduate students and their advisor. Given that the apprenticeship process is the most valuable form of graduate study but that students must also develop independent research skills, it is argued that program responses and materials in the emerging field of English for Research Publication Purposes (ERPP) must be more innovatively designed to accommodate the distinct characteristics of graduate study, particularly in non-English speaking settings. The findings distinguish between skills that urgently need to be addressed through required elearning diagnostic quizzes checked by senior students and faculty, such as proper paraphrasing, and other needs such as computer skills and knowledge of writing principles that could be efficiently delivered through elearning materials. Observations and interviews also revealed the need for simpler, more concise print and online searchable materials designed to be used by students while writing, rather than textbooks. Most significantly, observation also made clear the need for heuristics and checklists to facilitate the interaction and mentoring between senior and novice students, and between students and their advisor. The paper concludes by arguing that ERPP research-practitioners should expand the boundaries of the field by including support for all facets of research writing including facilitating mentoring, peer learning, and the writing process but to do so in responses embedded within existing lab practices rather than traditional teaching. Therefore, greater use of participant observation research is suggested to formulate such innovative responses.

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CHAPTER 1 INTRODUCTION

1.1 Development of the field of English for Research Publication Purposes

Needs analysis has traditionally been synonymous with designing a course or curriculum (West, 1994). However, the spread and problematic dominance of English as a lingua franca in many academic and professional fields, particularly in the sciences (Swales, 1997; Tardy, 2004), has brought in new constituencies of non-native speaking writers of English. Among these groups are graduate students, researchers, and faculty writing for publication in English to present at conferences, write journal articles, dissertations and theses, and other documents supporting the research process.

Since the 1990s, a consensus has emerged in the academic literature (Kramberg-Walker, 1993; Kushner, 1997) and more recently in science journalism (La Madeleine, 2007; Powell, 2012) that these writers face significant disadvantages in publishing in English and many need support. To study this problem and propose solutions, the field of English for Research Publication Purposes (ERPP) has emerged as an increasingly distinctive field within English for Specific (ESP) or English for Academic Purposes (EAP). This development was signaled by the foundational PRISEAL Conference held in Spain in 2007 (http://ija.us.edu.pl/sub/prisealweb/index.html), which culminated in the "Tenerife Statement," a declaration of concern for the support and critical analysis of English as the international language of science and research (http://webpages.ull.es/users/ppriseal/tenerife_statement1.pdf). In terms of research, the special issue of the *Journal of English for Academic Purposes*, "English for Research Publication Purposes" (Cargill & Burgess, 2008) signaled the consolidation of interest in this issue and an additional step toward building a sub-disciplinary identity for its researchers.

This development was first stimulated by the needs of increasing numbers of international graduate students in native English-speaking countries (Jenkins, Jordan, & Weiland,1993) prompting scholars such as John Swales to propose his widely cited CARS model of moves of introduction sections (Swales, 1990) to help these novice research writers. This stimulated further research on the texts and practices in different research fields as well as in foreign language settings. More recently, this need has been particularly driven by the weight given to the number of papers published in the Science Citation Index (SCI) as a key criterion in many university international ranking indices (http://www.arwu.org; http://www.topuniversities.com/university-rankings/world-university-rankings; http://www.timeshighereducation.co.uk/world-university-rankings) and faculty evaluation systems (Li, 2012a; Quia, 2010). This has been particularly problematic for international social sciences and humanities researchers as they are generally less connected to international

networks and norms (Steele, Butler & Kingsley, 2006). World gains and disparities in publication, particularly in Asia, are clear and mirror economic inequality, as vividly presented in King (2004).

1.2 Local impact of pressure to publish in English

Such an "SCI strategy" (Li, 2006, p. 459) is common at East Asian universities and especially acute at the large research university in Korea where I teach. Although in-house and external proofreading services are available and supported by my university for journal articles, I found through my own editing work and teaching English writing courses for graduate students in the Departments of English Education and Computer Engineering that proofreading services alone were insufficient for authors whose English skills and genre awareness did not meet a threshold level. In particular, support was needed for the many graduate students in engineering and sciences who are the first authors of papers co-authored with their advising professor even at the master's level—a common requirement also in China (Cargill, O'Connor, & Li, 2012). To meet this need, I made a successful proposal in 2004 to start a writing lab service exclusively for graduate students and faculty trying to publish in English, and I continue in this position. This support takes the form of individual email-based and face to face writing consultations as well as six workshops per term and materials (www.hanyangowl.org). Background on setting up the service is described in Turner (2006). The number of individual consultations I provide is manageable by limiting assistance to SCI index papers and receiving a reduced teaching load.

1.3 Motivation for the study

The service has been successful with constant demand for consultations provided by myself and good workshop participation (40-100+ participants depending on the topic). However, there were two areas where I thought further research was necessary. First, there remains a lack of materials usable by EFL graduate students in sciences and engineering grounded in research. Although the pioneering and subsequent work of Swales and Feak (http://www.press.umich.edu/series.do?id=UM75) remains a model, I found some of the advice and tasks less useful for engineering and applied sciences, as the text is designed for a multi-disciplinary class in a native-speaking setting and not sufficiently based on corpus work, as Swales acknowledges (Swales, 2002). Partridge (2002) also found a gap between guidebook advice and current practice in the sciences where dissertations are increasingly becoming collected works of edited journal articles rather than a single study. Dong (1998) also notes this trend. Harwood (2005) concludes that much advice in EAP textbooks is simply not grounded in research, and calls for more teacher-researchers to publish textbooks.

To meet my local needs, I created materials (www.hanyangowl.org/media/textbook/engsciresearchwritingbook.pdf) loosely based on an ESP genre framework as found in Swales and Feak (2004). Although informed by careful ESP genre analysis and discussions with students and faculty, my early work, like much current research, was based primarily on the textual features of published materials and my teaching experience but not sufficiently localized by qualitative research. This is especially important in EFL settings as the usability and appropriateness of many existing materials for graduate students seems in doubt. Gosden (1996) found that guidebooks and textbooks on science writing were little used by the Japanese research students in his study. This finding unfortunately agrees with my own experience where comprehensive volumes such as Huckin and Olsen (1991) are found to be intimidating by many students, while popular manuals on how to write a scientific paper (Day & Gastel, 2006) are not intended to address the complexity of the linguistic needs of EFL graduate students. Even when better targeted at non-native speakers, such as the collaborative work between a linguist and a scientist found in Cargill and O'Connor (2009), book-length materials, or even traditional courses may not be the type of format or response most demanded for busy graduate students in EFL settings as found by Orr, Smith, and Watanabe (2003) in a survey of Japanese researchers.

The second need for research was to better understand the practices underlying the creation of research texts. Although research articles are the natural "product" of "real writing" (Raimes, 1991, p. 414) for analysis, the practices that constitute them are largely hidden or "occluded" (Swales, 1996). The value of uncovering these practices is demonstrated in Pecorari (2006) where she identified, through interview studies, problematic source use by international graduate students that their faculty advisors had not detected. Like much genre work in the field, I would argue, I had overly relied on textual analysis without sufficiently trying to better understand the complex process of co-authorship I had identified (Turner, 2006) among peers, senior students, and faculty advisors that is characteristic of the engineering and science lab environment.

In the next section, a critical review of three categories of studies that have looked at the characteristics of research text will be reviewed to provide justification for the approach taken in this study.

CHAPTER 2 LITERATURE REVIEW

2.1 Genre analysis studies

First stimulated by a pioneering monograph, *Aspects of Article Introductions*, researched at Aston University English Language Centre (Swales, 2011) on the structure and textual features of research article introductions, the generic features and disciplinary and linguistic variation in sections of the research article has become a fruitful line of genre research further stimulated by the revised Create a Research Space (CARS) model (Swales, 1990). Genre, "a distinctive category of discourse of any type, spoken or written" (Swales, 1990, p. 33) comprises three traditions (surveyed in Hyon, 1996), but ESP genre analysis identified with Swales is used in ERPP. The literature is extensive and not the primary focus here, so only a brief review of engineering and science related work follows. Work has been done to identify the surprising variety of genres or types of documents produced in computer science and computer engineering (Orr, 1999). A second approach has been to analyze the overall "schematic structure" of articles in a given field such as computer science (Posteguillo, 1999). Building on the work of Swales, other researchers (Anthony, 1999) have looked at the characteristics of specific sections of articles in various fields to test the validity of generic models such as CARS. Other work has looked at inter-disciplinary variation (Samraj, 2002) and intra-disciplinary variation in a single field such as applied linguistics (Ozturk, 2007).

2.2 Corpus studies

Beginning with the analysis of huge corpora resulting in watershed texts such as the *Pattern Grammar* series (described in Willis and Willis, 2002) and the *Longman Grammar of Spoken and Written English* (Biber, Johansson, Leech, Conrad, & Finegan, 1999), Corpus tools are becoming increasingly common and more specialized in TESOL research (Biber & Conrad, 2001; Hunston, 2006). More recently, the predominance of phraseology, "the tendency for words to be co-selected by speakers and writers to achieve meanings" (Cheng, Greaves, Sinclair, & Warren, 2009, p. 236) and the notion of "lexical chunks" (Schmit, 2000) or "lexical bundles" (Biber et al., 1999) used in research writing has been investigated in more specialist corpora and applied to teaching writing and materials design (e.g. Chang & Kuo 2011) including a course based on student selected corpora (Lee & Swales, 2006). Comparisons of lexical bundles in published and student writing have also been made (Cortes, 2004), a promising direction in "learner corpora" studies (Lee & Chen, 2009). Corpora are also being compiled more explicitly for teaching writing and student use in addition to research (Krishnamurthy & Kosem, 2007). However, in response to criticism of the decontextualized nature of some corpus research, attempts have been made to connect patterns to meaning (Groom, 2005) by combining genre and corpus studies (Flowerdew, 2005) to include both textual and rhetorical (Charles, 2007) or functional categories (Durrant & Mathews-Aydinli (2011).

2.2.1 Limitations of textual analysis

Despite insights gained in genre and corpus studies, a number of problems remain unresolved. First, reliable classification of the specific linguistic forms that realize the moves and steps of genres or the rhetorical functions of texts has proven to be elusive (Paltridge, 1994) due to significant linguistic and disciplinary variation. Pedagogical approaches based on publication genres may also fail to be sufficiently based on the needs of novice researchers (Cheng, 2006). A consequence of such a lack of analysis is described by Dovey (2010). She found that classroom genre teaching that focuses on steps and moves structures such as the CARS model may be premature for students who are not yet familiar with the literature of their field and the rhetorical requirements of "knowledge-creating genres" (Hyland, 2007, p. 12) like the dissertation (thesis) or research article. In short, the main weakness of textual approaches is a decontextualization of the social processes constitutive of such texts. In response, a more social understanding of textual practices has been a feature of recent scholarship.

2.3 The social turn toward understanding text

One reason for the development of the field of English for Research Publication Purposes is the need to understand the distinctiveness of the interaction of graduate students with peers, advisors, research networks (Barnes & Edge, 1982, as cited in Li, 2006), language editors, and journal reviewers and editors (Li & Flowerdew, 2007). This is in contrast to undergraduate writing where questions of audience can be problematic. Shashok (2001), Burrough-Boenisch (2003; 2006), and Lillis and Curry (2006) provide a valuable clarification of how editing services and language facilitators, or "shapers" (Burrough-Boenisch, 2003) like myself, play a key role in helping with revision of manuscripts for publication.

In recognition of the distinctive social and tacit nature of much graduate learning, applied linguistics has needed to draw on other fields, particularly the social theory of "situated learning" through concepts such as "legitimate peripheral participation" (Wenger, 1998). This describes learning as embedded in a process of "apprenticeship" in a given "community of practice" (Wenger, 1998) whereby novices gradually learn their roles and increasingly participate as they become full members of a community (see Haneda, 2006, for a review of the concept). A "community of practice" is similar to a "discourse community" (Swales, 1990, pp. 24-27), a place and/or network where members share common knowledge, practices, and textual genres. However, the emphasis is on social learning and interaction in CoP, whereas the boundaries of the term "discourse community" are the subject of debate in the field (Hyland, 2003; Partridge, 2006). Hyland, drawing on Swales (1998), describes communities as being

"where genres make sense; they are the systems where the multiple beliefs and practices of text users overlap and intersect" (Hyland, 2003, p. 23). The socially oriented research on writing for publication is reviewed in the next section.

2.3.1 Non-native speaking scholars publishing in English

A review paper of research in Applied Linguistics of the publication experiences of multilingual scholars mainly in English-speaking countries can be found in Uzuner (2008). McGrail, Rickard, and Jones (2006) provide a comprehensive review of types of support for native-speaking faculty, primarily in the form of writing groups. Although insight may be gained from studies in ESL settings and for fields other than sciences and engineering (e.g. Wang & Bakken, 2004), the distinctiveness of the collaborative lab environment, strength of science research in East Asia, higher demand for support, lack of qualified EAP professionals, lesser amount of fluent English peer help, language threshold barrier, and fewer resources, make EFL lab environments a distinctive setting for research. Therefore, research done in this context is the focus of the following review and my study.

2.3.2 Survey and interview studies

The most extensive work has been done in Hong Kong. Flowerdew (1999a) carried out a survey finding most faculty confident writing in English at 87%, which surprisingly was higher than Chinese at 49% (p. 138). However, reviewer bias against non-native speaking authors was cited as a barrier to publication. A summary of the problematic features of non-native speaker academic text is presented, but the study was not designed to support a program response. In a follow-up study, Flowerdew (1999b) used in-depth interviews to further elucidate the findings of the first survey. There was consensus that non-native speakers were at a disadvantage in publication due to a lack of vocabulary resources and difficulty with writing introduction and discussion sections in particular. This finding agrees with my own experience and I have created specific workshops for these sections. However, the interviews focused on the views of faculty across fields, but, unlike the humanities, many papers in sciences and engineering are co-authored with faculty with doctoral students as the first author (Cargill et al., 2012), which is an important disciplinary difference.

Also in Hong Kong, Li (2006) answers Casanave's (2003) call for more "socio-politically-oriented case study research" by detailing the publication history of a Physics PhD student writing for SCI publication. The paper helps to highlight the power differences in co-authored papers in the sciences. Li (2007) then focuses on a single chemistry graduate student but emphasizes the notion of a community of practice in the student's engagement with the research

field. In terms of pedagogic implications, Li argues for support for science students, particularly to scaffold their early learning to save time, and the need for greater specialization among EAP practitioners in EFL settings. Li's study is methodologically innovative but does not include participant observation to validate the student's perspective.

In contrast to the descriptive research in Hong Kong, Gosden's (1995) work emerges from providing courses to graduate students in sciences at a university in Japan. A systemic-functional model of Ideational, Interpersonal and Textual metafunctions (Halliday, 1996) is used to account for text revisions in terms of quality, a focus missing in much descriptive genre and corpus work. As is the case with Li's body of work, the importance of the interaction between the advisors and graduate student co-authors is emphasized as requiring greater awareness among EAP practitioners. In a subsequent paper, Gosden (1996) conducts an interview-based study of doctoral science students in Japan focusing on their composing process. Translation strategies were found to range from probable interference with writing success to legitimate scaffolding. However, a lack of awareness of the importance of audience was found. A sophisticated discussion of cultural issues such as the role of "face" (p. 122) as a barrier to directly criticizing previous research showed the need for more work in a variety of EFL settings, as called for by Flowerdew (1999a) and a contribution of my study.

Flowerdew (2000) also contributes work within a social-constructivist perspective, but concentrates on a case study of an ultimately successful publication attempt by "Oliver" after returning to Hong Kong from work in mass communication in the US. Like the participants in Gosden's (1996) study, Oliver underestimates the importance of the rhetorical positioning of his work within his field. Flowerdew (2000) concludes by suggesting a blending of apprenticeship with workshops, classes, writing groups, and individual guidance by writing clinics, supporting my current practice.

In a study at a science and technology university in Korea, Cho (2009) surveyed and interviewed students and faculty separately. Faculty felt overwhelmingly that the English of students was lacking but critical to their career. Faculty also felt at a disadvantage in publishing in English, not necessarily due to their own skills deficit, but the additional burden of extensive revisions of student papers as there are few peers fluent in English to help students in Korea. This advisor burden of "rebuilding" student text through appropriation was also highlighted in Li (2012a, p. 62) and Huang (2010).

Although rich in descriptive case study detail and supported by some empirical survey data, this work has not been connected to program responses or materials design which we now turn to.

2.3.3 Research on program responses for graduate students in Asia

Allison, Cooley, Lewkowicz, and Nunan (1998) report an initiative at the University of Hong Kong combining textual analysis of needs with a survey of graduate students and advisors. Interestingly only 57% of faculty felt it was their "responsibility" to mentor students in improving their language skills (p. 203). Five three-hour workshops were offered with a generally positive response, but science and engineering students rated the workshops as significantly less relevant. However, the data was not clear why. A Diagnostic Assessment Profile handout based on the identified needs was used to plan the workshops and help students to identify their writing problems. However, it consisted of broad categories such as "citation" and "cohesion" which the authors acknowledge may not be specific enough for students to use (p. 209).

The "Collaborative Interdisciplinary Publication Skills Education program" developed by a linguist, Cargill, and a scientist, O'Connor, at Adelaide University was built on team presented day-long workshops at the home institution and exported as workshops running for five days in China and Spain targeting less experienced researchers (Cargill and O'Connor, 2006a; Cargill et al., 2012). Feedback showed that the participants viewed the workshops as useful but with requests for more emphasis on sentence level advice. Despite the quality of this program response, the "exportable" workshop model to places in need such as China is not really an example of a local initiative in an EFL setting. However, more sustained partnerships are a goal of this program (Cargill et al., 2012) also advocated by Li and Flowerdew (2007).

It must be noted however that support in EFL settings may be being offered by writing centers but not "published" in the literature. However, Tan (2011) in a review of writing centers outside North America only mentions support for undergraduates in Asian settings.

2.4 Justification for the study

Underlying these social approaches to understanding research practices is the concept of "situated learning" where knowledge develops from apprenticeship in communities of practice, which is especially crucial to engineering and science laboratory settings. Gosden (1996) notes that given the lack of research writing support in Japan, "it is not surprising that the apprenticeship as a research student must itself be considered the most powerful pedagogic relationship" (p. 114 citing Myers, 1988). Effective mentoring was also found by Belcher (2004) to be the "determining factor" (p. 26) in student success. Indeed, there is increasing recognition and research on the importance of informal (Wenger, McDermott, & Snyder, 2002) and even "incidental" learning across fields (e.g. nursing workplace writing Parks, 2000). However, if we acknowledge that "Learning is not always based on overt teaching" Flowerdew (2000, p. 128) and "if we believe that information stored in explicit ways is only a small part of

knowing, and that knowing involves primarily active participation in social communities, then the traditional format [classes] does not look so productive" (Wenger, 1998, p. 10).

Therefore, the gaps in the literature and current practice reveal a need to rethink materials and program responses so they are grounded in local research and designed by ERPP specialists to scaffold this community interaction as complementary or as an alternative to traditional workshops and classes. This is because "Language needs cannot be separated from the social context in which they play a role" (Holliday, 1995, p. 126).

Yet, no research has taken this direction nor have studies in applied linguistics been based on actual participant observation to better understand this interaction but have instead relied on surveys and descriptive interviews. Jenkins et al. (1993) confirms the concerns of researchers about the validity of survey data as the terminology and accuracy which linguists and content faculty use to describe writing skills and genres can be incommensurable. As a result of her observation of the interaction between a non-native speaking physics graduate student and post-doctoral researcher and their advisor in an L1 setting, Blakeslee (1997), writing from the field of technical communication, stresses the need for more "micro-level analyses" of mentoring in science. She concludes that factors including the "implicitness" (Blakeslee, 1997, p. 128) of the knowledge gained through tacit learning by experienced researchers can be a barrier to efficient learning by novices if not passed on more explicitly. Hence, direct observation seems necessary to determine whether learning can be made more transparent and efficient through innovative program responses. As Shaw remarks, this is important because EAP practitioners "need to understand the strategies their students already use to acquire this culture and work with them rather than impose their own ideas as to appropriate composition procedures and forms" (1991, p. 189).

2.5 Needs and means analysis

The question then arises as to what needs should be identified. In the case of my own context, I am more familiar with the general linguistic "deficiency analysis" needs (West, 1994, p. 1) through my feedback on papers on an almost daily basis for the last 7 years through writing lab work, teaching and research. In addition, determining communicative needs is not as complicated as it can be in many ESP settings (e.g. Holiday, 1995). Graduate students in engineering and sciences at my institution must almost immediately produce research articles and presentations co-authored with senior students and faculty so the "target situation analysis" (Hutchinson & Waters, 1987) is fairly clear and not distinct from future needs as the writing lab consultation service I provide and the engineering research writing course that I teach have a narrow focus on supporting the writing of research texts rather than preparing students for workplace writing. For the same reason, debates over the degree of authenticity of materials

(Belcher, 2006) and degree of discipline specificity of model texts to be used (Hyland, 2002) are also less problematic as students must not only understand but produce authentic research texts even as novices. Outsourced as well as in-house proofreading services, which I help to coordinate, are available, making surface errors that do not affect meaning a low priority for treatment.

Instead, the primary problem is the disciplinary and my situational need to observe the writing practices characteristic of laboratory co-authorship in order to effectively design usable materials and program responses suitable for a combination of self-study, before and after writing lab consultations, learning between peers, and graduate student interaction with their faculty advisor. This is in line with Hyland who argues that textual analysis must be complemented by "a more ethnographically oriented approach" (Hyland, 2007, p. 153) for fuller understanding of the practices that create such text. Bhatia (2008) has also called for a greater connection between understanding text and awareness of the professional practices that underlie it. This is not only desirable in terms of situated learning, but making a virtue of a necessity as the "means analysis" (Holliday & Cooke, 1982 as cited in West, 1994) in my institutional context is daunting. I am the only instructor giving writing consultations and workshops through the writing lab to a population of 10 000 graduate students, forcing the need for web-based innovation. Making this link between needs, means, methods, and materials is crucial but as West (1994) notes, "most needs analysis procedures do not begin to handle the leap between needs analysis and methods/materials selection or development (p. 14).

2.6 Research Questions

In order to trace this link, this study examines the practices of a single computer engineering laboratory. Based on the review of the literature and the local challenges presented above, the following research questions guide this qualitative study.

A. What insights can interaction with researchers in a lab and participant observation of the interaction between students and advisors in research meetings bring that may have implications for writing support and materials design and usability, whether through formal or informal responses?

B. What needs are not being met that have not been described in the existing literature or identified through my current support and materials?

Chapter 3 will present the research methods. Next, the findings and discussion will be combined in Chapter 4. Finally, Chapter 5 will include the conclusion consisting of the

limitations of the study and the implications of the findings for my context as well as the developing field of ERPP.

CHAPTER 3 METHODS

3.1 Review of ethnography

The review of the literature highlighted the key concepts of apprenticeship and legitimate peripheral participation in a community of practice that motivated my primary choice of observation as a method. This section will explain how I drew from ethnography to examine these practices.

Current ethnographic approaches across fields developed from anthropology are influenced by the work of scholars such as Geertz (1983) who is cited by Hyland (2007) as having the view that "knowledge and writing depend on the actions of members of local communities" (p. 1). To understand such practices best, "thick" or detailed description through fieldwork is done to understand the context constitutive of events (Richards, 2003, p.15). However, Long (2005) and Richards (2003) argue that most studies in applied linguistics (including this one) are not genuine "ethnography" as long-term immersion in a community is the norm. Therefore, the term "ethnographic" (Ramanathan and Atkinson, 1999) is used here to mean drawing on techniques inspired by ethnography. This method was chosen as being appropriate when "not enough is known about a context or situation to establish narrowly defined questions" (Mackay and Gass, 2005, p. 169) as was the case with the engineering student-advisor interaction I wanted to better understand.

3.2 Subjectivity

While ethnography has always acknowledged the "ineradicable role" (Rampton et al. 2004, p. 2) of the subjectivity of researchers, the goal has been to minimize it through immersion, triangulation and other methods and adopt an emic or "insider" perspective (Richards, 2003, p. 15). The subjectivity of my own experience and interpretation is guarded against here, but it is also treated as a resource. As Richards (2003, p. 15) and Heigham and Croker (2009, p. 97) note, both insider and outsider perspectives are important in qualitative work. As an example, West (1994, p. 8) cites Dudley-Evans (1988) case study of student theses where the author found that "the language tutor may be able to give clearer advice on the 'move structure' of a thesis than the subject tutor." In addition, etic observation is valuable because learners can have an "incomplete" (West, 1994, p. 5) idea of their own needs. Long (2005, p. 27 citing Tarone et al., 1981) stresses the importance of consulting domain experts in conducting needs analysis,

but states that experts may not be accurate in their assessment of "detailed linguistic" and "higher discourse level" language as I was to find in my study. In support of this position, Blakeslee (1997) highlights the problem that mentors may have had no explicit instruction in how to teach writing, while Belcher argues that subject faculty may not have sufficient skill in helping L2 learners (2006, citing Snow, 1997) or modeling and coaching students (1994).

3.3 Place discourse community

The importance of place underlies Swales (1998) work in his "partial ethnography" of the creation of texts in a single building on his campus consisting of three communities. He describes his approach as "textology" or "the form and formation of the written texts themselves as produced by such members, via an exploration of their contextually embedded discursive practices (Swales, 1998, p. 112). Place becomes central in his reexamination of the notion of "discourse community" as he argues for a more localized understanding of discourse that includes the notion of a "place discourse community" (Katz, 1999, p. 424), the site of face to face interaction. To ground my observation of interaction I chose a single lab as the place of my study. This decision was also based on my opinion, confirmed by respondents N and B that in contrast to undergraduates, engineering graduate students identify and work very little with other students in the same department and most have "very little" interaction with networks outside the lab, despite evidence of their importance (Ferenz, 2005). Indeed, the lab is *the* community for these students (for a lighthearted view see Brenner, 1994).

Therefore, the approach taken in this study is a combination of "top down" and "bottom up" qualitative approaches. The categories of analysis were not solely identified by being emergent from the data, as in the work of traditional ethnographic approaches (e.g. Flowerdew, 1999b) as my research questions guided my observations. However, I was also open to unexpected findings to pursue. A good example was the mentor-mentee relationship that I uncovered by chance and then reprioritized over textual analysis. Such recursive developments are often the case with the "emergent nature" (Dorneyei, 2007, p. 131) of ethnographic analysis.

3.4 Data collection

This section will detail the data collection procedures. First, a description of the lab will be introduced.

3.4.1 The lab

The lab is headed by one full professor in the department of electronics and computer engineering. The members of the lab consist of five PhD students and an equal number of part-time PhD students working at companies (who were not included in this study) as well as just under ten master's students whose number varied. Two members of the lab are non-Korean Asian students. Student receptive English skills are substantial, but active skills such as speaking and writing vary from low to fluent. To preserve anonymity, further details of the lab are not provided. According to the advisor, the size of this lab is similar to others in Korea but significantly larger than many in the US.

3.4.2 Standards research

To better understand my data, the concept of "standards" will be introduced. Standards are technical bodies who create requirements for a variety of devices and practices that make internationalization possible. The metric system is a good example. The International Standards Organization (ISO) is the governing body consisting of national organizations that define the procedures for creating a standard, which is "a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose" (http://www.iso.org/iso/home/standards.htm). The standards work of the lab in this study is to develop MPEG video, which allows the playing of video across computer platforms. Explanation of the standards process in the electronics industry can be found at (http://standards.ieee.org/develop/index.html). The other work of this lab is the more common research articles in the fields of computer graphics and video quality.

3.4.3 Sampling

This lab was chosen as a "purposive" and "convenience" sample (Long, 2005, p. 34). The sample is purposive because it is from a laboratory in a department where students can take my graduate engineering writing class, and I am familiar with the genres they write in despite my lack of content knowledge. This population is also the target audience that attends my workshops and receives writing consultations. The lab was chosen as a convenience sample as I had former students from my class in this lab making introductions easier. In addition, a PhD student whose paper was the primary focus of my observations was willing to communicate with his advisor in his fluent English during meetings for my benefit. The advisor had a US PhD, which is the norm in engineering departments in Korea.

3.5 Data types

The following procedures were used to collect a variety of types of data. Rather than a pseudonym, students are identified by a letter (not an initial).

3.5.1 Orientation visit

A visit was made to the laboratory to present the purpose of the study and administer consent forms, which were explained and signed.

3.5.2 Interviews

To orient my work, initial interviews were recorded with the advisor (38 min) and G (28 min). After attending group editing meetings (see below), individual interviews were conducted with students at the lab. The interviews were done "recursively" (Ramanathan & Atkinson, 1999, p. 53) scheduled at different times based on points I wished to follow-up that had originated in my observations, earlier interviews or texts, so students were asked to interview based on their suitability for a given topic. For example, I first asked D to actually run and explain his research experiments on video algorithms and give me the general background to the work of the lab rather than a traditional interview, which lasted 85 min. An interview with B (39 min) was done to clarify issues during the writing up—a "recursive" follow-up on the mentor-mentee relationship (see findings), which is a benefit of ethnographic method (Flowerdew, 2002, p. 238). A final semi-structured interview with the advisor was recorded (70 min) to determine the feasibility of formats to scaffold student-student and faculty-student interaction. Other students who volunteered to be interviewed were E (36 min) and M (25 min). Then G (27) with a student translator, L (37 min), H (45 min), and F (44 min with a student translator). Two open-ended written interview questions were distributed by email only after observations and interviews mainly to provide further triangulation, an opportunity for students to further reflect on their interview, or to write in Korean for convenience. Only three students took the opportunity, all writing in English.

3.5.3 Texts

A variety of research genres were collected including organizational documents for a technical standards meeting.

Table 1. Text types collected in this study

Type of document	Number of versions (drafts) Students kept a new draft file after each meeting with their advisor.	Author
Four articles providing the basis for, and the first completed and final dissertation draft	1, 2, Final versions, 14 and 27 for articles, Final version of Ph.D. thesis	C
An article and reply to reviewer's comment	Final draft	B
Journal Article	20	B
Journal Article	Feedback from me on completed draft and revised draft of intro	H
Proceedings article and presentation	22 and final presentation PPT	D
Two standards documents	Feedback and correction by me with reply from the advisor using the comments function of MS Word.	Lab
Eight Standards documents	A variety of organizational documents in preparation for presentation and discussion at a technical meeting. Other extensive files were also examined but the textual analysis is not included in this study.	Lab
Class assignments and final portfolio (7 documents)		D
Journal article (in progress)	1 abstract and 2 introduction drafts only	E
Laboratory brochure for foreign student recruitment	1	Lab
Journal article (ongoing) main focus of the observations	46 (almost daily meetings with the advisor)	A

3.5.4 Observations

Observations were of two types.

A. Group standards meetings

The standards meetings, conducted in Korean, were participated in by the full standards team consisting of 3-5 mostly doctoral students. I attended a total of 13 editing meetings lasting approximately one hour on average. Although the meetings were slightly different in procedure depending on the stage of the document, the most common procedure was to edit line by line and discuss and even debate word usage. Discussions of appropriateness toward their team strategy in getting their proposal accepted were also discussed. Observational fieldnotes were taken based on a "salience hierarchy" (Richards, 2003, p. 136) focused on materials design and program response as well as background for my understanding of the lab.

B. Journal article meetings with the advisor

The main approach employed in this study was to follow the interaction between the main author N of a co-authored journal article and his advisor over a four month period. A total of 21 meetings ranging from 35 minutes to 90 minutes were observed and notes were taken. For comparison, I also attended two meetings with E as the first author for the introduction and one with B as the first author discussing a reply to reviewer's comments.

C. Format of the editing meetings

Because the findings in Chapter 4 are arranged according to their implications for materials and program development rather than the type of data gathered, a general description of the format of editing meetings is described here. The standards and journal article meetings had the same basic format. The meetings took place in the advisors office. The text was projected from a student's laptop onto a 45 inch screen on the wall. The advisor sat at his desk and I sat with the students on a small sofa set in a U around a table. This format made recording difficult and intrusive but fieldnotes were taken. The advisor would read the sentences and comment on them line by line by making suggestions, asking questions, or dictating corrections that the student would make on the computer. The advisor was the co-author of all documents I observed, which is common practice in engineering. Editorial changes were discussed and debated with the students at points. For the articles, when students did not agree on changes, the advisor would stress the primary role of the first author and his role in helping to clarify their thinking. At one point, the advisor pressed N to provide more data to back up his opinions and stated his purpose in debating a point, "I want you to win over me. Give me examples of why I am wrong." This is in stark contrast to the lack of interaction reported in Huang (2010) and Li (2012a).

3.5.5 Technical seminar

I also presented at an overnight trip technical seminar and was able to observe student as well as guest presenters working in the private sector. This was an opportunity to further interact informally with the lab and was an enjoyable experience.

3.6 Participant observation

I adopted the role of participant observer where I answered questions such as article usage, capitalization of abbreviations, and whether or not some passages had the intended meaning. I gave suggestions about topics such as the given and new information principle and improving the writing process. I also provided proofreading of standards documents and feedback on articles. However, due to the technical nature of the content, I might more accurately describe my role as a "peripheral" participant observer.

CHAPTER 4 FINDINGS AND DISCUSSION

The following sections organize the findings of how my data illuminated potential for a materials and program response. The focus is on support for pre- or post workshop or writing lab consultations, individual study, senior-novice student and/or student-advisor interaction in my context. Given the epistemological difficulty of separating description from interpretation (Grix, 2004) in my question-driven "focused" ethnographic approach (Heigham & Croker, 2009, p. 94), each finding is presented and then its implications discussed, rather than in separate sections. To summarize the findings, a framework for a blended learning program response is presented at the end of this chapter in Figure 1.

4.1 Mentor relationships

A central concept in examining social approaches to understanding graduate student learning is through the concept of apprenticeship. However, this master-apprentice analogy seems to downplay the importance of self-directed, peer, and senior and novice student interaction. While walking to the advisor's office, I was introduced to F by N when N noted that he was F's "mentor." In follow-up interviews with B and discussion with D, I found that this mentor-mentee relationship was introduced in this lab a year ago. Mentors are senior PhD students assigned to help master's students with their research skills. When a master's student has an idea, they refine it with their mentor before proposing it to the professor, according to D and B. Mentors then become the second author with the faculty advisor being the last author.

To determine if mentoring could be a useful vehicle to provide materials and support, I interviewed B for 40 minutes. B was a newly appointed post-doctoral student who had just

graduated from this lab and was a mentor to D and G as well as the most successful student in terms of publications. I asked him to imagine what he could have learned more efficiently if he had had the help of a mentor when he was a master's student. First, he said he would collect "well-known" papers to pass on to his mentee as exemplars of good writing, which he had already done. This need was also mentioned by B who said that he is "not sure which is a good quality paper" so he valued my opinion in providing annotated examples of what constituted well written papers. Similarly, B explained that master's students "don't know" how to establish the relative quality and reliability of conference papers, domestic journals and SCI journals in a subfield, so he collected a list of the top journals and conferences to help novices map the terrain of his subfield of MPEG research. H noted that a technical seminar weekend workshop I did on how to find theses and dissertations from top engineering schools was an especially valuable source of writing models.

If annotated for content by discipline experts as well as genre moves by ERPP researchers, such sets of seminal papers could provide insight into the criteria valued by a particular field and an opportunity for both to learn. In addition, just labeling genre moves and steps without annotation has been found to be less effective for novices as they may lack the disciplinary background to understand the rhetorical reasons behind the choices of moves (Brown, 2005). ERPP instructors could recommend such practices to advisors to facilitate the transfer of tacit knowledge between senior and junior graduate students.

4.2 Diagnostic approach

However, a significant barrier to learning English writing was simply the lack of time. E who had audited some of my class, indicated that it was useful but, "it takes much time." B also complained that time invested to study English was difficult to find "I know that it save my time, but I have too many works to follow." H also noted that effective mentoring takes time and could have a cost. Unless he worked on a paper with a mentee as a co-author, "It is not helpful for my graduation" he said.

Therefore, to save time a diagnostic approach to materials could be taken. Such an approach is particularly appropriate as needs varied and were sometimes hard to identify from my textual samples of multiple drafts. This is because initial errors in novice early drafts were corrected by second authors and the advisor in successive meetings. For example, an earlier draft of E's introduction used sentence initial "and" which the advisor pointed out as incorrect in a meeting I observed. Master's student F reported extensive help being given to her to write her first solo international conference paper, an important step from peripheral participation. Therefore, the appropriate use of learner corpora (Gilquin, Granger, & Paquot 2007) may not be so clear in

research settings as texts may mask the help novice researchers are receiving. Collections of successive drafts as was done in this study are a potential solution.

4.2.1 Limitations of workshops and online materials approaches

A diagnostic approach would also more quickly identify critical skills that graduate students urgently need or identify those that would waste time for all the stakeholders in a paper if not learned efficiently. Chief among them is proper paraphrasing skills. Tather than plagiarism of ideas, the main confusion is over norms for "borrowing" text (e.g Yilmaz, 2007). This need has also been identified in other studies (Flowerdew & Li, 2007; Li, 2012b) and debated in the scientific community (Vessal & Habibzadeh, 2007). It is not only the possibility of plagiarism that makes a diagnostic approach urgent, but the limits of providing voluntary workshops. Although I give workshops on using references, they are attended by students who already acknowledge their need. In contrast, my own investigation in the methods module (Turner, 2012a) indicated that many students in my classes, including members of the lab studied in this paper, may not be truly aware that they are using sources improperly. Unfortunately, more developed assessment programs as described in Silva, Reichelt, and Lax-Farr (1994), Read (2008) and Swales (1995) would be beyond the staffing expertise and resources available at my institution. Instead, mentors or faculty could ask new graduate students to take a quick plagiarism diagnostic with supporting materials explanation as I have trialed in my class (Turner, 2012a; Appendix 1). If students were found to lack skills, they could be tutored by academic services, their mentor or post-doc, or advisor. Here, it must be acknowledged that competence in discipline specific source use is an epistemologically complex activity (Hyland, 1999) that requires practice and apprenticeship (Tardy, 2005), but to simply avoid improper paraphrase and the more serious types of plagiarism seem realistic and urgent goals. This is especially important as subject faculty may not notice transgressions (Pecorari, 2006) or incorrectly assume students have the skills (Duff, Rogers & Harris 2006), which has been my experience particularly with new faculty returning from the US after PhD programs.

4.2.2 Organizational vs academic plagiarism standards

However, ERPP instructors must take care not to overgeneralize academic standards of source use. As emphasized by the professor in a review of A's paper, graduate education is also "professional education." Graduate student engineers write a mixture of "academic" and what is commonly called "organizational writing," documents such as grant proposals where the norms for textual reuse may differ. In a meeting I observed discussing a standards document that took place over three days of hour-long meetings, N noted that "part of the introduction is copied

from my previous paper, another section is also copied." In reply, the advisor did not object. Later when G mentioned the copied section, the advisor legitimated the practice and noted that "it is OK to reuse some parts of the paper." It should be noted that the transfer of text was not between G's published paper to another academic published source but to a temporary "working" technical document within the standards committee not yet made public. If accepted to be published as part of the standard, the final form would have to be revised. This finding shows the need for instructor awareness of variations in citation practices in different genres in graduate education.

4.3 Core skills

Before discussing other "necessities," the application of a diagnostic approach to other skills will be taken up here. Some skills are less urgent than source use such as formatting papers but must still be learned, often by asking peers. However, many of these skills could be broken down into discrete items and operationalized by an objective task completion check through elearning. For example, in H's paper, the correct IEEE reference format "[2]-[6]" was incorrectly written as "[2],[3],[4],[5],[6]." If students did not complete a task correctly compared to an objective answer, tutorial slides or video could be linked to for review. Although I have already provided quality materials on scientific formatting (www.hanyangowl.org/media/punctuation/formatpunctuationerrorsdesktop.pdf), more opportunity for practice and diagnosis would enable more efficient learning and reduce correction by peers or advisors. Other discrete skills such as correctly formatting figure captions were identified by F as being something she asked of senior students. The incorrect font *batang*, a default font for the Korean version of MS Word, was also used for a brochure in English that I helped to correct. F liked the idea of the efficiency of non-evaluative quizzes and explained that "self-study is better than learning from mentor. Study from mentor is difficult to schedule." When asked, L also felt that a non-evaluative quiz first approach would increase interest.

4.3.1 Video Tutorials

Other "necessities" (Hutchinsen & Waters, 1987, p. 55) identified in this study less amenable to online quizzes and powerpoint slides fell into two categories: research and computer skills and writing principles. In a group meeting, the advisor gave E the feedback that she had not searched the literature sufficiently and had only included one example of a "few" studies she had mentioned in her introduction. In a follow-up interview E agreed that "how to find the paper is a problem." Likewise, N indicated difficulty finding papers in a subfield less familiar to him during an observation. When I asked him to explain his search strategy, he said that he relied

primarily on keyword searches in Google Scholar rather than mining the reference lists of articles to build up his orientation to the research subfield. Video tutorials (using camstudio.org) could be suggested for those indicating inefficient strategies in diagnostic quizzes. Such tutorials may also be needed because, in my experience, workshops done by library staff may suggest broad keyword searches across databases that may not reflect how subject expert faculty may search the literature by starting with the top journals or scholars in their field and "mining" the references. Although G and the advisor felt that student word processing skills were sufficient, I observed a number of needs including the format of embedded lists common in standards documents, which was mentioned by E as being something she had asked senior students. These lists can get surprisingly complicated in MPEG technical documents (Appendix 2 provides an example).

4.3.2 Writing principles

In addition to urgent skills such as proper paraphrasing, my findings showed that key writing principles should be introduced. Perhaps the most transformative that students can apply to their writing is the "given and new" principle (Halliday, 1994, p. 298). This is characteristic of much academic English text where new information is usually presented at the end of a sentence and then taken up again at the beginning of the next sentence where further new information is added at the end. Indeed, Weissberg (1984) argues that this principle is more reliable to describe scientific text than functional models of paragraph development such as comparison and contrast. When I suggested applying this principle to revise a sentence from A's paper, the advisor replied that in his own experience he had been told that "long subject is not good" —a reasonable caution but overgeneralized rule. This observation is in line with Allison et al. (1998) who note that content faculty may know tacitly what is wrong with text but lack linguistic tools and principles to help students revise effectively.

However, B expressed some reservations about how well students would be able to use print materials to learn such principles, "I am concerned about self-study. Some students cannot follow the materials because they don't have the basic concept of writing." He then pointed out that he had the benefit of taking my class which helped him to understand the given to new information principle and to use moves and steps analysis genre frameworks. I acknowledged this hurdle and suggested short elearning videos to introduce key concepts supported by one page handouts describing each principle also with worked examples. He was enthusiastic about such an approach and noted that he had found open courseware materials (http://ocw.mit.edu/index.htm) useful. He said that if such video explanations of key principles were available then "I strongly suggest my mentee to follow the videos." Closed elearning courses are being developed for research writing

(http://sbio.vt.edu/youngs/sciwriting.asp?page=syll) but open stand-alone skills materials would be more amenable to a diagnostic approach, individual reference while writing, and scaffolding interaction between mentors and students and students and faculty. Other principles suitable for video would be techniques to correct sentence punctuation errors (e.g. Turner, 2012b), levels of generality analysis (Smith, 1990) hedging across disciplines (Hyland, 1994), and persuasion. Print material of mine on criticizing previous work politely that could be adapted for video is shown in Appendix 3.

4.4 Heuristics

One way to make the thinking of experts more transparent is through heuristics that serve as "consciousness raising" (Swales, 1987) to more explicitly model tacit knowledge and practices. Such aids to reasoning are especially valuable when students are confronted with their first paper for publication. For example, Blakeslee (1997, p. 158) found that a PhD student in an L1 setting relied on past knowledge of the genre of the lab report in describing his results which impeded rather than scaffolded development of the persuasive rhetorical strategies necessary for published work, which he was not able to model through his own reading.

4.4.1 The "curse" of expertise

The development of expertise has been described across domains as developing from conscious incompetence to unconscious competence where subskills are increasingly chunked together through increasing practice (participation) toward automaticity (Dörnyei, 2009, pp. 153-156). Once gained, however, disciplinary expertise can remain "tacit" (Becher, 1987, p. 262). An important example identified by Bitchener and Basturkmen (2006) was the difficulty subject faculty had of conveying their knowledge of the structure of the thesis in their field to novices. This may in part be due to the "curse of expertise," the human tendency of experts to overestimate the knowledge and background of novices (Nickerson, 2001, p. 270). However, if expert knowledge is not made more transparent to novices joining a CoP then organizational learning may suffer. To avoid such loss, organizations are developing best practices for the transfer of informal learning, especially in business settings (Wenger, McDermott, & Snyder, 2002). In applied linguistics, Li (2012a) also calls for greater incorporation of subject faculty expertise into EAP pedagogy, not just as expert informants to validate research.

4.4.2 Alternative formats of heuristics

One type of heuristic is genre moves and steps frameworks for abstracts, introductions, and results/discussion sections, which I created based on Swales' Revised CARS model for use in my classes and workshops (see Appendix 4 for examples). However, as mentioned, B questioned whether genre moves materials would be easy to understand without teaching, while N found the alternative checklist format I have also made (http://www.hanyangowl.org/media/researcharticle/researcharticlechecklist.pdf) easier to use on his own. On the other hand, E found the moves analysis useful as she reported that she had to draft the first version of her abstract and introduction before meeting her advisor. As a methods aside, I was able to ask such questions prompted by my observations by using a few minutes of transit time to the advisor's office—a clear benefit of informal interaction. Therefore, alternative formats of heuristics need to be researched.

For students who desire a more usable alternative to genre moves materials, question based heuristics may provide an answer. Materials based on heuristics are being used with success for university freshman lab report writing because they have the benefit of making the thinking process inherent in the genre more transparent to students (Erkol, Kisoglu, & Büyükkasap, 2010), as shown in Table 1.

Table 1. Example of a heuristic vs a traditional descriptive approach to writing lab reports

Standard Report format	Science Writing Heuristic Template
1. Title, purpose 2. Outline of procedure 3. Data and observations 4. Discussion 5. Balanced equations, calculations, graphs	1. Beginning Questions: What are my questions? 2. Tests: What did I do? 3. Observations: What did I see? 4. Claims: What can I claim? 5. Evidence: How do I know? Why am I making these claims? 6. Reading: How do my ideas compare with other ideas? 7. Reflection: How have my ideas changed?

(Source: reproduced from Erkol, Kisoglu, & Büyükkasap, 2010, p. 2311)

Another benefit of heuristic questions is that they can be both broader and narrower than descriptive ESP genre moves and steps analysis. My data highlights some examples with implications for materials design.

In our very first interview in answer to my question of what were the most common difficulties of students, the advisor identified the importance of "logical writing." When prompted to give examples to unpack the concept he included "identifying assumptions," "providing adequate background," and "transitions" between sections of texts as particularly problematic for students. In the work of this lab, assumptions are likely to be part of the

constraints of the experimental setup. G also mentioned transitions and logic, “What is a good expression as a bridge in a logical way” [translated]. Heuristics to aid student thinking could be in the form of narrow questions like the following:

- What specific assumptions do I have in my model/experiment/proposal etc.?

A worksheet to fill out before meeting the advisor could also include tasks to clarify thinking such as

- The specific assumptions of my model/experiment are ….

4.4.3 Audience and background

An example of a broad issue was the question of audience and background, which came up a number of times during meetings I observed between the advisor and the first author A. Their paper involved the issue of standards engineering education written for a more general audience than the more technical MPEG research and standards papers usually written by this lab. This difference caused difficulty as evidenced in one early meeting. After related discussion, the second author F, directly asked “who is the target of the journal?” In response, the advisor explained that the paper would be of interest to faculty and administrators. At two other sessions, the advisor reminded the primary author “don’t mention tech too much as it will be a general audience” At a later session, the advisor suggested that N “use simple examples, like digital TV so people can understand it.” Therefore, a useful focusing heuristic might help authors imagine their audience:

- The type of people I am writing this paper for have the following background knowledge …

Before starting a paper, graduate students could be asked by faculty to fill out a worksheet question to define their audience in order to get consensus with their advisor. Clarifying such differences in assumptions early could even be a determinant of successful dissertation completion as Belcher (1994) found. In investigating student-advisor interaction in the UK, Shaw (1991, p. 194) also uncovered confusion concerning audience for the dissertation with the interesting finding that a more expert reader is the norm in China. As “unpublished” but public genres of work, the thesis and dissertation are especially problematic (Bitchener & Basturkmen, 2006, p. 6) with regards to audience. Such foundational heuristics need not even be written in

English as it was found in this lab that preliminary and ongoing outlines were usually written in Korean and checked by mentors or the advisor, while the drafting was done in English. These examples show that well designed heuristics could potentially help scaffold more effective interaction between graduate students and advisors.

However, the wording of heuristics can be important. While self- or peer-administered checklists or heuristic questions are fairly common in second language editing and guidebooks on research writing (e.g. Hart, 2005, p. 15), they often involve questions that may be hard for students to self-evaluate such as my own problematic checklist example: "Have you clearly explained the research problem?" In such an example, the student may not be armed with criteria to evaluate clarity. However, a contrasting approach was suggested by my observation data. In helping to clarify the purpose of the paper for A, the advisor explained that people are going to remember very few things after reading a paper. Therefore, he advised N to "tell a great story." This was important because "people should remember just one thing, so you are making a case" [the contribution of the paper]. This attempt to scaffold the student's rhetorical awareness could be transformed into a useful heuristic to help students focus the purpose of the paper as follows:

A. What is (are) the one (two) things that you want your reader to remember after reading this paper? [advisor]
B. Where exactly in the paper have you emphasized these points? [my addition]

Point B is included because I have found in teaching that specific instructions to circle, underline, bold, or annotate with MS Word™ comments make peer editing and student understanding more transparent to evaluate. Therefore, a heuristic question to check that the contribution to the literature is being made clear could be phrased as follows.

- Underline the sentences that indicate how your paper has contributed something significant that is different from other papers in this research area.

Adopting such a directive approach would help mentors and advisors to quickly locate and check key passages. This may be a critical step as there can be a gap in what a writer thinks they have explained and what they have explicitly stated that standard checklists may fail to identify. Problems with such a comprehension and performance gap were identified by Artemeva and Fox (2010) who found disparities between student's awareness of genre and their actual writing performance. As an example, the journal reviewer's comments on K's journal article, which I edited, indicated a desire for a more explicit presentation of the research contribution, "It is hard to understand what is the main contribution? Is it the idea of SVA, and/or CDC, and/or BSC? *The main contribution can be stated upfront*" [Italics added].

4.4.4 Heuristics as aids to contrastive rhetoric

Another reason to ask students to locate the exact sentences is that there is evidence from contrastive rhetoric that native speaker's English prose tends to be more "writer responsible," a term introduced in Hinds (1987) to describe a more direct style of writing where the onus is on the author to be clear. In contrast, speakers of other, even European, "reader responsible" languages, may feel writing that is too direct may be even insulting to informed readers. St. John (1987) humorously reports this view by a Spanish researcher: "Americans and British write for bobos" and that "child's language" is required (St. John, 1987, p. 114). From a "critical" perspective (Benesch, 1996), we may share the concern of the assumption of assimilation in much EAP work as expressed by Kubota (1999) in questioning why the norms of English speaking countries are to be *the* privileged standard of writing. However, at least when limited to making assumptions explicit and explaining research purpose directly, these seem to be desirable goals to avoid confusion when science is read in English by multilingual authors from languages with different rhetorical traditions. A useful heuristic to prompt discussion might be

- Generally speaking, is it the primary job of the writer to write clearly, or for the reader to understand what is written?

There was also general acceptance that this audience will be in English. Indeed, four of the students and the advisor mentioned that they preferred to write in English and D in particular mentioned the benefits of presenting in the US that his English skills afforded him. At least in the very globalized field of engineering, I have not found much concern about the loss of Korean language journals. However, I noted that some students lacked experience writing in professional written Korean. Therefore, for those students with Korean PhDs (who are more likely to enter the private sector according to the advisor) this reduced opportunity to write in Korean may be a negative consequence of the dominance of English that may have an effect on student needs that is worth further study.

In my concluding interview with the professor, he stated that the heuristics approach had potential, "I think this is good." In addition, he was in favor of checklists as well: "I like the idea of checklists as a must thing before they come to me." Part of the reason was that he judged that the students would respond well to the clear task and that it might save the author and advisor unnecessary revision time.

4.4.5 Heuristics as aids to model mentoring practice

However, an even more critical need for creation of heuristics and checklists for use between students and mentors was identified in my interviews. Most senior students, including A, showed a clear lack of confidence in their ability to mentor. As H stated emphatically: "Even I don't know how to write. I think I do not deserve to teach someone writing." However, L, a PhD student with experience living in the US in his youth, felt that senior students had excessively high expectations of their mentoring role with their Korean cultural assumptions of the role of the teacher when, as L stated, "they could [just] share how they write." Apart from lack of confidence, L also identified an additional hurdle, "We don't have materials we could use to teach or guidelines." Indeed, formalizing the mentor system in this lab was later discontinued and changed to ad-hoc help between students for these reasons. Therefore, a writing lab program response could be to design effective checklists and heuristics to help scaffold interaction between students. Therefore, I will redesign my existing checklists (see Appendix 5) to also serve this purpose. In addition, workshops given to post-docs and senior students on effective reviewing and mentoring strategies and modeling the use of materials could help build more of a peer help paradigm rather than a mentor-mentee "burden." In short, a teacher training type approach similar to international teaching assistant workshops in English-speaking countries could be adopted.

4.4.6 Heuristics as aids to discipline specific discourse

In addition to general research writing heuristics, more discipline specific heuristics could facilitate student's peripheral participation by making the "disciplinary discourse" (Becher, 1987) and epistemology of a particular field more transparent more quickly. An example of the importance of this thinking emerged in one of the meetings about A's article. The advisor pointed out that information essential to the decision on whether or not to introduce a new standard was lacking in the draft. The advisor modeled the thinking of experts as follows: "What are the competitor's in this market? Is this technology out of date? Is this standard necessary? Is there are only a few?"

These findings point to a promising direction for more research incorporating expert thinking into materials designed for novices as well as to facilitate student-advisor interaction. In addition to fieldwork, this research could draw on the common genre of how to read journal articles in a given field (e.g. medicine in Greenhalgh, 1997) as well as studies of the epistemological differences (Bazerman, 2008; Becher, 1987; Donald, 2002; Hyland, 2007) between fields to better understand the "conceptual structure" or ways of thinking, if not the content of a given field (Bloor, 1998 p. 52, citing Swales, 1985).

4.5 Short guides

Respondents also requested short guides on sections of the research article such as the introduction. G indicated a desire for two tiers of materials to consult while writing, "If he needs introduction part he will first see the short guide and if it is not enough then look at big book" [Translated by D]. This further reinforced the importance of materials designed for whilst in use writing and reference by students rather than traditional textbooks or workshop handouts—a neglected area of research. Therefore, my existing guide to engineering research writing (http://www.hanyangowl.org/media/textbook/engsciresearchwritingbook.pdf) could be broken up into shorter more concise stand-alone guides.

One page double-sided summaries on topics like given and new sentence structure could also be developed to supplement videos or as stand-alone materials. Other topics for short handouts identified in this study were gender neutral language and the difference between technical British and American English such as for punctuation and use of quotation marks. The advisor cleared up my confusion in giving feedback on a technical standards document by explaining that "MPEG or ISO prefers to use British English", evidence of "Englishes" as a lingua franca.

4.6 Vocabulary and sentence level support requested

In this study, even the students with the strongest English skills emphasized the need for more sentence level support. This was also requested by the more experienced researchers in Cargill and O'Connor's workshops in China, to the researcher's surprise (Cargill et al., 2012, p. 65). However, a significant finding of this study was that the types of help requested would not be met by lists of frequent vocabulary (e.g. Coxhead, 2011) or four word lexical bundles (e.g. Hyland, 2008) common in corpus studies.

Respondents E, I, and G all emphasized the difficulty of vocabulary—a common finding also in Dong (1998) and Shaw (1991). However, like the Spanish researchers in St. John's (1987) study, E had difficulty using "similar words to write the some clear meaning" such as "experiment" (verb) vs "implement" rather than not knowing words. F also mentioned that "similar words is very difficult." G also reported more difficultly determining the "nuances" of words rather than not knowing the core meaning and said that he did not need help with technical vocabulary. Only, M, a master's student, felt he needed "more professional vocabulary." Part of the difficulty E had was the lack of explanation of the differences of usage of similar words in bilingual dictionaries, which has been noted as a challenge to English learners in the literature (Chon, 2009, p. 26). As a related problem, L said that "Korean students don't know about thesaurus," another topic for a video tutorial.

In agreement with my own practice, E did not view teaching word lists as effective use of class time or appropriate for graduate students. Instead, she advised me to "Let them write some sentences related to their research, so they will find the words they need for themselves." In contrast to EAP undergraduate classes (e.g. Olga, 2006), vocabulary lists based on frequency do not seem to be a worthwhile for this population, However, lists of academic words that are often confused were requested by E, F, and G. Textual analysis showed that N was unsure of the correct register for words like "meanwhile; besides (sentence initial); So far; and sentential initial "Today, and Nowadays." F mentioned the same difficultly with words like "actually" as well as usage such as "see and watch" [a video] in our interview. Therefore, a list of commonly confused academic words and words that are too informal in an academic register would be valuable content for a short guide format. At my request E started to take notes on vocabulary and usage problems (see Appendix 6).

4.6.1 The importance of phraseology in student learning practices

An important step in the process toward fuller participation and acceptance as a "member" of a new community of practice (Hyland, 2008, p. 5) is learning its terminology as well as the phraseological preferences of a new community of practice. B was explicitly aware of the constraints of register and formulaic discourse when entering his established community: "Expression is very difficult for me. I have my own ideas, but I have to express their way, not my own way." The word "expression" in Korean English can mean idioms or generic sentence stems or heads as suggested in general EAP courses (http://www.phrasebank.manchester.ac.uk/; http://www.uefap.com/). To acquire this knowledge, B collects examples of useful expressions in his field and from his five published papers and his PhD Dissertation. During our interview, B demonstrated his practice of textual reuse on his laptop that shows an intuitive sense of the pervasiveness of phraseology. This example shows where B has bolded the chunks and patterns of value he identified:

> The DCT **has found wide application in** image/video processing and other fields.

He then substitutes his own nouns related to the content of the paper he is working on rather than including the meaning of the sentence as a source for a standard paraphrase. I confirmed that B is aware of how to properly paraphrase during our interview. More examples he found useful can be found in Appendix 7. The Spanish scientists in St. John's study followed a similar practice (1987, p. 118) as did many respondents in Shaw's study (1991) who "made purely linguistic notes of useful phrases, referring to 'fantastically good words,' 'beautiful language,' and 'good terms,' and quoting examples like 'the foregoing indicates,' 'highlighted the fact

that,' and 'such tests are still useful but it is now recognised that . . .' (p. 196)." Chinese scientists in Flowerdew and Li's (2007) study followed the same practice but the researchers found the subsequent language reuse to be problematic as has a recent study (Li, 2012b).

Given the pervasiveness of common phraseology in genres such as computer engineering research articles, distinguishing between legitimate textual borrowing and improper paraphrase in science writing is more complex than it seems, as my methods module research found (Turner, 2012a). While being careful that students are aware of how to properly paraphrase, EAP and ERPP researchers could "harvest" such a bounty of expressions as they are likely to be useful to other students. When I asked, a "good expression list" was felt to be particularly valuable to B as it would have saved some time he had taken to collect such expressions on his own. This widespread practice by non-native speakers of modeling sentence patterns explicitly may not be that different from native-speakers, except that native speakers acquire this language more implicitly by extensive reading in a field.

The implication of these findings is that researchers could draw more on analysis done by their student populations and share these notes with other students as well as researchers as a complement to descriptive corpus analysis. B indicated that there was "No reason not to share." In response, I recommended the free text clipping software, www.evernote.com, that would enable easy tagging, searching, and sharing between students.

4.6.2 Supra-sentential patterns

Although texts such as Swales and Feak (2004) include a language focus for many functions, there are few examples given and few are above the sentence level. Therefore, supra-sentential or multi-clause patterns could also be investigated such as the problematic example found in H's paper:

> Many researchers have tried noise removal techniques after analog-to-digital conversion before compression. This is because noise removal is better performed at the earliest possible stage, analog-to-digital conversion. Otherwise, the noises are likely to be enlarged or propagated during the compression stage. Most research on noise detection and removal has concentrated on pure film noise before compression [2]-[16].
>
> However, there are several difficulties in the noise removal process right after digitization: …

Here most readers would expect a contrasting pattern signaled by "Most research …. has concentrated on" to indicate a gap (Swales, 1990) describing a lack in another area, such as "but have failed to consider…" In addition, we might expect a contrast with the repeated keyword "after compression" to follow the "given and new" principle. I have already identified polite criticism of previous work in my research as a multi-clause or supra-sentential pattern (Appendix 3). Other more discipline-specific supra-sentential patterns such as explaining tradeoffs between accuracy and time to compute in image processing could be investigated as well as discipline specific realizations of patterns such as "logical sequence" in the work of Winter and "multilayered patterns" in the work of Hoey (as cited in Bloor and Coulthard, 2005).

As noted by Cargill et al. (2012), we may conclude that for the students in this study, "how to write an article" presentations given by foreign lecturers are less needed than "how to write it in English" (p. 63) with the latter needing more focus in EFL settings, especially where, as in this study, students are receiving effective advising from some faculty co-authors on rhetorical strategies. However, a significant hurdle remains on just how to make the fruits of computer corpus and manual textual analysis accessible by students and not just researchers.

4.7 Search as a solution to materials distribution and linguistic variation

Even if teacher-researchers were able to identify and connect phraseology to function (Durrant and Mathews-Aydinli, 2011) needed by students in particular fields by including local student needs analysis, student "expressions" notes, common errors, and/or comparative learner and expert corpora, it is unclear how this information could be accessed by students. Indeed, N was clearly skeptical, "I don't believe that such things can easily be delivered through written material" unless it was in a "dictionary" format he said. To achieve this, an online menu hierarchy of functions combined with a keyword search interface similar to (http://egg.ust.hk/cl3/index.html) could be used. Students could search by function, "criticizing previous research politely" or keywords, "polite" to find sentence patterns. The wiki site www.pbworks.com could achieve a similar interface but add the capability of collaboration in collecting patterns by researchers and/or students. While large corpora are online, they are not genre and discipline specific enough for research article language. However, open tools are developing (e.g. http://search-micusp.elicorpora.info/simple/).

Another barrier to researchers and students sharing lists of "expressions" is the pervasiveness of disciplinary variation in lexical bundles (Hyland, 2008) as well as academic vocabulary (Hyland & Tse, 2007). Proposed solutions have involved students creating their own corpus for exploitation with corpus software (Lee and Swales, 2006). However, concordancing software involves a learning curve that Yoon (2011) concludes requires training and has English user manuals, making it less suitable for EFL graduate student independent study. However, the

problem of disciplinary variation could be limited by having students validate instructor or peer created materials against their own specialist subfield corpus created from Adobe advanced PDF searches that can search *across* PDF files of articles collected by students from their given subfield, much like a rudimentary concordancer (for the technique see www.hanyangowl.org/media/computerassisted/computerassistedwriting.pdf). Google Scholar could be a less accurate but effective alternative. For example, using PDF advanced search, D found that sentence initial "Interestingly," was more common in computer engineering than I had expected. N, B, and D said that they continue to use these methods extensively that I introduced in class or through workshops. Students could also check whether words suggested using a thesaurus were appropriate for their field by searching their corpus of PDF articles.

One benefit of such "data driven learning" (Johns, 1991 as cited in Hadley, 2002, p. 106) is that it may reduce pressure on EAP specialists to be arbitrators of the linguistic features of specific research fields and instead concentrate on facilitating student skills in doing their own textual analysis to become more engaged as analysts (Holme & Chalauisaeng, 2006) of the phraseology of their own research area.

4.8 Framework for a materials and program response

Figure 1 gathers these findings into a framework for a program response.

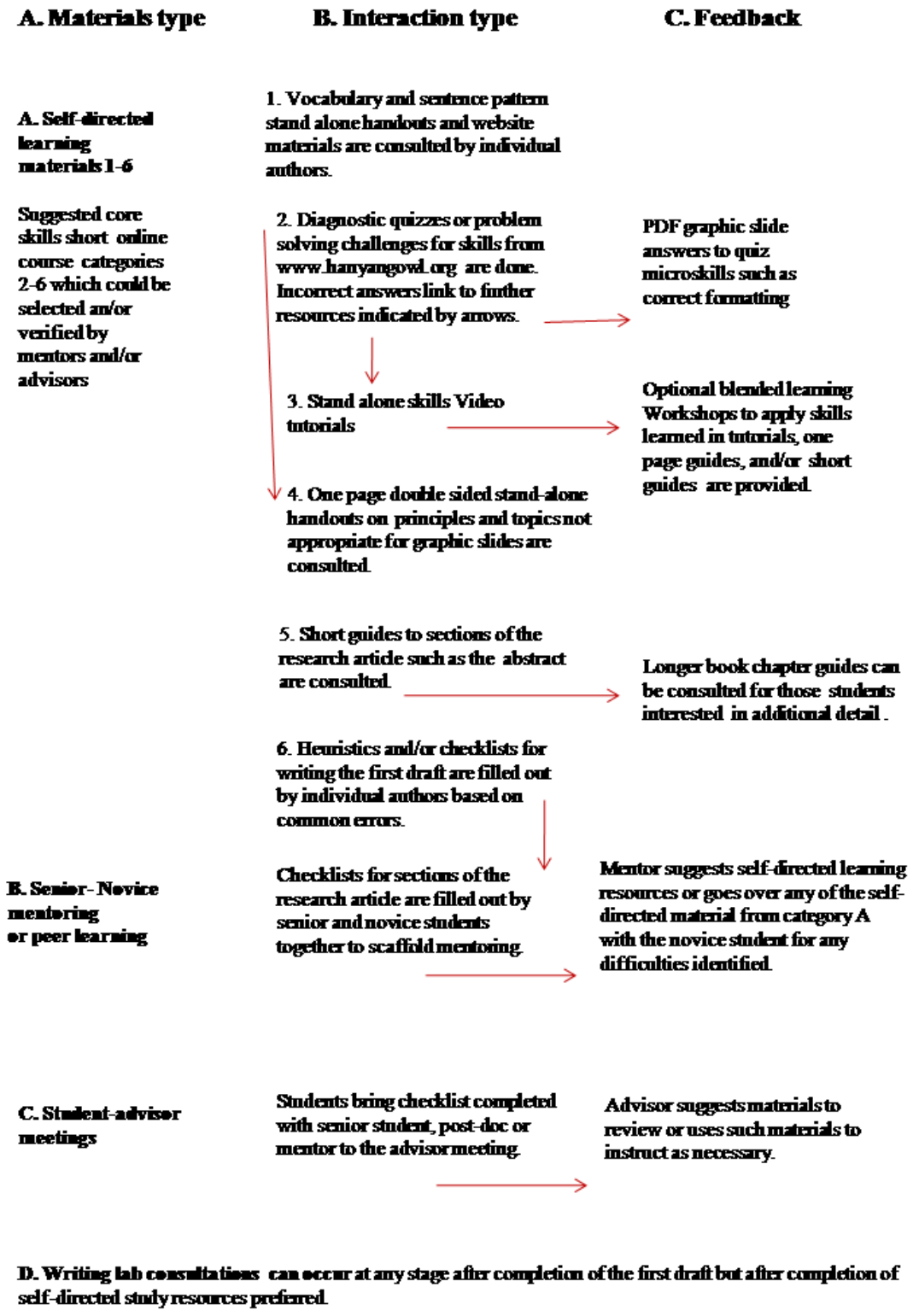

Figure 1. Framework for support for graduate research writing

Column A indicates the type of materials that students and faculty can choose from. Column B indicates the type of interaction with the materials, whether individual or with mentors. Column

C shows options for feedback or further study. The materials in interaction types 1-6 could form the basis for an optional short self-directed online course at www.hanyangowl.org.

CHAPTER 5 CONCLUSION

5.1 Limitations of the study

There are a number of limitations that may limit the generalizability of my findings. The extent of observation access was only made possible by the admirable fluency of the PhD student I observed in meetings. The agreement to conduct sessions in English created an "observer effect" (Richards, 2003, p. 156). When asked about the effect of speaking English, N said that he found some points of debate over content more difficult with his advisor, but was motivated by the extensive English practice in a professional context that it gave him. The extraordinary support and dedication to mentoring of the advisor is not typical of many labs according to student interviews and my anecdotal experience. My insufficient academic Korean limited my ability to understand other meetings, resulting in a bias in my data toward the students with greater English skills. However, my primary purpose was to gain ideas for materials and program responses rather than ethnography, which mitigates these problems somewhat.

The problem of generalization is inherent in any ethnographic work (Ramanathan & Atkinson, 1999) particularly as this study was based on a single laboratory in order to focus on interaction in one community of practice. Finally, too much of my evidence rests on the perception of effectiveness of some materials formats and topics rather than adequate empirical validation. However, as the advisor stressed "You don't know until you try" what formats and materials will ultimately be successful in any case, even with similar groups and individuals. Indeed, the advisor sagely cautioned that "the application will vary according to each individual." Following this advice, the materials will be designed and organized to be accessed in a number of ways: as a short online course, individual reference while writing, and peer interaction as well as multimodal quiz, video, search, and print formats with the expectation that students and advisors will use them in different combinations.

In terms of the limitations of the methods used, I would try to observe more tasks such as searching (using www.screenr.com) and ask clarification questions in realtime as is done in psychology research. I would also try to enlist students and faculty even more collaboratively in co-creating materials such as checklists, problem vocabulary and "expression" lists. As expected, the written interview response was low and also less useful as students lacked the vocabulary to clearly articulate their views without my follow-up questions, as during interviews, so I would use a less open-ended format in future research. The meeting

observations were time-consuming but very valuable, however, and should be done by more ERPP researchers.

5.2 Ethical considerations

In employing research in such an interactive environment, care must be taken to consider the interests of the informants. First, the motivation for this research was not purely descriptive but designed to help the students. Indeed, echoing Spradley (1979) “the purpose was to learn from the participants rather than study them” (as cited in Flowerdew, 1999b, p. 250). In addition, I was careful to respect the authority of the faculty advisor in front of his graduate students, a complex power relationship that ERPP researchers must be sensitive to. As was the case in Allison et al. (1988) where she identified problems with student research designs she was analyzing, I did not single out individual student skills deficiencies to the advisor but instead voiced my general concerns. As Richards (2003, p. 140) cautions, even in public observations researchers must consider privacy and have a duty not to “harm” the subject. The advisor and N who I mainly observed were given a chance for “participant verification” (Flowerdew, 2002, p. 237) by checking their quotations for accurate representation. Each suggested a factual correction related to MPEG standards, which were done.

5.3 Implications of this study

The purpose of this study was to observe and interact with a single laboratory community of practice in order to craft materials and program responses built on a better understanding of the underlying practices that create text. The focus of the findings was to present needs and formats for materials design that had not been sufficiently described in the literature or met by my existing work at the English writing lab. The approach was motivated by my analysis that research on graduate students in EFL settings relying on text, survey and interview data seemed insufficient to capture the interactive and tacit nature of much learning in engineering labs. Hence, participant observation was included as a research method, which distinguishes it from similar studies.

The findings basically validated the methodological approach. Insights such as the mentor-mentee relationship as a vehicle to deliver program materials were gained only through informal interaction. The additional triangulation of observation allowed me to develop the idea of heuristics, which would not have emerged from the interview data alone. Observation and interaction also allowed me to reduce reliance on participant perceptions of their behavior, which may not always be accurate. For example, using observation, Copland (2012) found a

discrepancy between teacher trainer's self-perception of their role in facilitating dialogue and their actual behavior toward their CELTA teacher trainees.

Through observation the opportunity to design materials to scaffold interaction between members of the lab was identified as an entirely unmet need and new research area distinct from facilitating writing groups (e.g. Haas, 2011). Even the research-grounded collaborative workshops proposed by Cargill et al. (2012) are still fundamentally a transmission model of teaching rather than a facilitative approach to learning grounded in existing practices. Heuristics, checklists, and workshops should be developed to facilitate learning between peers, senior students and novices, and students and faculty. Although the mentor role identified in this study is not formalized in many labs and was discontinued, post-doc students often play this role in other labs. In addition, other vehicles for cooperative learning in some fields include weekly "journal clubs" where an article or ongoing research from its members is evaluated by a lab (see Phillips & Glasziou, 2004, for an explanation). Further research using observation on how learning occurs in different disciplines may uncover other vehicles for scaffolding learning and distributing materials in other formats. Indeed, the advisor suggested trialing "as many as possible" formats including attractive use of graphics and even cartoons to draw attention from less motivated students, which L also suggested.

Although it is generally agreed that tacit learning through peripheral participation is characteristic of much graduate study, it is a finding of this and the literature that such implicitness may simply be the result of accepted practice or lack of time, rather than best practice. As the advisor said in the final interview, "my grad professor did not tell me how to write a paper." Self-directed learning could be made much more efficient particularly for core skills such as paraphrasing, searching the literature, and computer skills through online materials with feedback through diagnostic quizzes. Distinguishing between writing skills that need genuine subject specialist mentoring and those that could be more efficiently acquired by quality materials and workshops should be a future research focus.

The findings of this study will change my approach to materials. The importance of usability and whilst in use ease of reference as design criteria were made clear by respondents as existing book-length textbook formats do not seem to be being used effectively in many EFL contexts. As B emphasized, "My suggestion is simple and easy to follow. Simple way is efficient to them [students]." In summary, traditional courses or presentation-style workshops may fit administrative needs but may not be the most efficient response or even the desired one in my or other similar contexts. For example, Orr, Smith, and Watanabe (2003) found a preference for "short intensive training" (p. 360) among researchers in Japan. Creating the types of materials and support identified in Figure 1 will be the focus of my work for the next few years.

However, in the final interview, the advisor impressed on me the importance of student attitude. Some students will learn "if they are hungry" and just presenting the materials will be

enough, while others will need to see the content "as desirable" by effective design. Ultimately however, as I have found in writing this work, knowing best practices and even the best materials are only an aid to supplement extensive practice and mentoring of writing in disciplinary genres.

5.4 Implications for the development of ERPP as a subfield

Perhaps the most interesting conclusion of this work is that rather than simply seeing ERPP as unquestionably supporting the practices to complete research texts, which Pennycook (1997) terms a "vulgar pragmatism," ERPP research-practitioners have potential to better the research experience of students and faculty alike. By studying the research process and developing a somewhat more "critical" perspective (Benesch, 1996) materials and programs could be developed to model and increase awareness of best practices and expected norms of mentorship. To do so, ERRP instructors could collaboratively develop tools (checklists) and materials (heuristics) to aid communication between students and faculty to help them develop as mentors. The advisor in my study devoted a great deal of time and thinking about mentoring the research writing process, and, in the case of N and E, even decided to "change style" and decrease his direct scaffolding to help them become more independent writers. Unfortunately, feelings of disempowerment (Huang, 2010) and lack of mentoring in explaining faculty revisions to student texts (Li, 2012a) seem closer to the norm. Hence, the scope of the field could be widened beyond textual and rhetorical analysis and passive descriptive ethnographic methods to include more active solutions that address the distinctiveness and complexity of inputs that affect the graduate research writing process. These include mentoring, collaboration, writing routines, computer skills, and learning styles. Theory and techniques could be drawn from a wide range of fields including epistemological differences from the sociology of science (Knorr-Cetina, 1981), adult education and self-directed learning (Knowles, Holton, & Swanson, 2005), computer usability analysis of materials (Salvo et al., 2009), the psychology of writing self-regulation (Negretti, 2012), and writing coaching (e.g. www.academicladder.com). Ideally, this more integrated focus would help elevate the status of materials writing as an important "hybrid" (Swales, 1995) research genre in this emerging field.

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Appendices 1-8

Appendix 1
Example of a diagnostic quiz on paraphrasing.
The student has indicated with a 0 the sentences that they believe have been correctly paraphrased.

Paraphrase pre-quiz handout

Here is a paragraph from a real journal article. I want to use the underlined sentence below in my own paper because it clearly states the research problem I want to write about.

> The unreliable and stateless nature of today's Internet protocol (IP) results in a best-effort service, i.e., packets may be delivered with arbitrary delay or may even be lost. This quality-of-service (QoS) limitation is a major challenge for real-time voice communication over IP networks (VoIP). **Since excessive end-to-end delay impairs the interactivity of human conversation, active error control techniques such as retransmission cannot be applied.** Therefore, any packet loss directly degrades the quality of the reconstructed speech. Furthermore, delay variation (also known as jitter) obstructs the proper reconstruction of the voice packets in their original sequential and periodic pattern.

Source: Liang et al.: IEEE Transactions on Multimedia, Vol. 5, No. 4, December 2003 p.532 © IEEE 2003

The first sentence of the next paragraph is my own sentence. The second sentence is taken from the article by Liang et al. that I read and the reference [1] is added in IEEE style. There are five ways this sentence could be used as follows. Mark an X in the space next to the one(s) that are example(s) of **wrong** ways to use a reference. Please mark clearly in each space if you change your mind after talking with your partner.

In simple English, the sentence being paraphrased means that voice communication over the Internet is different from other types of data because when people talk in real-time the voice data can't be interrupted or delayed in the network and therefore can't just be sent again like other types of text or image data.

__O__ __X__ __O__ **Quotation 1** X because it is very rare in engineering writing.

Eliminating excessive end-to-end delay is an essential step in ensuring quality-of-service (QoS) in real-time voice communication over IP networks (VoIP). "Since excessive end-to-end delay impairs the interactivity of human conversation, active error control techniques such as retransmission cannot be applied" [1]. Therefore,

__X__ __X__ __X__ **Paraphrase 1** X

Eliminating excessive end-to-end delay is an essential step in ensuring quality-of-service (QoS) in real-time voice communication over IP networks (VoIP). Since excessive end-to-end delay impairs the interactivity of human conversation, active error control techniques such as retransmission cannot be applied [1]. Therefore, …

__O__ __X__ __X__ **Paraphrase 2** X -(∵ most are same)

Eliminating excessive end-to-end delay is an essential step in ensuring quality-of-service (QoS) in real-time voice communication over IP networks (VoIP). **Because** excessive end-to-end delay impairs the interactivity of human conversation, active error control techniques such as retransmission cannot be **used** [1]. Therefore, …

__X__ __X__ __X__ **Paraphrase 3** X

Eliminating excessive end-to-end delay is an essential step in ensuring quality-of-service (QoS) in real-time voice communication over IP networks (VoIP). **Because** excessive end-to-end delay **interrupts** the **interaction necessary** for human **speech**, **retransmission or other** active error control techniques cannot be **used**. Therefore, …

1st, technical & non-technical word 2/2 구별하고
↳ 이건 안바꿔도 되겠다.

__O__ __O__ __O__ **Paraphrase 4** O

Eliminating excessive end-to-end delay is an essential step in ensuring quality-of-service (QoS) in real-time voice communication over IP networks (VoIP). However, retransmission or other error control techniques cannot be implemented for real-time voice data because too much end-to-end delay impedes the real-time turn-taking necessary for people to have a discussion [1]. Therefore, …

1

technical → keep it
non → almost rewrite

Appendix 2.

Example of complex lists and an edited sample of a draft of a MPEG Technical Document

INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
…
CODING OF MOVING PICTURES AND AUDIO

…

…

Introduction

In this document, we proposed experimental results to convert CDDL to CAL code for syntax parsing, based on RVC CE 1.1 [1] and enhanced CDDL format to describe more efficiently decoder configuration, especially for the most advanced codecs like AVC. In addition, updates of CDDL part in WD and guideline for converting CDDL to CAL code are suggested in Appendix.

Results for CE 1.1

Scope

The objective of this core experiment is to study the feasibility of design and representation of syntax parsing in the decoder description scheme. In this experiment, feasible representation methods and design tools to describe syntax parsing process will be evaluated. Moreover, revision on instantiation methods of syntax parsing FU from decoder description also will be revised in this experiment.

Experimental conditions

Conditions

For easy comparison among the design tools and representation methods for syntax parsing, this core experiment has the following conditions:

1) **Practical examples**
   For the comparison of different design methods or compression tools of decoder description, proposers should provide compression results with MPEG-4 simple profile level 3. And to assure that the proposed technology has generic ability to describe syntax parsing process, proposers shall provide practical example of syntax parsing description from at least two or more different coding standards.

Codec/Profile	CDDL	BSDL	(…)
MPEG-4 Simple	O	O	O
MPEG-2 Main	O	O	…
MPEG-4 AVC Baseline	O	…	
MPEG-4 AVC Main	…		
(…)			

Table 1. Practical examples

- Our revised CDDL supports MPEG-4 SP as anchor codec. MPEG-2 also be supported.
- And, AVC with CAVLC is supported.

2) Instantiation ability

All the proposed descriptions of syntax parsing in this experiment shall be able to instantiate or generate syntax parsing FU automatically by a simulation environment or a supporting program.

- New CDDL can easily be instantiated as running parsers. We will provide two examples: C-based parsing SW and automatic transformation of CDDL to CAL.

3) Reconfigurability

All the proposed technologies in this core experiment shall contain on-the-fly reconfigurability on syntax parsing process description.

- Index-based reconfigurability is still available in this new spec. See BD specification in annex for detailed syntaxes to support reconfigurability.

4) Connectivity with network of FU

Decoder configuration cannot be available without FU networking. Proposed descriptions of syntax parsing shall be able to easily be combined with its counterpart, the description of FU network.

- New CDDL spec contains 'port output' functions that allows syntax parser to make outputs to FU network (and following/connected FUs).

Evaluation Criteria

For the evaluation, the following factors will be considered:

- *Language capability*

  RVC is designed to describe any composition of decoder configuration; therefore, its representation capability will be evaluated in this experiment.

  Language capability may have the following sub-factors:

  - Programmable parsing routines (e.g., branches, loops, VLDs…)
    - New CDDL structure supports programmable syntax parsing flow and has VLD capability including CAVLC from AVC/H.264.
  - Process of defining decoder description from the encoding process
    - Currently cannot be supported automatically.
  - Functionality of bitstream syntax manipulation
    - Since CDDL has index number system, easy manipulation is available.
  - Interface-awareness (with FU network)
    - New CDDL structure can be merged with NL-based FU network through transformation to CAL parser source code.

- It is able to be parse data with data flow based C++ implementation. NOT YET FIN.

- *Compactness*

  This is a general requirement on DD-related experiments: the size of description of syntax parsing will be evaluated (and shall be compared with other proposals).

  - Our compression ratio is as follows… (view result: TD vs BD)

- *Implementation*

  Syntax parsing FU which is instantiated from decoder description will be evaluated. The syntax parsing process is an abstract method and does not reflect any implementation issue. Efficiency of FU instantiating process or decompression complexity of DD (if DD is compressed) shall be a target of the evaluation.

  - TD→CAL transformation only takes a short time as follows… (view result: running time)

Appendix 3.

Criticizing previous research politely

1. Evaluate previous research critically but politely

Use adjectives and adverbs to show your positive or negative evaluations of previous research. We can see that this example is not simply a list of previous research, but the adjectives and adverbs themselves clearly show how the author evaluates the research. Using words like "challenging" and "shed light on" show the difficulty of a procedure while words like "limited" imply criticism.

EXAMPLE
A detailed understanding of the structures and reactivities of lithium enolates, however, has been slow to develop. Although numerous X-ray crystal structures of enolates show dimers, tetramers, and hexamers, analogous structural assignments in solution are both rare and somewhat tentative.[10,11] Colligative properties of enolate solutions shed light on the degree of aggregation[12] but can be technically challenging (especially freezing-point measurements in THF) and afford results that are quite sensitive to adventitious impurities.[13,14] NMR spectroscopy has thus far afforded limited structural details of lithium enolates.
Source: McNeil, et al.: J. AM. CHEM. SOC. 2004, Vol. 126 No. 50 p. 16560 ©2004

When evaluating previous research or responding to reviewers comments, the following sentence structures will help you to keep a polite tone. Just as when we speak, there is a tendency to first give a positive statement first, and then follow with a negative statement.

a) Positive COMPOUND sentence connected with a semi-colon (; however,)

EXAMPLE

The second decision stage chooses the best face location from all possible locations determined by the first stage using only the level 0 template. It was shown in [12] that the scheme shown above can locate the face from a complicated scene successfully; however, it is not guaranteed that the face detection is always successfully.

Source: Kuo et al.: IEEE Transactions on Multimedia, Vol. 5, No. 1, March 2003 p. 9 ©IEEE 2003

b) COMPLEX sentence: ALTHOUGH + STATEMENT, PROBLEM

EXAMPLE

Although nanotubes are a fundamental form encountered in tile based DNA self-assembly, the factors governing tube structure remain poorly understood.

Source: Rothemund et al.: J. AM. CHEM. SOC. 2004, 126, p.16344 ©2004

c) COMPLEX sentence: ALTHOUGH + POSITIVE EVALUATION, + CRITICISM

EXAMPLE

Although these papers present promising applications, the specific guidelines or directions on making use of the descriptors are not sufficient.

d) POSITIVE OR NEUTRAL STATEMENT + HOWEVER , + PROBLEM STATEMENT

EXAMPLE
The omniscient minimum is about 25% of the MSE of the best fixed method, so the tiny tree is capturing most of the available gain. However, the omniscient performance comes at a cost of 0.45% bit rate overhead (three bits for all 40 286 MBs),whereas a five-terminal node tree takes only about 0.001% bitrate overhead.

Source: Cen and Cosman: IEEE Transactions on Multimedia, Vol. 5, No. 1, March 2003 p.6 IEEE ©2003

You may also want to be even more indirect in your criticism of another paper

2. Criticize and summarize methods rather than individual researchers.

Summarize previous problems as a present tense fact

EXAMPLE
In other words, these methods cannot be generalized to novel conditions.

a) Passive impersonal criticism using "it." Refer to other research to help you criticize previous research.

In these examples in the field of computer face recognition, the authors use citations to indicate that the methods are not effective rather than directly criticizing them.

EXAMPLES
It has been argued that it is also possible to estimate an unknown template size using the MF [10], in which case the SAF would not provide any advantage.
Source: IEEE Transactions On Signal Processing, VOL. 56, NO. 8, p3818, AUGUST ©2008

But recently it has been claimed that in certain cases antenna coupling has a beneficial effect [3], [6], [12].

Source: IEEE Communications Society Globecom, p3155 ©2004

3) Other words used to describe problems are "insufficient," "is limited by," or "ineffective" but describe individual methods or theories not author's papers

EXAMPLE
We have attempted to fit the spectra without the Fourier transform filter (Figure S2), but the choice of parameters is not unique for the distant atoms, and the confidence of the fitting is limited by the data quality in the high *k* region.

Source: Mishina et al.: J. AM. CHEM. SOC. 9 Vol.126, No. 51, 2004 p.16934 ©2004

These experiments were performed with the same equipment and methodology used to identify color changes in similar systems with pyridine as the acceptor and underscores our position that electrochemical response in the cathodic region is insufficient to confirm the formation of delocalized charge carriers.
Source: Thomas et al.: J. AM. CHEM. SOC. 9 Vol. 126, No. 50, 2004 p.16448 ©2004

Although our implementation of the algorithm is essentially the same as the traditional association graph methods,[7,8] we have incorporated some heuristics because mathematically strict solutions are sometimes found to be inadequate from the biochemical point of view.

Source: Kotera et al.:J. AM. CHEM. SOC. 9 Vol. 126, No. 50, 2004 p.16489 ©2004

The ineffectiveness of FMO theory as a tool for explaining this phenomenon is now widely accepted.

Source: Ohkata et al.:J. AM. CHEM. SOC. 9 Vol. 126, No. 51, 2004 p.16788 ©2004

Appendix 4a.

Genre moves and steps analysis (Workshop handout Adam Turner, 2012)

Framework for the structure of introduction sections

This framework for paper introductions can be used for the analysis of published papers as well as writing your own paper. In the framework below, note that "AND/OR" indicates a choice between two steps or a combination of both of them, "OPTIONAL" indicates a choice while "AND" alone indicates a requirement. Introduction sections have three essential steps:

STEP 1. SITUATION: Explain the background and importance of the topic.

A) Give general background information on the topic (may include very general background references)
B) Explain the general research purpose/problem/issue in this field and its importance
C) OPTIONAL: Define the key terms and/or explain the key concepts necessary to understand the paper.

Note: The background information serves to indirectly argue that the topic is important as well as help the reader understand the background for the research in your paper.

STEP 2. PROBLEM CYCLE: Introduce the research problem or gap in research of the paper by reviewing and showing problems with previous research, methods, or theories in this research field.

D) Summarize, classify and compare the different methods, techniques, issues, or theories in this research area.
E) Critically evaluate previous theories/methods/issues including directly mentioning individual author's articles related to the problem of your paper by explaining their strengths and weaknesses.
F) AND/OR Indicate a "gap" or data that is lacking in this field to better understand this research problem.

Note: In some papers there may be more than one problem or issue in the research, so there may be a cycle of a summary, analysis, and often criticism that is repeated for more than one issue before the main purpose of the paper is introduced. D+E+F may be mixed together in a paragraph rather than clear separate parts.

STEP 3. SOLUTION: Introduce your paper as a solution to these problems or missing areas of research.

Explain how your paper is going to help solve the research problem or fill the "gap" in research in your field that you introduced in STEP 2.

G) Indicate exactly how the purpose of your paper is to solve a problem with previous research or find the results for something that is not known in your field (a "gap" in knowledge) by directly connecting problems you have identified with previous research or lack of research and the purpose of your own paper.
H) **Optional:** give more information about the methodology or arguments used in your paper and how it is different from other papers.
I) **Optional:** Summarize your main results (only in some fields such as some chemical engineering papers).
J) **Optional**: indicate the organization of each section of your paper (blueprint, common in fields such as computer engineering but not all fields).

Note: The letters in these steps are often not perfectly in this exact order. Also, some papers may have a separate section called “Related works” or “Literature Review” where there is a longer explanation of the background. This template only applies to introduction sections. Also, some of these steps may be quite short, even a couple of sentences or only one paragraph. Framework adapted in part from John M. Swales *Research Genres* (2004).

Appendix 4b.

Framework for writing abstracts

1. Introduction	**Note: All categories will not appear in all abstracts**
A. Background information to understand the need for the research	Some hard sciences or engineering abstracts may not include background sentences and just start with the purpose, methods or results.
B. Research problem, research questions or hypotheses	Research questions are more common in the social sciences, business and education.
C. Explanation of a gap or lack of research in the field that makes your paper necessary	More common in social sciences and almost required in dissertation writing to show that your thesis is a significant document that contributes knowledge to your field.
D. Purpose of the paper or proposal contained in the paper.	Many Sciences and Engineering abstracts do not have much background but start with the purpose of the research or even the method. "*We propose a method to*"
E. Basic description of the contents of the paper	The contents rather than the purpose may be described. *In this paper, we compare case studies of …. and …* *We discuss the problem of …* (Similar to 4A but not the same as the purpose of the paper). This is more common in social sciences.
2. Methods	Usually given in the past tense but may be in present tense if a process or design is described. Methods sections are generally longer in dissertations especially in social sciences; smaller in other types of abstracts. Social science students frequently don't provide enough methods information.
3. Results	Many scientific abstracts concentrate more on the results rather than the introduction or conclusion. Results are given in the past tense. This category refers to reporting the actual data found in the study rather than a summary of the main conclusion (see 4c).
4. Conclusion	Main contribution of the paper. Results and conclusion may be mixed together in some engineering and natural science abstracts.
A. Other topics or issues that will be discussed	Introduction of other topics that are not detailed in the abstract. More likely in papers that are not based on an experimental design and in the social sciences where issues or arguments are debated rather than experimented.
B. Recommendations for changes in policy, training, procedures, or research methods	More common in professional fields such as civil engineering, medicine, nursing, teaching, and law. Recommendations to change policies etc. May also include recommendations for improving research methods etc.
C. Summary of the most important findings of the paper	Rather than specific results an abstract may summarize the main contribution of the paper but not may not talk about the application or importance of the finding to the field. Very similar to results.
D. Implications of the research for the field as a whole.	Explanation of the importance of the research results for the field as a whole, such as applications of the research or areas for future study. Especially important for dissertations.

Note: All categories will not appear in all abstracts. Also, these characteristics do not always appear perfectly in order. Occasionally Results 3 and 4C conclusions may be hard to distinguish. Each option may be represented by only one or two sentences or even a single clause of a sentence!

Appendix 5.

Checklists for different sections of the research article

[Example of the previous format of my checklists which should be changed to make different versions for self-checking and before meeting mentors or advisors. Comprehension and identification of checks should also be made more visible on the authors file if possible by underlining or adding MS Word ™ comments to important items. Different checklists for final formatting and rhetorical strategies could also be made. Note: Minor formatting changes were made from the original].

English Research Writing Checklist

Follow these checklists to review your paper when writing full journal articles that have an experimental structure. In some fields that have structured abstracts such as medicine, not all points below on abstract writing may apply. These tips are based on teaching and working with graduate students and faculty at Hanyang University in Seoul, Korea as well as actual reviewer comments.

Abstract writing checklist

1. I have found and followed the "guidelines for authors" from the journal website.	❑
2. The abstract is the correct number of words.	❑
3. I have written my abstract as a complete text. The reader can understand the key results of my research without reading the whole paper.	❑
4. The main keywords or index words are contained in the title and abstract.	❑
5. I have used as many index words as possible (usually 5) to make it as easy as possible to search my article online. I have consulted the official keywords in my field if appropriate. I have included both general (for non-specialists) and specific (for specialists) key words for interdisciplinary journal papers.	❑
6. I have fully spelled any abbreviations that should be spelled in my field. I have reintroduced those abbreviations in the introduction since the abstract should be written as a separate document.	❑
7. I do not include references from other individual papers directly in the abstract. I only describe my own research, well-known theories or methods, or problems of the field in general.	❑
8. I have included a sentence describing the research methodology used in the paper.	❑
9. I did not copy and paste any of the sentences from the paper directly into the abstract—especially the first two sentences of the introduction.	❑
10. There are no weak verbs such as "discuss," or "examine," or unclear terms such as "various methods." I have described precisely how I did my research and what I found.	❑
11. (Recommended but not required.) The sentences of my abstract follow the same general structure as the rest of my paper: introduction, methods, results, and discussion.	❑

12. I have specifically stated the exact results, implications, and/or importance of the findings. I have quantified (used numbers or %) if possible.	❑
13. In the first few sentences of the abstract, I have shown how my paper addresses a research problem, a limitation of previous methods, or an issue or "gap" in the research in my field (not required but a characteristic of well-written abstracts in any field).	❑

Introduction section checklist

1. I classify the key methods or theories and clearly define the key terms and concepts in my paper using formal definitions where appropriate.	❑
2. I not only list previous research, but I also analyze, synthesize and evaluate the literature in my field related to my research problem.	❑
3. I clearly explain the research problem or the lack of research in the area I am working on.	❑
4. I mention the weaknesses or limitations of previous research or methods related to my research problem.	❑
5. I have made the importance of my paper clear by showing how it is different from previous research and why my research is needed in the field.	❑
6. I reintroduce all abbreviations such as scanning electron microscopy (SEM), in the introduction, even if I have introduced them in the abstract.	❑
7. I have chosen the journal I want to send my paper to after I have completed the first draft. I understand that if I send my paper to a general or multidisciplinary journal rather than a specialist journal, I may need to give more background information and definition of key concepts in the introduction.	❑
8. I have read the author guidelines from the journal and have looked at a sample of the journal I am sending my paper to in order to make sure that the correct reference system is being used.	❑
9. I use a variety of verbs to introduce previous research such as "suggested," "proposed," "developed," etc.	❑
10. I have not copied and pasted the exact same sentence in the first line of my abstract and the first line of my introduction, as it is considered poor style.	❑
11. I have not copied and pasted any sentence from another article, even if I have given a reference. Instead I have rewritten the sentence in my own words as well as giving the reference.	❑
12. I introduce references in a variety of ways appropriate to my field using author names as the subject when discussing the work of an individual author as well as references at the end of the sentence.	❑
13. I have remembered to identify the corresponding author, to include any acknowledgements for those who have helped me, and to provide the exact grant number for any funding that I have received to do the research.	❑

Methods section checklist

1. I have explained my criteria for choosing any special materials/equipment or unusual methods that differ from commonly accepted procedures.	❑
2. I use transition signals to show the sequence of steps in my methods section.	❑
3. I have used active sentence structures to emphasize the choices I have made for my methods if necessary.	❑
4. I have provided enough information so that another researcher could replicate (do) the same experiment with the same results (this is often not possible these days, but it is still a worthwhile goal in science).	❑
5. I have explained the assumptions made in my model or method if they might be questioned.	❑
6. I not only describe my procedure, but I explain the reasons for choosing my methods where necessary by using sentences beginning with “To +Verb” or “In order to +Verb.”	❑
7. I have checked my paper again for any problems with passive sentence structure.	❑
8. I have checked any complex statistical methods again that I have used with this guide from *Nature*. http://www.nature.com/nature/authors/gta/Statistical_checklist.doc	❑

Results section checklist

1. I do not merely describe all of the results in a list, but interpret the important results for the reader. I use words like “significant,” “unexpectedly,” “surprisingly,” or “interestingly” to bring the reader’s attention to the most important results.	❑
2. If appropriate, I have pointed out any problems or inconsistencies with the data (not the same as limitations of the paper).	❑
3. If my paper does not have a separate discussion section, but a combined results and discussion section, I have also included references that compare my findings with the results in previous research papers.	❑
4. I have used the past tense to talk about the completed individual results of my paper, but I have used the present tense to talk about descriptions of figures or tables and generalizations based on these results.	❑
5. My tables have headings at the top, but my figures have captions at the bottom (in almost all journal formats, check).	❑

Discussion/conclusion section checklist

1. I discuss only the most significant findings and do not simply repeat the results section with more commentary.	❑
2. I have noted any problems with the methods or data. I note the implications of these problems and how they might affect the validity of my conclusions.	❑
3. My discussion section includes references from other papers to either support or compare my research.	❑
4. I have analyzed the structure of papers in my field to understand the relationship between the results, discussion, and conclusion sections.	❑
5. I have identified and clearly explained the implications of my findings for the field if important.	❑
6. I have mentioned whether my results support or differ from previous research in the field. If they differ, I have attempted to explain why.	❑
7. I have mentioned some possible areas for further research, the importance of the findings, the limitations of the findings, or the implications and possible applications of my research (not always required but good practice).	❑

Proofreading

1. I printed out my article and viewed the figures, tables, and graphs in print (sometimes font size and color looks clear on screen but is not clear in black and white print). A font size of 8 is often seen as the minimum for readability.	❑
2. I have done the final proofreading on paper not on the screen. Final proofreading for grammar, format, and spelling is more effective on paper.	❑
3. I have found and followed the “guidelines for authors” from the journal website and check the correct format of the references for my target journal. The references are in a consistent format and not just copied and pasted from different journals.	❑
4. My acknowledgements section has the exact grant number for my research.	❑

Tables and Figures

1. I have printed out and check my figures and tables on paper to check if the font size is big enough and that the figures and tables are readable. A font size of 8 is probably the smallest that is readable.	❑
2. If I have used color in my figures or images, I have checked the author guidelines to see if there is an additional fee and whether color printing is available.	❑
3. I have checked to see whether this journal style has a period after the figure caption or not.	❑
4. For Koreans, The font in my figure text is not *batang* or *gulim* or *malgun gothic* which are the defaults for English text in Korean software.	❑

References general

1. I have looked at the first few names in the references at the end of the paper. The first names or family names are consistently in the same format. [They frequently are not when copied and pasted from different articles.] More information	❑
2. I have used “double quotations” for American English and ‘single quotation marks’ (inverted commas) for British English. I have not mixed up the two styles for single words and complete sentences, which is incorrect unless there is a quotation inside another quotation.	❑
3. I have included a page number if I have used a direct quotation “…”	❑
4. I have checked the dates of my references to make sure I am not mixing out of date and recent articles together. “Novel” methods may not be so new after a few years.	❑
5. [For numerical systems, [2], [2]. I have rechecked that my references are in ascending order 1,2,3, etc. after I have made changes to the paper.	❑

Note: This handout is continuously being revised.

Terms of use

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Email corrections and suggestions to adamturner7@gmail.com

END

Appendix 6.

Examples of usage and grammar problems collected by E

Token traffic	The policy of mapping an activation frame to a single PE implies that interprocessor token traffic is only generated by data structure reads and writes and transmission of procedure arguments and return values.	*"Monsoon: an explicit token-store architecture" Greg M Papadopoulos, MIT*
	To obtain a more realistic assessment of the effect of the optimizations it is also necessaryto consider the total token traffic generated by each version of a program.	*"Code optimization for tagged-token dataflow machines"Bohm, A.P.W.Dept. of Comput. Sci., Manchester Univ*
Traffics (rarely used)	A Unified Approximate Evaluation of Congestion Functions for Smooth and Peaky Traffics	*Delbrouck, L., Canada, IEEE Transactions onCommunications*
	Performance analysis of leaky-bucket bandwidth enforcement strategy for bursty traffics in an ATM network	*Young Han Kim, Computer Networks and ISDN Systems, ELSEVIER*
Implementation results	/ Experimental results/	Simulation results
consolidation	merger	combination

Result in + bad results	lead to + general results
A. Moreover, B (B is more adj. compared with A)	A. Additionally, B (B can be no related with A)
Unnecessary (can be deleted)	Redundant (can be reduced)
Modular	model
An FU	A FU
Despite	Despite of (wrong); in spite of (right)
Minimize (to min)	Reduce (fewer)
configure	connection

Appendix 7.

Examples of collected “expressions” by B [edited for length]. Bolding was done by B.

THE discrete cosine transform (DCT) [1], [2] **is a robust approximation of the optimal** Karhunen–Loève transform (KLT) for …

It has satisfactory performance in terms of energy compaction capability, and many fast DCT algorithms with efficient hardware and software implementations **have been proposed.**

The DCT **has found wide application in** image/video processing and other fields.

There are mainly four types of the DCT, and they are labeled I–IV [2].

Among them, the DCT-II **is the most useful**.

Many different fast algorithms for the DCT computation **have been developed for** image and video applications.

Some of them **take advantage of the relationships between** the DCT and various existing fast transforms, including the FFT [1], [6]–[8], the Walsh–Hadamard transform (WHT) [9], [10], and the discrete Hartley transform (DHT) [11].

Besides one-dimensional (1-D) **algorithms**, two-dimensional (2-D) DCT algorithms **have also been investigated extensively** [6], [18]–[21], **generally leading to less computational complexity than** the row-column application of the 1-D methods.

However, the implementation of the direct 2-D DCT **requires much more effort than that of** the separable 2-D DCT.

The theoretical lower bound on the number of multiplications **required** for the 1-D eight-point DCT has been proven to be 11 [22], [23].

In this sense, the method proposed by Loeffler *et al.* [15], with 11 multiplications and 29 additions, **is the most efficient solution**.

In these circumstances, **significant algorithmic savings can be achieved if** some operations of the DCT are incorporated into the quantization step.

This leads to a class of fast 1-D and 2-D **DCTs that are generally referred to as** ..

All of the aforementioned fast algorithms **still need** floatingpoint multiplications, which are slow in both hardware and software implementations.

To achieve faster implementation, **coefficients in many algorithms** such as [7], [8], [16], and [17] **can be scaled and approximated by** …

Another approach for integer DCT **is presented in** [29] **by searching** integer orthogonal transforms with the same symmetry and similar energy compaction capability to the DCT.

Appendix 8.

Survey on learning to write SCI papers in English

[Note: it was actually administered as a written interview to support the face to face interviews rather than as a survey as originally conceived.]

BACKGROUND INFORMATION

1. Name: (optional)
2. Degree and semester: Master's PhD
(Example, master's 3rd semester)

3. Have you ever written a conference paper, journal article, thesis, or dissertation in English or Korean before? Please include the language, type, and number here.

4. MAIN QUESTIONS (only 2!)

A. If I gave printed and online materials to the mentors in your lab or post-docs in other labs, do you think receiving suggestions for what to study/use from your mentor would be a good way to help you to write in English?

B. If you were going to design a combination self-study and materials to be used in the lab between mentor and mentee students as well as between you and your professor, what CONTENT and what FORMAT would you suggest? You can suggest as many as you want. I have included some examples of the types of materials possible below. Please be as specific as possible.

…

EXAMPLES

1. Checklists for writing the journal article that can be used between mentor and mentee or for self study or before meeting your professor. Example: www.hanyangowl.org/media/researcharticle/researcharticlechecklist.pdf

2. Elearning short videos on computer skills like using the advanced search function of Adobe Acrobat Reader like this video: Example, http://www.screenr.com/koW8 (No audio, just prototype); how to find thesis and dissertations in English online; how to use evernote to clip vocabulary etc.

3. Short 5 or 10 minute online lectures on ONE writing principle: For example, using the Given and New information principle; how to fix sentence structure problems, how to connect

sentences logically; tips on how to design PPT slides, etc. Like this format http://www.khanacademy.org/#browse but for English writing. Topics I teach in my class ECE 885. Handouts to summarize and review the lectures.

4. Writing tips handouts combining general writing process tips from me and what I learned from …

EXAMPLE TIP: You can't really finish writing the introduction until you have finished writing the results and discussion because you need to find the focus of your paper. Therefore, don't worry about making each section perfect. Just keep moving forward in your writing. It is common for students to worry too much about grammar and vocabulary when they should concentrate more on the overall logic and structure of the paper and making the main contribution of the article clear to the reader. Grammar and vocabulary problems can always be checked last.

5. Vocabulary lists of words that are too casual or not used for engineering writing: Examples: *So far, Besides, In the meantime,* etc. Vocabulary lists of words that are similar but difficult to use: example, implement vs experiment.

6. Short guides

Shorter handouts with checklists on how to write each section of the research article: introduction, describing data, how to write an abstract etc. Like my book www.hanyangowl.org/media/textbook/engsciresearchwritingbook.pdf but just the key points.

7. Lists of questions (heuristics) to help you read other papers and to think how to write your paper more clearly when you meet your advisor for help. Master's students tell me they are not sure how to read a paper well first year. Here are some examples of the types of questions:

Experimental section

- Is it clear why you/the author choose this particular experimental design/model?
- What assumptions are used in this experimental design? Did you/the author make them clear in the paper?

Research Problem

- Where exactly is the problem statement clearly defined in this paper?
- What background does the reader need to know to understand this research problem?
- What have other researchers done to try to solve this problem? Why haven't they solved the problem? Or why are their solutions not good enough?
- How exactly is your paper different from previous research? Is this clear in the abstract, introduction, and conclusion?
- How exactly and under what conditions is your solution better or different than other solutions?
- Even if your solution was not totally successful, what exact knowledge has it contributed to the field and this research problem?
- What other knowledge is lacking concerning this research problem and should be studied in future research?

Thank you for your participation

Adam Turner adamturner7@gmail.com