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Support Systems for Instructors and Teaching Assistants in the ALESS Program

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Abstract

Teaching English communication to students of science is an essential aspect of scientific education, if students are to develop and become competitive in a global setting. The ALESS (Active Learning of English for Science Students) Program at the University of Tokyo is a 13-week academic writing course for all first-year students of science. The course is taught completely in English by instructors with diverse backgrounds from not just the natural sciences, but also from the social sciences and humanities. For this course, active learning is encouraged and the scientific thought process is emphasized through project-based learning, and students partake in this scientific process by designing and performing scientific experiments which provides the content for their academic papers.

Here, the "support system" includes assistance for students as well as mutual cooperation amongst instructors. As instructors have diverse academic and teaching backgrounds, collaboration and mutual learning constitute an important element of the development of effective curriculum and pedagogy. Among various aspects of the ALESS course, this paper specifically focuses on the supporting system involved in the course. Based on the close examination of the current situation, this paper proposes some possible solutions to problems observed in this study. This study may contribute to the development of course design and teaching methods in English for Specific Academic Purposes.

In this paper, reasons for students to seek advice will be discussed with specific examples of some actual visits. Furthermore, recent attempts to minimize the gap between students' interests and TAs' background disciplines to provide more effective consultations will be mentioned. Some reflections by instructors of various backgrounds as well as some specific concerns that have risen will be reported. Here, we will consider some of the difficulties that are encountered, not by students, but by the instructors and teaching assistants who directly support those taking the course, and discuss the support systems that are in place.

Keywords: *ALESS, English for Specific Academic Purposes, pedagogical practices, scientific writing, support systems*

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1 Introduction to the ALESS Program

1.1 Academic Writing for the Sciences

Academic writing in English is rapidly becoming a required course as part of the English education across all disciplines in Japan. The language of science, as the language of literacy, has become common in various aspects of everyday life (Hyland 2008: 301), and becoming familiar with the shared language in scientific writing is increasingly considered important even at the undergraduate level, rather than assuming that students will learn the writing skills that they will need to succeed later, after they become researchers or take up another profession (Maratese 2013: 3). It is also ideal if Japanese students can learn to write in English without first writing in Japanese, then translating into English. Not only does this save time, direct translations do not make writings easier to communicate to non-Japanese readers (Gosden 1996: 121).

To support such needs, the ALESS Program started in 2008 to prepare undergraduate students to be able to understand the construct and also be able to write in English in the most common research format (IMRaD i.e., Introduction, Methods, Results and Discussion) to present scientific research (Gally 2010, Gally 2011, Middleton 2013). The program is specifically for all first-year students studying science. It has been reported that a significant majority of graduate students in Korea find that they had been at a disadvantage when publishing papers due to technical problems with the language (Cho 2009: 237). Therefore, "[h]aving them acquire appropriate writing skills in English would increase their confidence in English" (Cho 2009: 238) and make them and the country as a whole more competitive globally (Cho 2009: 237). Approximately 80% of science students from the University of Tokyo pursue advanced degrees in graduate school, so in order to prepare its students to perform well as researchers, the ALESS Program believes that an early start is beneficial.

From purely a teaching perspective, there are many decisions that must be made by programs implementing such academic writing courses. From choosing the specialty of the instructors to deciding on the language of instruction, each decision will have impact on the students and on the success of the course. Furthermore, there are conflicting arguments about whether the scientific method should be implemented in classrooms to teach how to investigate science or more simply, "how science is done" (Windschitl 2008: 8). The argument against contends that the scientific method does not allow students to learn a subject matter deeply, focuses on the testing of predictions, and "lacks epistemic framing relevant to the discipline" (Windschitl 2008: 1).

For the ALESS Program, all classes are taught in English by instructors from various fields of research. It also follows the scientific method, as a form of authentic practice to teach English is applied in preparing students to become comfortable reading and writing scientific communication. Authentic forms of inquiry allow students to be enthusiastic and engaged in activities, although it may not focus students' attention to actual scientific ideas (Windschitl 2008: 4). As an English class ALESS is not focused primarily on teaching scientific content, instead the activities are used to facilitate academic writing. Windschitl (2008) argues that the actual scientific method may not

lead students to ask "why" questions, but may be "reinforcing a naive 'discovery' worldview in which scientists pose random questions without the framing of any underlying model" (Windschitl 2008: 6). Nonetheless, in ALESS classes, students begin by finding background papers to find gaps in knowledge to form the initial research question and to pose a hypothesis. Furthermore, the actual IMRaD format forces students to ask questions such as "why was the experiment important to do?" or "why were the results unexpected and what were the limitations that may have led to the discrepancies?" leading to development of conceptual understandings that can be guided in the classroom.

Modeling the scientific process stimulates scientific inquiry, and the authenticity of activities stimulates discussions, makes each activity more individualized and meaningful for each student, and also models research that many students will pursue in graduate school (Mishina 2015). Furthermore, incorporating an experimental aspect allows students to perform their own research and find scientific articles related to their research. This naturally raises awareness of the language that is used in scientific communication and provides concrete content for learning. This is important as classes are mixed levels, and for those language learners who are not proficient in English. The experimental aspect provides something concrete, rather than abstract ideas, to write and incorporate into their academic papers. Therefore, the supporting system for students must address two aspects—developing an academic writing skill in English as well as designing and performing original scientific experiments. The ALESS Program believes that the final product of the course, students' final IMRaD papers, is extremely important, but it puts just as much emphasis on the magnitude of the learning process throughout the course. By providing self-access support centers, the program provides opportunities for students to gain effective and valuable learning tools for the future.

1.2 Support Centers for Students

To assist students taking the ALESS course, there are two support centers. The Komaba Writers' Studio (KWS) is a writing center to help ALESS students with the writing aspects, whereas the ALESS Lab is a laboratory to help students with scientific assistance. Both of the support centers are self-access and encourage autonomous learning. Each support center has a manager who is in charge of overseeing and organizing the consultations, but on the whole, the actual consultations are initiated by graduate student teaching assistants (TAs).

The Komaba Writers' Studio (KWS) is a writing center initially created specifically for the ALESS Program and is designed to support students with the writing aspects of the course (Gally 2010). "Writing for publication in peer-reviewed research journals requires specialized skills and knowledge. It asks for mastery of English grammar and the ability to structure and present a convincing, logical argument. It needs a clear understanding of the technical requirements of the research paper genre and of international norms governing their production" (Matarese 2013: 2). The concept of the KWS, however, is to not simply provide a grammar check assistance but rather help students with all other aspects of the writing process, including improving ideas and

helping students develop the thought processes that would help them in their future writing. ALESS students can receive individualized writing assistance for such concerns at the KWS.

In general, the KWS has approximately 1200 visits each semester and estimates that approximately 50% of students revisit for follow-up consultations. The 40-minute consultation sessions can be in either English or Japanese, providing students with options to speak with the TAs who are comfortable consulting in either Japanese or English. More than 20 graduate students work as KWS TAs each year, and every semester, they are trained while on the job to get immediate feedback after each session and to observe other TAs consulting students. They participate in workshops with invited speakers on topics such as "how to lead sessions." They also participate in role-playing sessions to play or consult a hypothetical "difficult student." KWS TAs are also required to attend ALESS classes to observe and learn how the classes are implemented and discover their role in the Program.

The second support center for students is the ALESS Lab, which is a scientific laboratory specifically designed to support students of the ALESS program (Yamamura et al. 2016). The ALESS program covers a variety of science disciplines. There are about 20 graduate students who serve as TAs and consult approximately 1300 undergraduate students each semester. The ALESS Lab is a scientific laboratory specifically designed to support the students of this course. There are approximately 3000 consultations each year, attesting to the role that it plays in active learning in this course. TAs have a wide variety of science backgrounds, including mathematics, physics, chemistry, biology. These Science TAs have the responsibility of helping ALESS students with their research projects.

2 Support for ALESS Staff

2.1 Support for ALESS Lab TAs

Students generally visit the ALESS Lab for three main reasons (Figure 1):

Case 1. Students want help coming up with initial ideas for their ALESS experiment (more than 50%).
Case 2. Students want to know how to prove their scientific questions and actually set up their experiments (40%).
Case 3. Some students come to the ALESS Lab because they want to use cutting-edge technologies (less than 10%).

Figure 1: Three main reasons for ALESS Lab visits by students

As ALESS students spend the first several sessions deciding on a research question and an experiment to answer the question, many seek advice early in the semester at the ALESS Lab. The topics of the research questions can range from biology and food

chemistry to physics, for instance, so the ALESS Lab consults students about a wide variety of scientific disciplines. Table 1 shows the research topics of the consulting students as well as the research fields of the ALESS Lab TAs for the Autumn semester 2016.

Research Topic	**Number of Consultations**	**Research specialty of the TAs**
Mathematics	10	2
Physics	132	5
Chemistry	57	5
Biology	105	11
Food Science	141	0
Behavioral Science	25	2
Other	77	-
Total	547	25

Table 1: The number of consultations in one semester by research topic and research field of the 25 ALESS Lab TAs in Autumn 2016 semester

Furthermore, as the ALESS Lab consultations are by walk-ins only, TAs have the responsibility of assisting students with their experimental projects "on the spot," and these TAs may find it problematic if they are consulted about experiments that are outside of their field of discipline. In fact, in such cases, most of the Science TAs felt that during the consultations they were unable to confidently advise students on subjects outside of their respective disciplines.

Among students who visit the ALESS Lab more than half consult with TAs because they are unsure what they should do for their ALESS experiment. Experienced Science TAs usually begin consultations by asking students about their general interest in science; however, some students have a difficult time answering. In such situations, a new TA may not know how to successfully proceed with the consultation. On the other hand, a few students visit the Lab wanting to use specialized equipment or perform advanced research such as stem cell research. As the ALESS experiments are expected to be performed with commonly available materials, TAs must explain to the students that not all ideas are feasible to perform in the ALESS Lab.

Some students have specific ideas about what experiment they want to perform, but consult the TAs about how to set up their experiments. For instance, a student wanted to know the strongest bridge shape. Although the student came to the Lab with models of the different bridges, he did not know how to measure and compare their strength. During the consultation, an experienced Science TA suggested that plastic pet bottles filled with a known amount of water were useful to measure the resistant weight of the

bridges. The advice worked well to compare the bridge models. In another consultation, a student wanted to know how fast hot water cooled down to room temperature in a mug. Despite her attempts at searching for literature to find a method for her experiment, she was only able to measure cooling times in different mugs due to the suggestion of a TA to use a stirring bar and a magnetic stirrer. However, coming up with such advice quickly can be more difficult for a new TA, who has not been exposed to a wide range of student ideas and is not yet experienced with the types of questions that the students may ask. Therefore, less experienced Science TAs often encountered difficulties and uncertainties when consulting students about their experiments. For these TAs, there is now a database accumulating examples of ALESS consultations: trends and useful solutions for questions that often arise in ALESS experiments of each science field. In addition to the new database, to further streamline the consultations, a consulting manual was made to support the Science TAs (Figure 2).

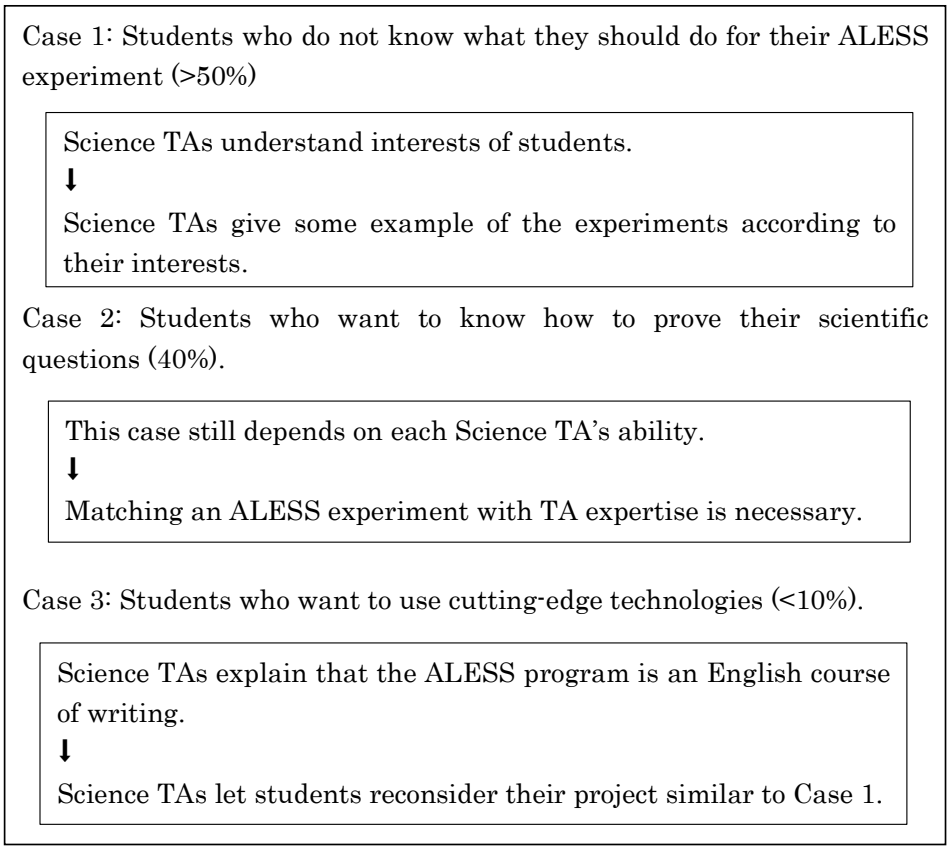

Figure 2: Manual made for Science TAs to facitilate ALESS consultations

In Case 1, ALESS students do not know what they should do for their experiments. First of all, a Science TA should understand the interests of the students and categorize their experimental topics into mathematics, physics, chemistry, biology, or others (Table 1). Second, if the Science TA comes up with ideas of the experiment in each category, the TA should show examples of possible experiments to the students. If the TA has only a few ideas, the students, now that they know the categories of their interest, can think of

a question again and revisit the ALESS Lab at a later time. As in Case 3, if ALESS students want to do advanced research experiments, Science TAs must remind the students that ALESS is an English course for writing. Then, they consult the students similar to case 1. Finally, in Case 2 where ALESS students know what they want to do, but they do not know how to do their experiments, it becomes essential for Science TAs to use their background knowledge and rely on their expertise. Therefore, the advice strongly depends on the ability of each TA.

The TAs are selected to work in the ALESS Lab for their research expertise as well as their ability to work well with students. Most of the ALESS students visit the lab with high expectations of the Science TAs. However, sometimes there is a gap between the TAs' disciplines and the students' research interests. TAs have a diverse background in fields such as mathematics, physics, chemistry, biology, so if they have to consult students on topics outside of their discipline, their expertise would not help. As can be seen in Figure 2, the most popular ALESS research topic is in the food sciences. Despite this substantial interest in food-related experiments by undergraduate students, the ALESS Lab does not have TAs with research fields in food science or food chemistry. In fact, in such cases, most of the Science TA felt that they did not have confidence to consult in the different disciplines. If TAs have difficulty in consulting students, the ALESS manager will assist them with regards to conceptual frameworks and discipline-specific experimental design and methods. In order to minimize the mismatches and ensure more relevant and productive consultations, a new system has been introduced recently. Currently, at the beginning of each consultation, students are asked about their research interests. If the students are interested in performing chemistry-related experiments, the assisting Science TA should ideally have chemistry background. Thanks to this new manual, there is now a process in place that matches the ALESS experiment with the expertise of each Science TA to help improve the effectiveness of each consultation. This has helped to alleviate some of the extra responsibilities of the Science TAs and to maximize the effectiveness of the consultations.

2.2 Support for ALESS Faculty

This gap in the research expertise and the chosen experiment or course content can be a point of concern for the instructors of the ALESS course as well. There are approximately 25 faculty members from varied backgrounds teaching the ALESS classes, including those from the natural sciences such as chemistry, biology, environmental science, food science, and paleontology, but also from the social sciences and humanities such as anthropology, education, applied linguistics, human geography, cultural and Japanese studies, psychology, linguistic anthropology, and sociology.

Scientific writing as part of academic writing is to persuade and communicate arguments, and it aims to share and further knowledge. Furthermore, awareness of audience and writing as social action are two other critical aspects. In particular, the purposes of scientific writing and its impact on the academic and social arena are broad and varied (Hyland 2008).

Due to the interdisciplinary nature of the instructors and the course itself, the content and the materials that are used in ALESS classes are multifaceted. ALESS classes have specific aims such as having students perform scientific experiments and write in the IMRaD format. Furthermore, there is no textbook or common required course materials, although there are shared teaching objectives for all instructors of the ALESS Program. Those objectives are to teach scientific writing, guide collaborative learning such as group work and peer reviews, and teach presentation skills. In particular, teaching scientific writing has various aspects such as designing a feasible experiment with a hypothesis and teaching the IMRaD and linguistic styles for each of the four major sections of the paper: introduction, methods, results, and discussion. Instructors also focus on teaching students how to develop their research question and find appropriate background papers that support their hypothesis, how to analyze their data that they collected from their experiments, and finally, how to develop their discussion and interpret their results while taking into account previous scientific studies.

As these teaching objectives are common to instructors of all fields of research, in order to gain a better idea of how some instructors draw on certain aspects of their backgrounds to enhance their courses, participant observation research was performed from November 2014 to July 2016. In addition, in July 2016, ALESS instructors were asked to anonymously complete an online survey, titled Experiences Teaching ALESS, about their thoughts on teaching scientific writing. Responses were received from 13 instructors: 5 were from natural sciences, 3 from social sciences, 2 from applied linguistics, and 3 from humanities.

Writing academic research papers is difficult and requires specialized skills and knowledge—in language, logical argumentation, data presentation, and ethical considerations. Instructors from humanities agree, and in the survey they focused in particular on argumentation, with comments such as "the unifying feature across all academic writing is having a clear argumentative thread running throughout the essay or paper" (Instructor 6, with humanities background) and "argumentation (signaling claims and showing reasoning) and the rhetoric conventions (topic sentences) are needed in academic writing across disciplines" (Instructor 9, with humanities background). Those with expertise in social sciences argue that "the author should show clear purposes, argument, supportive evidences, and a logical thread throughout the paper in academic writing across disciplines" (Instructor 12, with social science background), "basic stats and the organization of academic writing (…) and how to find and cite related papers" (Instructor 12, with social science background), and "ethics and participant recruitment strategies" (Instructor 7, with social science background). It seems instructors with social sciences are more likely to draw their knowledge of research methods and skills they acquired through their empirical research experiences.

On the other hand, instructors with natural science backgrounds directly apply their knowledge, skills, and experiences in their disciplines to their teaching. They mentioned in the survey that they were able to apply their "basic knowledge of life sciences, especially relating to background of experiments" (Instructor 16, with natural science background), "my practical scientific knowledge in predicting which experiments are

going to succeed and fail" (Instructor 8, with natural science background), "experiment design, writing in IMRaD format, data analysis, giving a story line in writing the paper, peer review and scientific presentation" (Instructor 10, with natural science background), "knowledge and experience gained in publishing papers in scientific journals" and even "everything I have learnt since I was an undergraduate" (both from Instructor 13, with natural science background).

From these survey results, it may appear that instructors from the natural sciences may have an advantage and face few challenges while teaching ALESS, compared to instructors from other fields. However, the results indicate otherwise. Instructors with natural science backgrounds face challenges such as "managing time to cover all the necessary material" (Instructor 11, with natural science background), teaching the "APA style of citation, referencing and preparation of graphs" (Instructor 10, with natural science background), and perhaps typical of any classroom, "students not asking questions for clarification (…) I was never quite certain how much of my instruction they understood" (Instructor 8, with natural science background). Other basic concerns included learning to incorporate the active learning style of teaching, one of the main features of ALESS classes. As one instructor put it, "learning how to allow students to discuss in class was a bit of a hurdle" (Instructor 8, with natural science background). Furthermore, as most of the instructors are from abroad, even with teaching experience prior to coming to Japan, there were also comments such as "finding effective ways to teach the material to non-native English speakers" (Instructor 13, with natural science background) and "teaching non-native English speakers the language necessary to convey their scientific results" (Instructor 8, with natural science background).

Just as the ALESS Lab and the KWS directly provide support for students, there are measures in place to help instructors during the semester. There are also many opportunities to interact with other instructors, as all the instructors have offices in the same building and also meet for meetings on a varied schedule, but as often as on a weekly basis. However, networking systems are naturally in place, as there are ample opportunities for instructors to problem-solve during both formal and semi-formal training sessions and workshops before, during, and after each semester. One of the in-service training include weekly meetings for new teachers where there are opportunities to reflect, trouble-shoot, and problem-solve with targeted advice of the older instructors. Some of the concerns that have been raised in these meetings include making decisions about whether to allow students to perform their ALESS experiments in groups or individually, whether a proposed experiment is actually feasible to do in the given time or with commonly available equipment. Other issues to discussions about how to effectively manage classrooms and how to give feedback. In general, there is never a correct solution to a problem, but the discussion and advice allow each instructor to make an informed decision and choose options that are best suited to match their teaching styles. More formal settings such as workshops and lectures allow time for reflections, raising awareness about assessment, and sharing novel or ambitious practices including flipped learning or incorporation of technology in the classroom.

The spirit of collaboration and willingness to share can also be seen in the classroom. ALESS instructors welcome class observations by their colleagues, and both new and senior instructors sit in on each other's classes, sometimes for an entire semester to take advantage of the occasion to learn from one another. This can be beneficial for both new and more experienced instructors in the Program to see how instructors use their teaching materials, get hints about how to effectively facilitate group discussions in the classrooms, and learn how students interact with other instructors. The sharing that occurs in the program can also be further perceived with the tradition of having access to one another's class pages, as well as the common Wiki where instructors willingly share their syllabi, materials, ideas about weekly activities and descriptions about uploaded and any modified materials. Often, new teachers do not have much time to prepare for their classes at the beginning of the semester, so being able to adapt a more experienced instructors' material becomes valuable.

There are, however, some aspects that may further improve the support given to instructors in the ALESS Program. For instance, although meetings are well attended, formal and informal discussions taking place, they are not fully recognized as faculty development opportunities by instructors and the institution. There is not much organized institutional support for instructors' attempts and new activities. In addition, there could be specialized teacher training sessions where discussion addresses specific issues that instructors find challenging. Although there are meeting minutes, specific details of discussions are not recorded, but they should be logged and made retrievable for reflection and future instructors. Finally, one of the main issues that arise is that the program relies heavily on individual instructors' voluntary efforts, so good practices, new activities, and unsuccessful attempts are not sufficiently shared and analyzed. Individual teachers' efforts should be officially recognized, and providing institutional support will likely promote further faculty development and lead to improvement of the course as well as discussions on teaching methods in English for Special Academic Purposes.

3 Conclusion

The present paper examined the support systems in teaching scientific writing in the ALESS Program. ALESS courses begin with the design and implementation of scientific experiments and conclude with a scientific paper written in the IMRaD style. To this end, the students taking ALESS classes can receive help from instructors as well as two support centers facilitated specifically for the ALESS Program, the KWS, and the ALESS Lab. The support systems in place for those who are helping the students, mainly the instructors and TAs, are essential for the success of the Program.

The process of how students acquire knowledge as a result of various pedagogical practices and how they can be supported to do so is important. Yet, unlike studies on direct learning outcomes, research on the support systems and the process of learning itself is still limited. This research has investigated the systems in place to support the needs of ALESS Lab TAs and the instructors of the ALESS courses at the University of Tokyo. Currently, due to the voluntary efforts of the instructors, there is an abundance

of resources that are shared among the faculty to choose their individualized methods to teach the course. However, having too many materials can make searching through the database a daunting task. Even after finding appropriate materials to use, knowing how to use it effectively can be challenging. Having more homogenous classroom practices along with the presently standardized learning outcomes may be advantageous, especially for new instructors in the program.

Uniformity in the program, in general, may actually help the Science TAs as well. Unifying the topics among instructors and restricting the research themes that are allowed for the course may help TAs provide more support to students. In the future, ideally, all TAs could be trained so that they are confident with most ALESS themes. However, recent efforts to categorize student research themes and matching the consultation topics with the research background of the TAs has been effective in providing more focused and specialized guidance to students. Such endeavors to shape the learning process for students of the ALESS Program are continuously and actively taking place for various aspects to improve English language education curriculum and pedagogy.

References

Cho, Dong Wan. "Science Journal Paper Writing in an EFL context: The case of Korea." *English for Specific Purposes,* vol. 28, 2009, pp. 230-239.

Gally, Tom. "Form and Content in a Science Writing Curriculum." *Komaba Journal of English Education*, vol. 2, 2011, pp. 95-114.

Gally, Tom. "The Cultures of Writing Centers." *Komaba Journal of English Education*, vol. 1, 2010, pp. 61-84.

Gosden, Hugh. "Verbal Reports of Japanese Novices' Research Writing Practices in English." *Journal of Second Language Writing*, vol. 5, no. 2, 1996, pp.109-128.

Hyland, Ken and Fancoise Salager-Meyer. "Scientific Writing." *Annual Review of Information Science and Technology,* vol. 42, 2008, pp. 297-338.

Matarese, Valerie. "Reporting—the final phase of scientific research—can and should be supported. A case for integrating language professionals into the research setting." *RT. A Journal on Research Policy and Evaluation,* vol. 1, no. 1, 2013, pp. 1-13.

Middleton, Guy. "Resource Development and Use in ALESS: An Evidence-Based Approach to Students' Reception and Use of the ALESS Collection and Companion." *Komaba Journal of English Education,* vol. 4, 2013, pp. 1-26.

Mishina, Yukiko. "Simulating the Research Laboratory: Using Science to Teach English in ALESS." *Komaba Journal of English Education,* vol. 6, 2015, pp. 67-83.

Windschitl, Mark, Jessica Thompson, and Melissa Braaten. "Beyond the Scientific Method: Model-Based Inquiry as a New Paradigm of Preference for School Science Investigations." *Science Education*, vol. 92, 2008, pp. 941-967.

Yamamura, Kimie, Diego Tavares Vasques, and Tom Gally. "Science Tutorials in an English-Language Program for Science Students." *Komaba Journal of English Education,* vol. 7, 2016, pp. 73-95.