様　式　Ｃ－１９、Ｆ－１９－１、Ｚ－１９　（共通）

科学研究費助成事業　　研究成果報告書

令和　２ 年　 ６ 月　 ８ 日現在

機関番号：１２６０１
研究種目：基盤研究(C)（一般）
研究期間：2017～2019
課題番号：１７Ｋ０３００４

研究課題名（和文）Impact of teacher characteristics on science writing education

研究課題名（英文）Impact of teacher characteristics on science writing education

研究代表者
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交付決定額（研究期間全体）：（直接経費）　　3,100,000円

研究成果の概要（和文）：この3年間の研究の目的は、第二言語教育（ESP）の13週間の学術ライティング授業において、教員の専門分野が与える学習者の動機付けや学習成果への影響に関する知見を得ることだった。学生の一学期間に渡る学習の動機付けを評価するための質問紙を作成、検証し、教員の教育信念とそれがどのように教室での指導とつながっているのかを質的に分析する有効な枠組みを作り上げ、また学生の論文をコーパスを用いて予備分析した。この学習者のコーパス・データは今までにないもので、というのも日本語を第一言語とする大学学部生が書いたIMRD形式の論文を集めたデータであるためである。

研究成果の学術的意義や社会的意義
We studied whether teachers' disciplinary backgrounds influence their teaching and student motivation. Our findings should enable English writing courses in Japan to move away from a one-size-fits-all approach, and to incorporate the characteristics of teachers into curriculum design.

研究成果の概要（英文）：For the past three years our aim was to gain insights into the impact a teacher's academic background has on student motivation and learning outcomes in a 13-week academic writing course in an L2 context (ESP). We succeeded in writing and validating a questionnaire which assessed student motivation over the course of the semester, we established a framework for conductive qualitative analysis of teacher beliefs and how those influence classroom practices and we established and preliminarily analyzed a corpus of student papers. This learner corpus is unique because it is a collection of IMRD-style papers written by undergraduate students whose first language is Japanese.

研究分野：Foreign language education

キーワード：education　motivation　learner corpus　academic writing　corpus analysis　focus groups　teacher characteristics

様　式　Ｃ－１９、Ｆ－１９－１、Ｚ－１９（共通）

１．研究開始当初の背景

Japanese universities have struggled to equip science students with necessary English communication skills. Past studies have focused on teaching methods and materials, but little is known about the effect that teacher and student characteristics have on student learning. Using quantitative (survey and corpus data) and qualitative approaches, this research focused on the University of Tokyo's English science writing program, which has an interdisciplinary faculty of twenty scientists and writing specialists, a database of more than 17,000 student papers (hereafter, the ALESS Learner Corpus), and teaches 1900 science students per year.

２．研究の目的

Around twenty full-time faculty teach for the ALESS program. Instructors come from a variety of academic backgrounds: from the natural sciences, social sciences, and humanities. We hypothesized that student engagement, motivation and achievement are impacted by the background of the writing instructor. We sought to understand not which type of instructor background is better for affecting student engagement and motivation, but where the differences lie. We had three aims in the project: 1. Teacher characteristics - Using a qualitative approach we consulted academic writing instructors about teaching style and academic background to understand their perceptions of the challenges and areas for improvement. 2. Student Motivation -To adapt and validate questionnaires examining self-regulated learning strategies, study process learning strategies, study process motivation, test anxiety, and future orientation; and to examine the role of future orientation in predicting learning strategies used by Japanese students learning English. 3. ALESS corpus analysis-using a corpus analysis approach we analyzed final papers submitted by ALESS students to identify particular characteristics of English writing by Japanese university students.

３．研究の方法

Each of the three parts of this research employed different methodologies. 1. Teacher Characteristics - The qualitative research began with several focus-groups addressing instructor self-knowledge of pedagogical tactics and teaching styles. As a result of these initial consultations, the research shifted on a focus of primary concern to academic writing instructors: the method and medium of feedback. The qualitative research consulted academic writing instructors about teaching style and academic background to understand their perceptions of the challenges and areas for improvement. We used focus groups to understand pedagogical challenges faced by academic writing instructors. The research has also developed a method to further understand written feedback. 2. Student Motivation - questionnaires examining self-regulated learning strategies, study process learning strategies, study process motivation, test anxiety, and future orientation were adapted and translated to Japanese. A preliminary study of 260 students was used to validate the questionnaire. The questionnaire was given to students twice during the semester, once in the beginning of the semester to establish a base-line measurement and once again at the end of the semester. 3. ALESS Corpus analysis-we focused on examining lexical bundles most frequently used by students and compared them with those most frequently found in published academic papers. We used two reference corpora: The

SciTex corpus (Kermes, 2012) contains 39M words and includes texts from computational linguistics, bioinformatics, digital construction, microelectronics, computer science linguistics, biology, mechanical engineering, and electrical engineering. PERC (Professional English Research Consortium) corpus contains 17M words and includes English academic journal texts in science, engineering, technology and other fields (https://scnweb.japanknowledge.com/PERC2/).

４．研究成果

Due to the covid-19 outbreak our analysis and research has been delayed and is therefore still ongoing. We summarize the findings we have so far below.

1. Teacher characteristics - The qualitative research began with several focus-groups addressing instructor self-knowledge of pedagogical tactics and teaching styles. As a result of these initial consultations, the research shifted on a focus of primary concern to academic writing instructors: the method and medium of feedback. The qualitative research consulted academic writing instructors about teaching style and academic background to understand their perceptions of the challenges and areas for improvement. We used focus groups to understand pedagogical challenges faced by academic writing instructors. The research has also developed a method to further understand written feedback. Overall, the qualitative research reinforces research showing that different disciplines convey subtle pedagogical practices and knowledge, such as writing genre-knowledge and variant use of technology for feedback. The research has developed a preliminary framework for studying written feedback on academic writing. This approach takes into account the technological devices used in feedback as well as the wider interactive environment.
2. Student Motivation - In the preliminary analysis two questionnaires were used to survey 260 Japanese undergraduate students who were enrolled in an English writing course. The questionnaires were adapted and translated into Japanese. The questionnaires were reliable in assessing factors related to successful academic outcomes. Furthermore, future orientation appears to be a predictor of self-regulated learning strategies. Findings from this study suggest that encouraging students to make a plan for learning English writing, be cognizant of future consequences associated with their current learning behaviour, and to focus on the potential future value of learning English writing predicts students' use of learning strategies that are known to be associated with better academic outcomes. As the next step, we have gathered responses from 227 students from the classes of 9 professors. Analysis of these survey results is ongoing.
3. ALESS Corpus analysis - An analysis focused on 4,817 papers (fall semester 2014 to spring semester 2017) which was approximately 6.9 million (M) words. To address the question of whether students use lexical bundles similarly to published papers, we focused on identifying 4-word collocations that were frequently found in student papers but not in published articles, which could indicate incorrect use or a

misunderstanding of how to use these phrases. Additionally, we also identified 4-grams frequently used in published papers that are not commonly used by ALESS students, to identify expressions that students are less familiar with. Finally, we examined if the use of n-grams was grammatically correct and whether they were used in the same context as published papers. We used two reference corpora. The SciTex corpus (Kermes, 2012) contains 39M words and includes texts from computational linguistics, bioinformatics, digital construction, microelectronics, computer science linguistics, biology, mechanical engineering, and electrical engineering. PERC (Professional English Research Consortium) corpus contains 17M words and includes English academic journal texts in science, engineering, technology and other fields (https://scnweb.japanknowledge.com/PERC2/).

Comparing the 100 most frequent 4-word clusters in the ALESS corpus to 1000 most frequent 4-word clusters in the two reference corpora, we found that roughly half (49) appeared only in the ALESS corpus (Figure 1), suggesting that these be phrases are overused by ALESS students. Upon closer examination these could be sorted into three categories 1) correct grammatically, but too simplistic or specialized - therefore infrequent in professional papers (e.g. *in this experiment the*, *the purpose of this experiment*); 2) describes experiments most frequently performed by ALESS students (e.g. *the sugar content of the*, *the temperature of water*); 3) incorrect grammar or non-standard use (e.g. *the difference of the*, *this study aimed to*).

Comparing the 1000 most frequent 4-word clusters in the ALESS corpus to 100 most frequent 4-word clusters in the two reference corpora, we found that together, 84 clusters from both reference corpora are not found among the 1000 most frequent ALESS clusters; Of these 18 occurred in both reference corpora. These high frequency expressions tended to be used for more conceptual or abstract writing. For example phrases such as *in the absence of*, *is the number of* suggest a more complex analysis of experiments, and phrases like *is assumed to be*, *in the context of*) indicate more conceptual writing. Realizing that our students lack these phrases in their writing, we can encourage their use by making students aware of expressing ideas in this way and giving examples of usage.

It is interesting to note that the lists of the most frequent n-grams for the two reference corpora overlap by only about 50%, highlighting the variability among published articles and disciplines, despite both corpora being interdisciplinary.

We additionally looked at the actual use of the frequent n-grams in context and found that some frequent n-grams are not used correctly in sentences in the ALESS corpus. For example, while the ngrams "*the relationship between the*" and "*the effect of the*" are frequent in ALESS and both reference corpora, in student writing these are often preceded these by "*about*" while this combination does not occur in either the PERC or SciTex corpora.

Overall, we were able to identify which lexical bundles are frequent in both student and professional writing, and which are unique to each. It should be noted that while the current sample size of the survey data is large enough to draw conclusions about the survey data, but not large enough to establish relationships between the survey data and the patterns of language use in the corpus data.

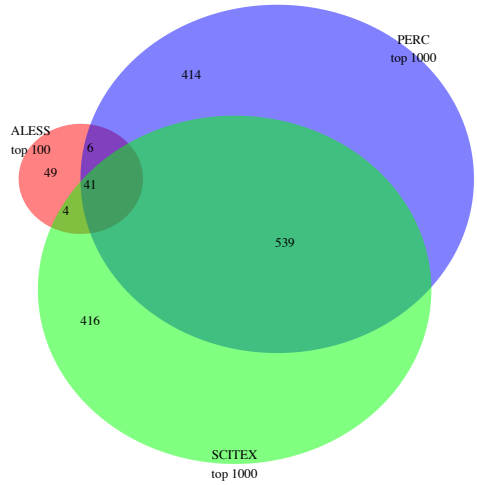

Figure 1. Comparing the 100 most frequent 4-word ngrams to 1000 most frequent ngrams in the two reference corpora, we found that 49 ngrams are found only in the ALESS corpus. 49 4-grams frequently used by ALESS students that are not common in published papers.

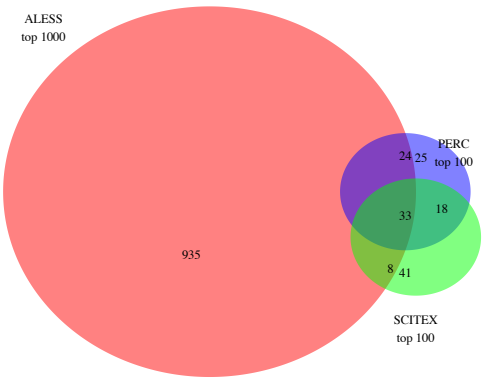

Figure 2. Comparing 1000 most frequent 4-word ngrams from the ALESS corpus to the 100 most frequent ngrams in the SciTex and PERC corpora, 84 in total were not found among the top 1000 4-word ngrams from the ALESS corpus. IN particular 18 were found in high frequency in both reference corpora. 18 (or 84) 4-grams frequently used in published papers that are not commonly used by ALESS students.

References

Kermes, H. (2012). A methodology for the extraction of information about the usage of formulaic expressions in scientific texts. In *LREC* (pp. 2064-2068)

５．主な発表論文等

〔雑誌論文〕　計1件（うち査読付論文　1件／うち国際共著　1件／うちオープンアクセス　0件）

１．著者名 HALLMAN Candler and NOZAWA Emiko	４．巻 9
２．論文標題 Genre Knowledge as Distributed Cognition in the ALESS Writing Classroom: A Preliminary Discussion	５．発行年 2018年
３．雑誌名 Komaba Journal of English Education	６．最初と最後の頁 57-79
掲載論文のDOI（デジタルオブジェクト識別子） なし	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 該当する

〔学会発表〕　計5件（うち招待講演　0件／うち国際学会　5件）

１．発表者名 Alexandra Terashima, Douglas Roland
２．発表標題 Use and misuse of lexical bundles in a learner corpus of IMRaD-style papers written by Japanese undergraduate students
３．学会等名 International Corpus Linguistics Conference（国際学会）
４．発表年 2019年

１．発表者名 Emiko NOZAWA and Candler HALLMAN
２．発表標題 Summarization in Academic Writing: Ethics and Practice
３．学会等名 The 1st Annual Conference of Asia ESP & the 6th Chinese National Symposium on ESP（国際学会）
４．発表年 2017年

１．発表者名 Alexandra TERASHIMA
２．発表標題 A Corpus Analysis of Scientific Register Use in IMRD-Style Papers Written by Undergraduate Japanese Students
３．学会等名 The 1st Annual Conference of Asia ESP & the 6th Chinese National Symposium on ESP（国際学会）
４．発表年 2017年

１．発表者名 Alexandra TERASHIMA and Doug ROLAND
２．発表標題 Lessons from the ALESS Learner Corpus
３．学会等名 Symposium On Academic Writing In An L2 Context（国際学会）
４．発表年 2018年

１．発表者名 Emiko NOZAWA and Candler HALLMAN
２．発表標題 The Teacher Perspective
３．学会等名 Symposium On Academic Writing In An L2 Context（国際学会）
４．発表年 2018年

〔図書〕　計0件

〔産業財産権〕

〔その他〕

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