

Japanese STEM Students in English Conference Presentations: A Collaborative Approach

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Abstract

This study reports on the development of support programs for STEM university students presenting research in English at international conferences. According to an in-depth needs assessment involving stakeholders in the field of STEM in Japan, it was found that undergraduate students had opportunities to present their research in English (Kawano & Fukuchi, 2022). It is crucial to navigate students, who are novice, nonnative English-speaking scholars, in following certain protocols within their genres during preparations (Noguchi, Terui, & Fujita, 2014). The authors, who include both discipline and English faculty members, collaborated to develop and implement workshops for Japanese undergraduate and graduate students in the fields of STEM in 2022-2023. Eight participants in total prepared slides and scripts, practiced their presentations, and received feedback on vocabulary, expressions, and delivery. Simulations of interactions with session chairs and questioners were also conducted. Post-presentation interviews were recorded and analyzed via text-mining and open-coding, which revealed that the workshops were effective in improving word usage, slide clarity, and delivery skills. However, the participants recalled that they faced challenges during Q and A sessions and were affected by technical difficulties caused by the online conference system. The collaboration of discipline and English faculty proved effective in supporting students' international conference presentations. It will be necessary to focus more on simulating conference communication and on spontaneous responses in Q and A sessions. From this study, the audience will understand the design, implementation, and evaluation of collaborative workshops in the context of an ESP setting in Japan.

Keywords: STEM, Presentation Skills, Mixed Method Approach

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Introduction

The authors aim to develop ESP (English for Specific Purposes) education tailored to the needs of students in the STEM (Science, Technology, Engineering, and Mathematics) department at a private university in Tokyo. The whole project has three phases, the phase 1 as needs assessment in the use of English in STEM, the phase 2 as needs analysis in international conferences, and the phase 3 as development of preparation workshops to present a paper abroad. Between the academic years 2020 and 2021, as the initial phase of investigation, we conducted needs assessment on the use of English with students and discipline faculty in the STEM fields. The study revealed that some undergraduate students have opportunities to present their research in English at international conferences, and there is a demand for cultivating the ability to communicate research results in English in such occasions (Kawano & Fukuchi, 2022). Also, it turned out that students usually write a paper in Japanese, translate it into English, have it edited by a proofreader, and submit it to a conference. Once the paper is accepted, they work on PPT slides, write scripts, and practice reading them repeatedly. The participants of the study expressed that they managed to present their papers, though they had difficulties in dealing with Q and A sessions and small talks during breaks and social events.

In Japan, not all university science majors feel comfortable communicating about their studies in English; in fact, presenting in the first language is a challenging task especially for novice scholars; speaking about their specialized areas in the second language poses further challenges to them. Terui et al. (2016) found that a certain percentage of science and engineering university students lack confidence in English skills and therefore wish to improve them. The research entailed a case study involving a single graduate student who composed a paper in English and subsequently presented it at an international conference. The study was conducted as a one-on-one tutoring session, indicating that there is a need of systematic programs or prototypes designed to assist Japanese science majors in learning academic discourses in English in their disciplines.

In response to these needs, the authors developed workshops to help students prepare to present their papers in English at international conferences. English language faculty and discipline faculty members collaborated to design, pilot, and verify the effectiveness of workshops aimed at supporting undergraduate and graduate students who had been accepted to present at international conferences in science. In this paper, we will report on the two types of workshops, one for the oral presentations in computer science and the other for poster sessions in biophysics, and further attempts to propose prototype of essential components of such support programs.

Prior to designing workshops, we investigated literature focusing on existing materials to improve English skills required to participate in academic conferences. In the context of Japanese universities, there have been two main types of commercial books published that are relevant to our study. The first type includes books written by experts in English education, such as those by Langham (2013) and Noguchi, Terui, & Fujita (2014). These works primarily focus on providing strategies for engaging in academic communications at international conferences. The second type comprises books that offer practical hints and advice from scientists, drawing on their experiences in their respective fields, as seen in works by Hirooka (2011) and Morimura (2014). We have consulted these materials while brainstorming to create tailor-made materials for our study.

Studies measuring the effectiveness of educational practices and interventions of presentation skills are limited. Omotedani and Sannomiya (2023) investigated the effectiveness of a presentation course from a metacognitive perspective. They suggest that explicitly teaching oral presentation skills using PowerPoint, and focusing on delivering presentations based on keywords rather than simply memorizing scripts, while considering discourse markers, was effectively learned. Additionally, as a method of presentation instruction for science students, Fujii (2019) discussed the effectiveness of teaching presentations at his school curriculum. As for teaching poster session skills, Rowe (2017) published a comprehensive report on practices in the medical and pharmaceutical fields, and Elwood and Kawano (2018, 2022) conducted a series of action research conducted with students majoring in mathematical sciences over several years. Their descriptive statistical analysis reported effectiveness of instructions in the praxis.

When we looked into studies concerning strategies of Q and A sessions, Xu (2022) discussed skills to ask questions at a conference in computer science. This study shows typical questions-answers dataset which would help us understand patterns of academic communications in its particular genre.

Regarding the instruction of small talk at international academic conferences, there appears to be a lack of research on its significance during these events or on methods for teaching scientists to participate in small talk. While studies have examined small talk in business communications and within companies through the lens of English as a Lingua Franca (Pullin, 2010), the exploration of small talk within scientific communities remains unexplored.

Methods

As noted, the primary means of providing support was through two types of workshops tailored to the particular needs of the student presenters. The workshops comprised three facets: a demonstration presentation by each student, advice from the English professors and the content faculty professor about various aspects of the presentation, and finally a Q&A simulation. The workshops lasted 2-3 hours depending on the students' availability. All the students were at the CEFR A2-B1 level.

The first workshop addressed oral presentations. The six participants in this workshop were preparing for an international conference on human computer interaction, which is an important area in the faculty to which these students belong. The second workshop dealt with poster presentations, which in this faculty and its associated fields at least as important as the oral presentations. Two graduate students participated in this workshop; both were preparing for an international conference on biophysics.

Objectives

The workshops were an intermediate step in the sequence of activities addressed in this study. The objectives included four distinct steps, the **first of which** was to make the presentation materials as effective as possible. In the PowerPoint presentations, this meant carefully adjudicating the slides and providing feedback, while in the poster presentations the poster was examined and feedback offered. In both scenarios the feedback was based on our experience teaching consecutive undergraduate courses on oral presentations and poster presentations as well as our linguistic proficiency. The discipline professor provided

feedback based on his knowledge of the subject matter and—again based on his experience—effective ways to explain.

An additional focus in increasing the effectiveness of slides and posters was to explicitly address the visual aspects of the respective media. Our students often have little understanding of the effect of different font styles and the need for care in selecting font size (in my own classes, I simply note that many senior faculty members are older and thus less able to read small font!). Tables and figures are also evaluated, and many of our students benefit from advice to remove clutter (such as unnecessary lines). Finally, there is a propensity to include more open (‘white’) space on English media than Japanese, so students are advised to consider more austere use of space.

The **second step** was to assess the student’s spoken delivery to allow them to present with confidence. As one might imagine, this can be facilitated with practice and more practice coupled with feedback on pronunciation, intonation, and lexical usage. This is also challenging for the students, most of whom have excellent knowledge of their subject material in Japanese but had considerably less facility in presenting that knowledge in English. This is compounded by the fact that they were for the two language professors, whose respective specialties in linguistics were far removed from the technical areas (human-computer interface and biophysics); in general, the students were used to presenting in seminars for their peers and discipline professors, who were certainly proficient in those two areas than their English professors. Presenting to novices requires a deft touch to explain discipline-specific information, and doing so in a foreign language exacerbates the level of difficulty; both aspects guidance and practice to instill confidence, our second objective.

We note in passing here that the translation of technical language has become much easier with the rapidly expanding use of artificial intelligence (AI) software such as ChatGPT, but the students’ work still requires a human touch.

While the first two steps constitute common steps in advising on students’ work, the **third step** was identified as a pressing area in our needs analysis. ‘Surviving’ the question-and-answer session has long proven to be an anxiety-inducing segment of student presentation in lieu of its mostly unscripted and quite impromptu nature—the verb ‘survive’ is exact. To survive and hopefully thrive, the students were coached to anticipate possible questions and lines of questioning. As shown in Figure 1, possible threads included the various sections of the presentation (e.g., Methods and Results) as well as future plans for research or their career.

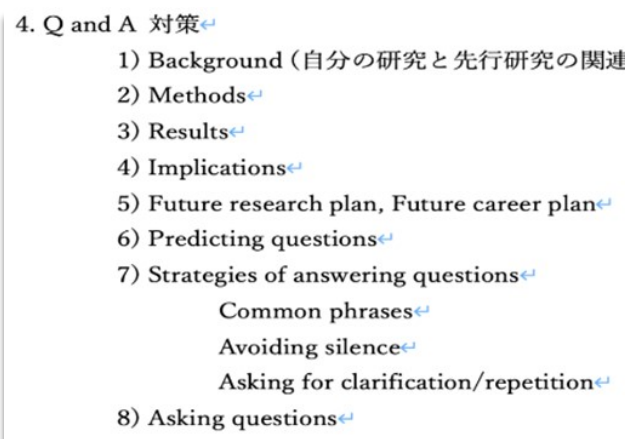
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- 4. Q and A 対策
 - 1) Background (自分の研究と先行研究の関連)
 - 2) Methods
 - 3) Results
 - 4) Implications
 - 5) Future research plan, Future career plan
 - 6) Predicting questions
 - 7) Strategies of answering questions
 - Common phrases
 - Avoiding silence
 - Asking for clarification/repetition
 - 8) Asking questions

Figure 1. Segment of Possible Questions Worksheet for Workshop Participants

In addition, students were coached on the use of coping strategies such as common ways to ask for clarification or repetition and the necessity of avoiding silence as much as possible. This is a common and quite vexing problem inasmuch as students must first understand the question and then formulate an appropriate answer, and our students tend to take uncomfortably long times to do so.

The **fourth and final area** is the various post-presentation opportunities for small talk. This is a seldom-mentioned and little-researched area, but such opportunities inject the possibility of, for example, receiving additional feedback, deepening discussions that are difficult to pursue in the limited time available after presentation, or simply networking. As was suggested in the Q&A section, students were advised to consider possible topics, both academic and more mundane (e.g., a personal introduction or some details about their university). Moreover, students were coached to actively participate in small talk, asking questions and making comments in what is often a casual venue.

Research Design and Data

The data for this project arose from the configuration of the third phase of this research project. The first two phases focused on needs assessment by the three stakeholders (the students, the discipline professor, and the two English professors), while the third phase then included the workshops, decamping to present at an international conference, and finally a semi-structured interview. Data were culled from the workshop in the forms of observations, comments, and the materials; thereafter the interviews about the students' experience and reflections from the respective conferences also comprised a source of data.

The data were then analyzed with a mixed-methods approach. Text mining using KH Coder 3 (Higuchi, 2017) yielded insight on word frequencies and co-occurrence of lexemes in networks, while the interviews were first transcribed and then analyzed qualitatively with NVivo (Jackson & Bazeley, 2019). The data were first coded inductively, after which the software extracted patterns of usage.

Results

1. Quantitative Analysis

KH Coder 3, a text-mining tool was used to analyse the transcripts of interviews. For Workshop I, as is shown in Table 1, *sahen meishi* or suru-nouns most frequently used were *presentation*, *question*, *slide*, *research*, and *inquiry* in the order of occurrence; *keiyo doshi*, or adjectives such as *all right*, *anxious*, *difficult*, *safe*, and *compact* were commonly used in the interviews. The verbs such as *understand*, *say*, *watch*, *hear*, and *listen* were also used.

| | Noun (suru) | Count | Adjective | Count | Verb | Count |
|----|---------------|-------|-----------|-------|------------|-------|
| 1 | presentation | 190 | all right | 21 | understand | 127 |
| 2 | question | 100 | anxious | 10 | say | 68 |
| 3 | slide | 68 | difficult | 7 | watch | 49 |
| 4 | research | 54 | safe | 7 | hear | 45 |
| 5 | inquiry | 37 | compact | 6 | listen | 29 |
| 6 | participation | 32 | usual | 6 | go | 27 |
| 7 | preparation | 30 | easy | 5 | write | 26 |
| 8 | story | 24 | important | 5 | do | 23 |
| 9 | sharing | 20 | essential | 5 | make | 22 |
| 10 | explanation | 20 | vague | 4 | come | 22 |
| 11 | practice | 19 | various | 4 | speak | 21 |
| 12 | response | 18 | regretful | 4 | use | 20 |
| 13 | expectation | 18 | simple | 4 | think | 18 |
| 14 | worry | 15 | necessary | 4 | finish | 18 |
| 15 | comment | 13 | perfect | 3 | memorize | 17 |

Table 1: Words in order of frequency in Workshop I

In the interview data of Workshop II, frequently used nouns are *question*, *presentation*, *explanation*, *story*, and *participation*. As adjectives, *simple*, *common*, *clean*, *certain*, and *decisive* were used. Verbs such as *think*, *watch*, *understand*, and *hear* were most frequently used (Table 2). In comparison to Workshop I, vocabulary related to the nature of poster sessions such as *design* and *speak to* were ranked high in the table.

| | Noun (suru) | Count | Adjective | Count | Verb | Count |
|----|---------------|-------|--------------------|-------|------------|-------|
| 1 | question | 43 | simple | 12 | think | 55 |
| 2 | presentation | 31 | common | 11 | watch | 36 |
| 3 | explanation | 15 | clean | 8 | understand | 36 |
| 4 | story | 13 | certain | 5 | say | 26 |
| 5 | participation | 12 | decisive | 4 | hear | 25 |
| 6 | design | 6 | regretful | 4 | speak to | 21 |
| 7 | conversation | 6 | free | 3 | go | 11 |
| 8 | research | 6 | all right | 3 | use | 11 |
| 9 | sightseeing | 5 | difficult | 3 | do | 9 |
| 10 | preparation | 4 | possible | 2 | come | 9 |
| 11 | comprehension | 4 | strange | 2 | post | 7 |
| 12 | approach | 3 | various | 1 | answer | 7 |
| 13 | layout | 3 | same | 1 | notice | 6 |
| 14 | accompany | 3 | close to the limit | 1 | teach | 6 |
| 15 | printing | 3 | easy | 1 | take | 6 |

Table 2: Words in order of frequency in Workshop II

When these frequently used words were crosschecked in the concordance, it was found that the participants were concerned whether their presentations were understood and whether they were able to communicate with the chairperson and with the audience. In addition, co-occurrence network analysis revealed major clusters of related terms: '*workshop slide – presentation - poster*', '*question - Q&A - response*', '*convention site, trouble, Zoom*' - and '*understanding of content - speaking - listening - thinking*'.

2. Qualitative Analysis

Research has elucidated a four-step analytical approach wherein codes, or themes, are inductively derived using an open coding technique. This method is characterized by the identification of patterns within the data emerging from the codes. Furthermore, part of the analytical process involves a thorough examination of the interconnections between these codes. After the initial coding phase, the analyses with NVivo are enhanced by consulting the outcomes from KH Coder, which aids in the reflective process.

| Codes in two levels | Number of files | Number of references |
|----------------------------------|-----------------|----------------------|
| Conference | 8 | 23 |
| Schedule | 2 | 3 |
| Poster session site | 2 | 18 |
| Online conference | 7 | 35 |
| Social activities | 7 | 11 |
| Future goal of English study | 1 | 1 |
| Past experiences of poster in L1 | 3 | 5 |
| English to Japanese | 3 | 5 |
| Poise and confidence | 2 | 2 |
| Preparation | 8 | 18 |
| Poster/slide design and layout | 3 | 6 |
| Printing of poster | 1 | 1 |
| Q and A | 8 | 35 |
| Unsuccessful talk | 1 | 3 |
| Sightseeing and Travel | 2 | 6 |
| Troubles | 5 | 5 |
| Workshop evaluation | 8 | 26 |
| Workshop helpful points | 11 | 24 |
| Workshop suggestions | 11 | 21 |

Table 3: Initial codes generated by open coding via NVivo

From open coding of all the utterances in the interviews, codes shown in Table 3 were extracted and further grouped into four topics which will be elaborated in this paper; 1) hybrid conference style, 2) preparation, 3) Q and A, and 4) workshop evaluation. The summary of each topic is explained below.

Hybrid Conference Style

The participants described the profile of conferences in detail. In Workshop I, they expressed advantages and challenges derived from the hybrid nature of conferences that took place after the pandemic surge in 2022. Another participant mentioned, “It was possible to deliver the online presentation without feeling nervous, and I could refer to my notes during the

presentation.” Another student said, “I was able to present even in the case of a COVID-19 infection or with a positive PCR test result.”

On the contrary, a couple of students “faced challenges in interacting with the session chair and other participants, when both online and in-person attendees were involved in their presentations.” There were issues due to technical disruptions online, requiring students to solve them in English spontaneously. As another disadvantage of such hybrid conferences, participants were required to submit pre-recorded presentations well in advance, which placed additional burdens on them. They were unfamiliar with procedures and common phrases in recorded presentations, and therefore struggled to create on an effective video on a trial and error basis.

Preparation

In preparing their presentation, one student told that he dedicated significant time to the creation of slides, ensuring they were engaging by incorporating videos and data, and conducted comprehensive checks to guarantee a smooth run during the event. Another faced challenge translating Japanese slides into English, wondering how to effectively condense the text. Most students began scriptwriting process with writing a scenario in Japanese; then they translated it into English, which was then refined using an AI program such as DeepL; the accuracy of the translation was confirmed by cross-referencing multiple machine translation tools. To improve pronunciation and intonation, a couple of students sought help from colleagues, particularly those who are overseas returnees. Lastly, they would practice reading the scripts to the level of memorization.

Q and A

All the students expressed the difficulty of answering questions asked of at Q and A sessions. Some managed to respond to the questions that were predicted in preparations; however, a student recalled, “I couldn’t answer the question on the spot, but later I came up with what I should have said.” Another student shared that when she couldn’t immediately answer a question about her poster, the audience walked away from her poster without waiting for a response. Naturally, frustrated by this experience, she became determined to study English, motivated to communicate her ideas more effectively and prevent similar situations in the future.

Workshop Evaluation

In general, the workshop was well received by the participants; three of them expressed that the advice on presentation slides in terms of font size, content, and scripts was helpful. Comments on English expressions and usage also contributed to successful presentations. A student pointed out that the workshop gave him an opportunity to situate his study in a wider perspective; “I have been doing this research for a long time and know a lot about it, so I learned what people outside my field thought of my research.”

On the other hand, there was room for improvement; the workshop seems to be too short, being conducted as a crash course right before the departure. Due to the limited time, the overall flow of the presentation was not examined. In addition, more Q and A practices including role plays and simulations should have been incorporated. As a poster session

preparation, the workshop should have included phrases and strategies to speak to an audience in front of the poster.

Conclusions

This study has discussed the practice of designing, piloting, and evaluating last-minute preparation workshops for a science international conference presentation. The findings from the preceding section indicate that while the workshops were successful in boosting presenters' confidence, there is a notable need for improvement in flexible communication skills. It was observed that program should place more focus on the area of Q&A skills and the development of strategies for impromptu communication within academic contexts.

Based upon the data and the insights gained from two workshops, we would like to propose a pilot prototype for a last-minute preparation workshop, comprised of six steps:

- Step 1: needs assessment of students and discipline faculty
- Step 2: outlining objectives, schedule, and materials of the workshop
- Step 3: examining draft slides
- Step 4: helping practice presentation
- Step 5: Q and A simulations and practices
- Step 6: small talks and tips for international conferences

As limitations of the study, we had the limited number of the participants. Also, since this is our first project, implementing the workshops demanded significant individual attention and time from both language and discipline faculty members. Looking forward, we aim to apply this model to a larger participant base and create a sustainable framework for science students. For instance, we could include peer review activities and develop checklists to aid students in their presentation preparations. It is hoped that through future research, this prototype will be further polished and widely applied, enabling young scientists to confidently present in English on the international stage.

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