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Multimodal assignments in higher education: Implications for multimodal writing tasks for L2 writers

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ABSTRACT

This study investigated the types of multimodal writing tasks that undergraduate students in academic contexts (i.e., degree-pursuing undergraduate students at a US university) are required to complete. With an assumption that undergraduate courses across disciplines are one target language use domain for international students in ESL courses in tertiary education, we interviewed seven professors in Humanities, Education, Business, and Engineering and analyzed 104 multimodal writing tasks we identified from 161 syllabi across the disciplines. We report parameters that can be used to develop multimodal writing tasks in EAP classes and for research on multimodal composing processes: 1) goals and instruction of multimodal writing: disciplinary versus creative expression; 2) linguistic mode in multimodal texts: written and spoken words; and 3) tasks of multimodal writing: individual versus collaborative work. Based on the results, we discuss pedagogical implications regarding the design of multimodal writing tasks for L2 academic writers.

1. Introduction

Previous research has offered findings on the essential role of multimodal writing tasks in shaping learners' authorial voice and identity (e.g., Cimasko & Shin, 2017; Jiang, 2018; Smith, Pacheco, & de Almeida, 2017), as well as facilitating language development (e.g., Dzekoe, 2017; Vandommele, Van den Branden, Van Gorp, & De Maeyer, 2017). However, using multimodal tasks in second language (L2) classes often presents challenges because of varied definitions and understandings of multimodal writing tasks across studies. Furthermore, little is known as to what types of multimodal writing should be prioritized in academic settings. In an attempt to advance our understanding of how to design and implement multimodal writing tasks for adult language learners in academic contexts, we aim to address the following research question: What types of multimodal writing assignments are required of university undergraduate students in the United States? The broad definition of *multimodal writing* refers to composition that involves multiple linguistic and/or nonlinguistic modes, while most multimodal tasks explored in the current study elicit students' use of alphabetic written words and other modes.

1.1. Previous research on multimodal writing in applied linguistics

The majority of L2 research on multimodal writing has been based on the assumptions of social semiotics that focuses on the author's agency in constructing a multimodal text (e.g., Cimasko & Shin, 2017; Jiang, 2018; Nelson, 2006; Tardy, 2005); and systemic

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functional linguistics that examines the interrelations of semiotic resources in a multimodal text (e.g., Archer, 2010; Morell, 2015). For example, in a sociosemiotic ethnography study, Cimasko and Shin (2017) examined the authorial decisions that a college ESL writer made in transforming her argumentative essays to an animated video and were able to show how her language differed across the modes. In terms of the multimodal task, the scholars developed what they called *a remediation task* (i.e., transforming a written paper into another medium) that allowed learners to explore different authoring tools for recontextualization. Jiang (2018) investigated how video production projects changed three EFL learners' investments in English writing. Each project included text reading, group discussion, script-writing, use of multimodal resources for video recording and editing, and sharing. The result showed that the three participants showed varying patterns of investment because of their different perceptions and attitudes toward the video production task. The two studies commonly explored the medium of digital video as a potential means for multimodal writing, but the specific steps employed were different (Cimasko & Shin, 2017; Jiang, 2018).

By integrating systemic functional linguistics and an ESP approach, researchers have revealed genre-specific grammar for linguistic and nonlinguistic modes (e.g., D'Angelo, 2010, 2016; Rowley-Jolivet, 2002, 2012). D'Angelo's (2016) analysis of academic posters, for example, focused on identifying how presenters in three disciplines (i.e., physics, law, and clinical psychology) utilized visual and linguistic modes as metadiscourse features that were originally defined as linguistic resources for writer-reader interaction (Hyland & Tse, 2004). The strong version of multimodality supports the argument that linguistic and nonlinguistic modes of expression contribute equally to building communication, which has received increased attention for content learning (Grapin, 2019).

It has also been noted that the weak version of multimodality, in which nonlinguistic modes serve supporting roles for language development, is still more common in language instruction (Grapin, 2019). There have been some researchers who indicated that replacing language tasks with multimodal tasks may distract language learners from their goals of developing language competence or, at least, that this is an area that needs to be investigated (e.g., Manchón, 2017; Polio, 2019; Qu, 2017). However, studies taking the weak version of multimodality have offered some findings of multimodal writing tasks that facilitate language development (Dzekoe, 2017; Vandommele et al., 2017). For example, Dzekoe (2017) investigated how college L2 writers in the United States revise their own alphabetic texts after composing digital posters on their own alphabetic texts. Results indicated that the multimodal poster activity increased the amount of revisions on the alphabetic texts, especially for contents. Vandommele et al. (2017) had secondary school students in the Netherlands create a website and used a pretest-posttest design. They revealed that multimodal writing contributed to promoting language development in written discourse (e.g., complexity, accuracy, and fluency) and the impact of multimodal writing on language improvement was stronger when multimodal writing was used as a project that goes beyond the boundaries of the classroom context. Thus, while the evidence of multimodal writing as an activity for language development is far from conclusive, we can suggest that previous research has shown the possibility of multifaceted roles of multimodal tasks for language development (e.g., Dzekoe, 2017; Vandommele et al., 2017) and identity construction (e.g., Cimasko & Shin, 2017; Jiang, 2018; Nelson, 2006; Tardy, 2005). As Table 1 summarizes, studies have examined adult L2 learners' multimodal practices using dissimilar tasks. All tasks were administered in first-year composition or English language courses, and as a result, little is known about how multimodal tasks are being used in university content courses. Focusing on adult learners in higher education, this study aims to review and discuss the wide range of academic multimodal writing tasks.

2. Methods

2.1. Context

This study was conducted at a US public university in Midwest where 3,862 international students (10.2 % of undergraduate population) were enrolled in undergraduate programs during Fall 2018. In terms of their majors, according to the institutional report in 2016, about a quarter of the students identified their major as Business and about 20 % were in Engineering majors. Other popular

Table 1
Multimodal Tasks in the Previous Studies Focusing on L2 Learners in Higher Education.

Study	Context	Focus	Tasks
Jiang (2018)	University in China (non-English majors)	EFL writers' investment change in English writing after completing the digital multimodal composing program	Video productions representing students' learning of curricular contents (genres: storytelling, argumentation, and advertising)
Cimasko and Shin (2017)	U.S. University (English 101)	L2 writer's authorial decisions and contextual factors in multimodal designing	Transformation of argumentative essays students wrote into animated video or slide
Dzekoe (2017)	U.S. University (ESL)	Effect of computer-based multimodal composing activities on students' revision	Online multimodal posters
Molle and Prior (2008)	U.S. University (EAP course for graduate students)	Genre and needs of EAP students (graduate)	Authentic writing tasks students performed in their content courses.
Nelson (2006)	U.S. University (First-year writing course for ELLs)	Multimodal authorship	Design experiments with students
Tardy (2005)	U.S. University (EAP course for graduate students)	Identity development observed in slides (disciplinarity and individuality)	Presentation slides participants made for their own academic purposes

majors were in Nature Science and Social Science; students in Education and Humanities consisted about 6 % of the population.

2.2. Semi-structured interviews

We recruited instructors and faculty members who taught undergraduate courses across disciplines to investigate undergraduate course requirements. The first author interviewed seven professors who taught in the following disciplines: Education (n = 3), Engineering (n = 2), Business[1] (n = 1), and First-Year-Writing (n = 1). The instructor of the first-year-writing program also had experience designing and teaching courses for English language learners.

The interview protocol was designed to elicit instructors' descriptions of their course syllabi and major assignments (e.g., guidelines, reasons for including the multimodal assignments, and grading criteria); and to address their thoughts on the similarities and differences of multimodal tasks and formal writing tasks (see Online Supplementary Material for the interview protocol). Each interview lasted about 45 min, and all interviews were voice- recorded and fully transcribed. Instructors provided sample syllabi and course materials.

2.3. Course syllabi

In addition to the materials that interview participants allowed us, we collected 161 undergraduate-level course syllabi from four disciplines[2] : Education (n = 25; Teacher Education), Science (n = 11; Chemistry, Physics), Engineering (n = 25; Mechanical Engineering, Computer Engineering), Social Science (n = 41; Economics, Political Science, Psychology), and Humanities (n = 59; Philosophy, Writing). Most of the syllabi included in the current study include ones publicly available on the department websites in the four colleges at the moment of data collection; the business school declined to share their syllabi. The course syllabi that interview participants provided were not included as the course syllabi data for quantification.

2.4. Data analysis and triangulation

The qualitative analysis software MAXQDA was used for all analyses. We imported all data into the MAXQDA, a qualitative analysis software, as documents to analyze interview data and syllabus data. Initial analysis on the syllabi data was to identify multimodal writing assignments from the description. Given the focus of the study on students' use of language with other non-linguistic semiotic resources, we coded for any assignments that explicitly showed the inclusion of multiple modes including linguistic mode, without further categorizing the specific non-linguistic modes used in the assignments. Assignments were excluded from the analysis when they required only one mode such as alphabetic texts (e.g., two-page double- spaced essays on previous experience) or computer language (e.g., code for computer program). As a result, we identified 104 multimodal writing tasks from Education (n = 38), Humanities (n = 42), Science (n = 7), and Social Sciences (n = 17). None of the tasks in the Engineering syllabi data were described in enough detail to determine if they were multimodal tasks, so Engineering was eliminated from our syllabus analysis.

All audio-recorded interviews were fully transcribed. We conducted a thematic analysis (Braun & Clarke, 2006) on the interview data without a pre-existing coding scheme and thus looked to see what themes emerged. Taking an inductive approach, we coded the interview data on how instructors implement multimodal tasks in their classes with *in vivo* codes (e.g., "evaluation criteria", "disciplinary convention", "creativity", "team work"), reflecting the actual language used by the interview participants (Saldaña, 2011). We used in vivo coding function that the software provided and clustered the list of codes into categories. There were three ways to categorize the codes, which are the themes reported in the results section. Lastly, we retrieved 104 multimodal tasks that we identified from the syllabi data, using the *Coded Segments* function in MAXQDA. We re-examined them in terms of the three themes as a coding scheme. Therefore, we triangulated the data by integrating two datasets in the process of data analysis

3. Results

We found three themes that characterized multimodal writing tasks in academic contexts and that could be considered in developing multimodal tasks for research or pedagogic purposes: (1) Goals and instruction of multimodal writing: disciplinary versus creative expressions; (2) Linguistic mode in multimodal texts: written and spoken words; and (3) Tasks of multimodal writing: individual versus collaborative work.

3.1. Goals and instruction of multimodal writing: disciplinary versus creative expressions

It was commonly indicated by the interviewers that the main goal of multimodal writing is to communicate an intended meaning to a target audience. However, we identified two different functions of multimodal tasks. One is for students to understand and meet

[1] The instructor shared his syllabus and sample tasks to elaborate what he shared during the interview. However, we did not include specific examples from the syllabus because he did not want to share the details in documents publicly.

[2] Most of the syllabi were from unique courses. Syllabi from education, however, consisted of nine courses with multiple sections across majors (e.g., mathematics, language arts, science education) which share the overall course goal.

Table 2
Multimodal Writing Tasks in Two Approaches.

	Education	Humanities	Science	Social Science	Total
Creative expressions	8	22			30
Essay to visual representation	2	10			12
In-class presentation	3	3			6
Video[a]		4			4
Online discussion posts	1	2			3
Reflection project	1	1			2
Portfolio		1			1
Paper (data analysis)	1				1
Journals/lab notes/field notes		1			1
Disciplinary expressions	30	20	7	17	74
In-class presentation	12	12		7	31
Mini lesson and lesson plan	15				15
Paper (data analysis)	2	3	2	6	13
Journals/lab notes/field notes		1	5	2	8
Professional webpage		2			2
Video resume		1			1
Online discussion posts[b]	1				1
Others (map, art description for an exhibition, diagram)		1		2	3

[a] Video assignments focusing on creative expressions include documentary, resemiotization tasks, and a promotional video.
[b] Unlike other three online discussion assignments, one assignment specified the structure of the post.

the audience's expectations of academic genre conventions (i.e., *disciplinary expression*), and the other is to have students experience various modes and mediums for creative production (i.e., *creative expression*). Unlike multimodal tasks for disciplinary expressions, those for creative expressions had no clear expectations or conventions to follow.

We found that tasks for *disciplinary expressions* were mostly structured with explicitly stated preferred styles and components prevalent in a specific discipline. Examples of such assignments included papers containing the presentation of data, PowerPoint slides for an in- class oral presentation, and lab reports. For these tasks, students were expected to demonstrate their ability to follow sets of established conventions and rules. The conventions were not always explicitly written, but occasionally listed as requirements. For example, for a technical report for a senior-year Engineering course, an instructor used two class sessions to illustrate what he expected students to do for the report and to provide feedback on their report drafts. In a similar course, another Engineering instructor asked students to research target multimodal products (e.g., posters) and follow some genre conventions:

> I don't actually tell them how to present. I give them a number of websites that talk about preparing posters… I leave these [posters] up and it's like go look at them. What works what doesn't. Critique it, think about it, critique it, critique it amongst your group and then use that information to inform your questions. The posters have gotten better over the years I think because of that something they can learn from doing. [Engineering Instructor 1]

Another way to focus on disciplinary practice was to provide a detailed description of the components that students should include in their final outcome. For a lab note assignment in Science, for example, students had to include "coversheet, data, formulae, and graphs based on the data." Instructors often provided templates for the students. From the syllabi, we found 74 tasks were designed with specific disciplinary conventions (see Table 2). In-class presentations based on course readings and students' own papers (n = 31) and data analysis papers (n = 13) were common types of assignments across the disciplines.

Thirty assignments, on the other hand, focused on students' achievement of rhetorical goals, with little attention to disciplinary practice. These tasks inducing the writer's purposeful choices of nonlinguistic and linguistic modes enable students to express their ideas in creative methods. Tasks for creative expressions were found from the syllabi of Humanities (n = 22) and Education courses (n = 8) (see Table 2). It should be noted here that one type of multimodal writing does not necessarily have one exclusive function of disciplinary expressions over creative expressions, or vice versa. For example, an in-class presentation with slides was one of the common multimodal tasks (n = 37); for 31 presentation assignments, students were given a particular format to follow (e.g., a conventional academic presentation), while they were given medium options for six presentation tasks (e.g., a skit, a video, a poster, presentation slides).

In a first-year writing class, through a "digital remix project," which is coded as "essay to visual representation", students transform linguistic texts they previously wrote into multimodal texts such as "a video, a photo essay, a poem, a web page, a painting, a poster, a collage." Through this resemiotization process, as illustrated in the following interview excerpt from its instructor, students are expected to raise their awareness of the affordances of different modes and use linguistic and nonlinguistic resources strategically to achieve their rhetorical goals:

> We'll talk about the ways that different forms operate and how they have other things in. Are you using that? So one of the questions might be, are you fully using the tools of this new genre… And then there's always the understanding. Is it clearly understandable? Is the music too loud? Did you do your words too fast on the screen so nobody could read them? Are there parts of it people don't understand because they don't come from your culture? [Writing Instructor 1]

Table 3
Linguistic and Nonlinguistic Resources Anticipated from the Multimodal Writing Tasks.

	Creative expressions	Disciplinary expressions	Total
With written words			
Data presentation (graphs, diagrams, tables)	2	25	27
Webpage		2	2
Medium of the writers' choice	1		1
Art pieces at an exhibition		1	1
Interactive map		1	1
With written and spoken words			
Visual aids for presentation (e.g., slides)		42	42
Medium of the writers' choice[a]	21		21
Video	5	2	7
Poster	1	1	2

[a] *Note.* Six of them should be shared online, thus limit some non-digital resources (e.g., interactive gestural and spatial modes).

Multimodal tasks for creative expressions allow students to explore different modes, but they can be perceived as overly challenging for students without an explicit provision of new authoring tools and resources for them (Cimasko & Shin, 2017). In this regard, an instructor of Education-major courses indicated that pre-service student teachers needed more assistance and preparation for multimodal task performance than she had thought earlier:

> So we saw something I think we need to work on that course actually is the video crafting part because we think the students, they are part of a particular generation and we think that they come in already knowing how to use technology. And actually a lot of our students don't know a lot. Some of our students don't know how to use Google Docs. [Education Instructor 3]

There were, however, some instructors who considered multimodal writing tasks to be easier than formal writing tasks. For example, an instructor from Education mentioned that a good essay requires "another level of skill set" that is beyond what is needed for effective multimodal performance such as creativity and abstract thinking. Another instructor said that students will be able to perform well on a multimodal task as long as they comply with its guidelines; thus, poor multimodal performance can be interpreted as a lack of investment.

3.2. Linguistic mode in multimodal texts: written and spoken words

The second theme mainly involves how the linguistic mode is used and interplays with other nonlinguistic modes. We found that the multimodal writing tasks required either written words or a mixture of written and spoken words (e.g., a written script for an in-class presentation with slides). For the assignments that required written words in the final product, it was anticipated that authors create a visual presentation of data analysis ($n = 27$; e.g. graphs, diagrams, tables) (see Table 3). While the visual mode was widely used with written words, other modes were also available in some assignments such as building professional webpages and interactive maps for which writers could utilize spatial and aural modes. Except for three assignments out of 32, multimodal writing assignments that did not elicit spoken words focused on promoting disciplinarity. More specifically, students were given some specific guidelines for visualizations that include layout and formatting. While academic papers were found to be the most popular multimodal text type in the context of this study, they still had a heavy reliance on linguistic resources to convey information.

The other category of multimodal writing assignments required written and spoken words as well as nonlinguistic modes including visual, aural, spatial, and gestural modes. In terms of the linguistic mode, spoken words tends to be a more dominant method in meaning making than written words (e.g., spoken narration and written caption in a digital story); however, it should be noted that the spoken words are expected to, and sometimes required to, be rehearsed in written words. For example, a script is either read naturally for recordings (e.g., digital storytelling) and practiced for an in-class academic paper presentation with slides. During the interview, an instructor of Business explained how a nonnative speaker of English was assisted by his group members to write a script for presentation in the classroom, and this collaborative preparation made his presentation qualitatively better than his earlier presentations. Furthermore, students in an Education course were required to turn in the script as shown in the following excerpt:

> We are looking at sort of the images and the script and how those things interplay together and really like that stuff is particularly on the rubric for that multimodal project because they have to do video they have to do the sound over. [Education Instructor 3]

When an assignment required written and spoken words coupled with visual aids for presentation, it focused on the expression of disciplinary voices (e.g., academic presentation based on data analysis); on the other hand, when an assignment allowed a student to choose other media to supplement written and spoken words, it tended to promote the student's creative expressions (e.g., digital story, performance, skit). It was also observed that assignments using posters ($n = 2$) and videos ($n = 7$) as media could be designed to serve both functions. For example, one poster assignment was a resemiotization task to transform an original piece (e.g., essay, skit) into an artistic poster. Another poster we found was a part of academic poster presentation. In this case, as D'Angelo's (2010, 2016) showed, students are expected to use nonlinguistic resources with linguistic resources (e.g., words woven into visualization, juxtaposition of graphics and linguistic texts, and font styles for information hierarchy). The following quote by an Engineering instructor specifies grading criteria for poster presentations. That is, for the successful competition of academic posters, students

Table 4
Authors of Multimodal Tasks Focusing on Creative and Disciplinary Expressions.

	Creative expressions	Disciplinary expressions	Total
Individual	23	57	80
Group	7	12	19
Group and individual work[a]		5	5

[a] Note. Individual reports based on problem-solving activities in groups where writers build outlines and notes together (e.g., lab reports).

should be able to use graphics coherently in terms of relevance, layout, and color schemes, and make them easily readable, aiming to achieve the interplay between these different modes for successful communication:

> People don't want to sit there and read a whole article. Better when it's bulleted because it's just easier… they've got some pictures here that you know their pictures are relevant. They're one of the things that I would really emphasize you know with the graphic is to make it easy to read... I say keep everything across the board consistent to make it easy for your reader because otherwise you get lost in that looking after code every time. [Engineering Instructor 1]

3.3. Tasks of multimodal writing: individual versus collaborative work

The majority of multimodal tasks in academic settings have been designed to involve individual writing performance, as evidenced by the course syllabi. Of the total of 104 tasks described in the syllabi, 19 tasks involved group work, and five tasks included individual performance followed by the initial stage of collaborative writing; the remaining tasks ($n = 80$) were identified as individual tasks (see Table 4). We found that many assignments focusing on creative expressions involved individual performance ($n = 23$), which might indicate that such multimodal assignments were designed to encourage individual writers to make authorial choices on mediums and modes. All of the resemiotization tasks (e.g., essay to visual representation) were described as individual work.

It is worth noting that 17 out of 24 collaborative assignments had their focus on disciplinary expressions. An instructor in Engineering reported that such collaborative assignments were expected to help students "get groomed toward producing this [professional] level of expectation." The instructor further presented the rationale for developing collaborative multimodal writing projects:

> So the way that it's divided is set on a project. There are actually seven different types of roles that they could take. So I have engineers. They are doing buildings, they're doing foundations and transportation engineers that do parking areas. And they all work together on the same big project but they're only going to report on their specific part of it. [Engineering Instructor 2]

As shown in the excerpt, a course for senior-year students would mimic an authentic project that requires collaborative problem-solving and that each student is responsible for reporting the part they were in charge of. While each member composes their own segment, they all collaborate to make a coherent technical report eventually.

4. Discussion

In this study, we have investigated what types of multimodal writing tasks are needed in undergraduate courses. First, we found that multimodal tasks in academic contexts serve a wide range of roles depending on the instructional goal. Some tasks are designed to reflect students' needs for effective disciplinary practice (e.g., academic posters and lab reports), while other tasks intend to make students better aware of the wide availability of multimodal ensembles to communicate their meaning effectively (e.g., digital storytelling). Disciplinary multimodal tasks have been found to involve linguistic and nonlinguistic modes of communication that follow their disciplinary conventions (e.g., D'Angelo, 2010, 2016; Rowley-Jolivet, 2002, 2012).

Professionals using such disciplinary multimodal tasks expect their students to be accustomed to academic conventions of multimodal texts. Given the value of identifying genre-specific linguistic patterns by text-oriented ESP research (i.e., Swalesian genre research), disciplinary multimodal texts also merit various lenses of genre analysis to offer suggestions for material developers.

We found that tasks such as an academic presentation or some manifestations of the remix task do not lead students to produce much written alphabetic text, while such alphabetic texts are expected to scaffold the development of multimodal texts (e.g., script writing for presentation and digital storytelling). This observation may indicate that multimodal task performance involves more planning for language formulation and production than we have expected. Furthermore, academic multimodal texts include spoken language that is extensively planned and rehearsed in written language, which may not be captured through conventional speaking tests measuring spontaneous and impromptu speech. This finding offers a pedagogical suggestion of the possibility of viewing writing as a means supporting oral task performance (Rubin & Kang, 2008). In addition, given the interest in L2 acquisition that views writing as a way to facilitate acquisition (Manchón & Vasylets, 2019; Williams, 2012), the use of monomodal writing as a pre-multimodal task production step, as Jiang (2018) and Dzekoe (2017) did for their participants, might address Manchón's (2017) concern that multimodal tasks may not facilitate acquisition. The issue of the role of multimodal writing tasks for language development needs more empirical evidence so that multimodal tasks can be designed and implemented with a clear understanding of how they allow

students to notice linguistic forms and structures, eventually leading to language development

The last theme, authors of writing, can be discussed in lieu of previous research on the role of collaborative writing in L2 writing development (e.g., Storch, 2005; Wigglesworth & Storch, 2009; Zhang, 2019). Collaborative writing tasks have become increasingly common in ESL classes because they provide opportunities for peer interaction and scaffolding. We found that for multimodal writing, however, individual tasks were far more common. Interestingly, previous studies of multimodal writing also employed individual tasks (except Vandommele et al., 2017) through which participants expressed clear authorial voice and identity. More research on the collaborative multimodal tasks needs to shed light on how learners interact each other for challenges while exploiting various semiotic modes and jointly advance their multimodal writing ability.

5. Conclusion

The current report bears some limitations including the convenience sampling and the lack of specific samples of students' multimodal writing. In addition, it did not consider how EAP instructors perceive the findings of the study. Future studies can explore how language instructors develop and implement multimodal tasks to achieve achieve course goals. Despite the limitations, we hope that this study can serve as a starting point for deeper and broader multimodal task needs assessment specific to contexts. Based on the findings, research implications could be discussed in terms of L2 multimodal task development. Because multimodal writing tasks can be designed in various ways, future studies need to explain their rationale behind why a specific task they choose is helpful for developing language and for expanding meaning-making repertories. Furthermore, given recent studies finding facilitative effects of multimodal task on language proficiency and literacies, more research is necessary to collectively provide more insights for how to design a task and evaluate L2 learners' multimodal performance.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jslw.2020.100713.

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