Influence of integration of multimodal writing portfolios into academic writing courses on novice researchers’ academic writing

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Abstract

Purpose – Multimodal writing portfolios were introduced and integrated into an undergraduate course and a graduate course in a research-oriented university in northwest Taiwan. This study aims to examine the influence of multimodal writing portfolios of novice researchers’ academic writing.

Design/methodology/approach – Comparative case studies involve collecting data from several cases and analyzing the similarities, differences and patterns across cases (Merriam, 2009). To address this underdeveloped area of research, a comparative case study method was employed to understand undergraduate and graduate students’ multimodal writing portfolios in academic writing in two courses in Taiwan.

Findings – First, multimodal writing portfolios enabled novice researchers to be more familiar with the structure of academic paper and they had better performance in intrapersonal and linguistic aspects. Second, novice researchers held positive attitude toward multimodal writing portfolios because they regarded process of making multimodal writing portfolios as preparation for their future academic writing. Finally, participants highly valued the class PowerPoint slides, weekly writing tasks and the instructor’s modeling as effective facilitation for making multimodal writing portfolios.

Research limitations/implications – Limited studies focus on multimodal writing portfolios (e.g. Silver, 2019). The present case study explores the integration of a multimodal writing portfolio into one undergraduate and one graduate course to explore learners’ attitude and performance in academic writing.

Practical implications – Novice researchers can learn to compose multimodal academic texts for the academic writing community.

Social implications – Suggestions on effective integration of multimodal writing portfolios into academic writing instruction were provided based on the research findings.

Originality/value – The findings of the study provide the field of L2 writing with insights into the pedagogical development of multilingual writing portfolios and help educators to be better prepared for teaching novice researchers to comprehend and compose multimodal texts and enter the academic writing community. The framework in Figure 1 and suggestions on course designs for academic writing can inform educators on the integration of multimodality in academic discourse. Moreover, this study moves beyond general writing courses at the tertiary level and could contribute to L2 writers’ deeper understanding of how multimodal writing portfolios can be constructed.

Keywords Academic writing, Multimodality, Multimodal writing portfolios, Novice researchers

Paper type Research paper

Multimodality refers to using more than one semiotic form simultaneously (Jewitt and Kress, 2003). Multimodal affordance can include linguistic, visual, gestural, auditory and spatial modes, because different modes can enable writers to express their ideas (Hafner and Ho, 2020). Multimodal writing has become popular in higher education (Archer, 2010, 2012, 2016; Cheung, 2022; Early et al., 2015; Gourlay, 2016; Jiang, 2018; Tan, 2023). Undergraduates or graduate students as novice researchers need to be trained to be equipped with knowledge for multimodal writing, particularly the structure of writing genres or technology (Bowen and Whithaus, 2013; Dieterle and Vie, 2015). They are asked to use multimodal writing in creating oral (a speech), graphic (a presentation) and written types (e.g. a research proposal, a paper) (Liu and Jeba, 2018; Ubozhenko and Zhang, 2019).

Novice researchers may not have been totally immersed in the disciplinary communities yet (Querol-Julían and Fortanet-Gomez, 2019). Fourteen undergraduates in an English as a
second language (ESL) freshman composition class in the United States tended to prioritize linguistic design over other modes (Shin and Cimasko, 2008).

Instructors in academic writing are called to develop multimodality pedagogy and assessments so that learners can be encouraged to compose multimodal writing (Aberg and Akerfeldt, 2017; Liu and Jeba, 2018; Molle and Prior, 2008; Oskoz and Elola, 2016; Selfe, 2009). Multimodal writing portfolios were introduced and integrated into an undergraduate course and a graduate course in a research-oriented university in northwest Taiwan. This study examines the influence of multimodal writing portfolios of novice researchers’ academic writing. The study discusses the following questions.

RQ1. To what extent did the participants gain their academic writing skills and knowledge through the multimodal writing portfolios?

RQ2. How did Taiwanese EFL (English as a foreign language) novice researchers perceive multimodal writing portfolios for their academic writing development as L2 writers?

RQ3. What facilitations were provided for novice researchers’ completion of multimodal writing portfolios?

Suggestions on effective integration of multimodal writing portfolios into academic writing instruction were provided based on the research findings.

Literature review
The literature review discussed different instructional strategies on multimodal writing. Literature gap was identified and conceptual framework was proposed.

Instructional strategies on multimodal writing
Querol-Julián and Fortanet-Gomez (2019) proposed a three-stage model of using multimodal writing or composing: modeling and joint deconstruction, joint construction and independent. Moreover, it is suggested that revisions and reflections be included during the multimodal writing process, because these instructional practices can enhance learners’ composition fluidity and foster their writing agency (Archer, 2017; Donnelly et al., 2022; Kitalong and Miner, 2017; Silver, 2019; Vandommele et al., 2017).

Benefits of multimodal writing
Writers in English as a foreign language (EFL) benefit from multimodal writing. Firstly, learners may be familiar with academic arguments through multimodal writing (e.g. Jacobs, 2013). Jacobs (2013) explored six college students’ academic literacy: data analysis of the questionnaire and multimodal projects indicated that engagement in multimodal academic projects helped foster college students’ understanding of the construction of academic arguments. Similarly, elementary school L2 writers in Shin et al. (2020) were able to orchestrate linguistic and visual modes to construct a multimodal writing project and a metalanguage was developed for multimodal composing.

Secondly, language writers can construct their identity as academic writers when completing multimodal writing projects (e.g. Archer, 2013; Hafner, 2014; Jiang, 2018; Jones, 2010; Kajee, 2011; Shin and Cimasko, 2008; Smith et al., 2020). Four international graduate students in Tardy (2005) portrayed themselves as members of disciplinary communities through organizational structure (introduction, method, result and discussion), lexical choices, visual images and slide colors in their PowerPoint presentations using multimodal writing. Moreover, Jiang (2018) investigated college students’ process of composing multimodal writing. The analysis of observations, interviews and writing projects showed that learners moved from being resistant writers to active composers or exam-oriented writers, from textbook-decoders to multimodal writers.
Thirdly, multimodal writing might enhance language writers’ motivation to write (Kim and Belcher, 2020; Vandommele et al., 2017). Eighteen Korean university students were asked to produce both traditional and multimodal compositions in Kim and Belcher (2020). The analysis of the reflection survey indicated that participants were motivated to write more in English because multimodal writing provided them with opportunities to consider the audience.

Furthermore, multimodal writing fosters L2 writers’ awareness of the audience for their multimodal writing projects (Dzekoe, 2017; Gagich, 2018; Hafner, 2014). In Dzekoe (2017), six Spanish majors in the United States were required to compose digital storytelling as multimodal writing. Analysis of the reflections and questionnaire revealed that these six participants tailored their vocabulary to their audience by moving from the logical, concrete, informative and academic lexicon of argumentative essays to more emotive vocabulary.

Finally, multimodal writing involves different processes and fosters L2 writers’ reflection (Vandommele et al., 2017). In Hafner (2014), undergraduates in English for science in Hong Kong were required to complete a multimodal scientific documentary. Analysis of the student interviews, their comments and their documentaries showed that learners actively engaged in making meaning, reflecting on multimodality and creating multimodal ensembles to suit their rhetorical purpose and audience.

**Literature gap**

Multimodal writing has become the trend in research on writing instruction (DePalma and Alexander, 2015; Smith et al., 2017). Empirical studies explore multimodal writing from different aspects, such as goals of instruction, linguistic mode, or types of multimodal writing task (Lim and Polio, 2020). Lim and Polio (2020) analyzed 161 undergraduate syllabi and conducted semi-structured interviews with seven professors in universities in the United States. Compared to creative expressions, disciplinary writing tasks were mostly structured with explicitly stated preferred styles and components of a specific discipline. In terms of the linguistic mode, the spoken word tends to be a more dominant method than the written word. Finally, the majority of multimodal tasks in academic settings have been designed to involve individual writing performance rather than collaborative writing. Hence, it was recommended that collaborative writing be included in academic writing classes.

Research on multimodal writing focuses on learners in different settings, including elementary schools (e.g. Shin et al., 2020; Smith et al., 2017; Unsworth and Mills, 2020; Vandommele et al., 2017), secondary and tertiary schools (e.g. Aberg and Akerfeldt, 2017; DePalma and Alexander, 2015; Kim and Belcher, 2020; Molle and Prior, 2008), out of school (Vandommele et al., 2017), or in the workplace (e.g. Jonsson and Bläsjö, 2020). Researchers also explore instructors’ perspectives on multimodal writing (e.g. Hafner and Ho, 2020; Lim and Polio, 2020). However, multimodal assessment has lagged behind (Grapin and Llosa, 2020; Hafner and Ho, 2020).

Limited studies focus on multimodal writing portfolios (e.g. Silver, 2019). The present case study explores the integration of a multimodal writing portfolio into one undergraduate and one graduate course to explore learners’ attitude and performance in academic writing.

**Conceptual framework**

Based on empirical studies (e.g. Hafner and Ho, 2020; Grapin and Llosa, 2020), the conceptual framework in Figure 1 was proposed. The instructor modeled academic writing and introduced the structure of academic journal articles. The instructor designed different writing tasks for the participants to be familiar with the structure of academic writing. The multimodal writing portfolios consisted of the following five elements. Firstly, participants were required to use a digital checklist, outline, or flowchart to structure their research proposal, demonstrating their logical mode and intelligence. Secondly, the participants were required to carry out a self-evaluation and check the grammar via Grammarly or other online
tools, demonstrating their intrapersonal intelligence and technological mode. They were asked to describe how they use multimedia tools such as Grammarly to improve their academic writing as reflection. Moreover, participants were asked to comment on each other’s writing in Word or the traditional paper-and-pencil way, an interpersonal method and to reflect on and describe how peer reviews improved their academic writing. Next, participants were asked to give a three-minute oral presentation in English to demonstrate their oral mode. For the visual part, they were asked to make PowerPoint slides or posters based on the writing texts they composed, demonstrating their visual mode.

Methodology
Comparative case studies involve collecting data from several cases and analyzing the similarities, differences and patterns across cases (Merriam, 2009). To address this underdeveloped area of research, a comparative case study method was employed to understand undergraduate and graduate students’ multimodal writing portfolios in academic writing in two courses in Taiwan.

Participants and setting
A total of 34 students from a research-oriented university in northwest Taiwan participated in this study: 28 were undergraduates from the TESOL (teaching English to speakers of other languages) seminar course and six were graduate students from the Research Methodology and Thesis Writing course. Participants were recruited based on convenience sampling, because the researcher was the instructor of the two courses.

On the first day of the semester after the researcher’s explanation of the course requirement and research, the participants were informed of the research study and were asked to fill in their consent form under the approval of the institute’s research ethics committee. Names in this study were pseudonyms.
The undergraduate seniors voluntarily participated in this study. The course was designed to provide a basic overview of research methods in English language teaching so learners could be familiar with the purpose, design and conduct of the research for their senior graduation projects. Of 28 undergraduates, 24 researched B2 “vantage” and four researched C1 “effective operational proficiency” of the Common European Framework of Reference (CERF), the international standard for language proficiency. They did not take any academic writing related courses prior to this course.

Six graduate students also voluntarily participated in this study. This course was designed to provide these first-year graduate students with a basic overview of research methodology so they were familiar with the purpose, design and conduct of research for the research proposal. They all achieved B2 of the CERF.

**Data collection**
Data in this study included documents, pre- and post-tests, participants' multimodal writing portfolios and interviews. Firstly, documents are unobtrusive (Merriam, 2009) and do not interfere with the participants. PowerPoint slides were collected to answer the third research question regarding facilitation for multimodal writing portfolios, such as procedures or structure of academic paper.

A multiple-choice test of ten questions on academic writing were designed as a pre-test and delayed post-test. While four questions were related to the structure of academic paper, one question was about APA (American Psychological Association). Another two questions and three questions were related to data analysis and method section respectively. Concerning the test's content validity, the researcher first asked for professional advice from three experts specializing in TESOL and academic writing. The test was pilot tested among five graduate students and ten seniors who were not included in this study.

Participants were required to complete their multimodal writing portfolios, including a three-minute oral presentation, PowerPoint and a hard-copy or digital poster on the research proposal. Moreover, to foster participants’ reflection on their academic writing experience, they were required to describe how they used multimedia tools such as checklists or flowcharts to structure their research proposal. Finally, they were required to describe how peer reviews improved their academic writing and how they used multimedia tools for self-correction.

Based on the empirical studies (e.g. Åberg and Åkerfeldt, 2017; DePalma and Alexander, 2015; Matsumoto, 2015; Shin and Cimasko, 2008), a six-point (0–5) grading rubric was designed in terms of oral, visual and linguistic mode, interpersonal, intrapersonal and logic mode: 5 (outstanding) means “well written and very organized”, while 0 (bad) means “no evidence” is provided in the multimodal writing portfolio. Participants were required to use the grading rubric to complete their self-evaluation and peer evaluation. The instructor of these two courses also graded participants’ multimodal writing portfolios. These three scores were used to answer the first research question on participants’ demonstration of their academic writing skills and knowledge of multimodal writing portfolios.

Next, the researcher employed semi-structured interviews. The interview protocol was constructed based on the empirical studies (e.g. DePalma and Alexander, 2015; Shepherd, 2018) to answer the second and third research questions, aiming to elicit participants’ perspectives on multimodal writing portfolios and factors pertaining to quality. The interview protocol consisted of two parts. The first part was related to participants’ demographic information, such as writing experience or courses that they had taken, while the second part was about their perceptions of and attitude toward multimodal writing portfolios. The interview was conducted at the end of the semester and each interview lasted
about thirty minutes. All the interviews were audio-recorded and fully transcribed for later analysis.

Data analysis
Descriptive analysis of the scores given by the instructor, the participants and peers to the multimodal writing portfolios was conducted in terms of means and standardized deviation. In addition, the documents, the multimodal writing portfolios and interviews were analyzed thematically and inductively. The researcher first read through all the data with the tentative codes (e.g. PowerPoint and literature review). These tentative codes were then classified into different categories (e.g. guideline and organization), and these categories sorted into major themes (e.g. facilitation and challenge) based on the theoretical framework. The researcher sought to establish trustworthiness by triangulating different sources (e.g. documents, interviews, portfolios and pre- and post-tests), conducting member checks with participants and seeking disconfirming evidence from two colleagues as a form of peer review.

Results
Data analysis was conducted based on the conceptual framework and the research questions. Issues were discussed in terms of results of effects of the multimodal writing portfolios, attitude toward and challenges for making multimodal writing portfolios and facilitations for making portfolios.

Effects of multimodal writing portfolios on novice researchers’ academic writing skills and knowledge
As shown in Table 1, participants made great improvement in the post-test (post-test \( M = 8.71, SD = 1.0 \) vs. pre-test \( M = 4.68, SD = 1.90 \)), particularly the graduate students (post-test \( M = 9.67, SD = 0.52 \) vs. pre-test \( M = 4.5, SD = 1.76 \)). Participants scored highest in the structure of academic papers in both the pre- and post-tests, particularly questions 1 and 2. Multimodal writing portfolios enabled novice researchers to gain knowledge of the conventions of academic writing through the various modes of their research presentations and enhanced their growth as academic writers in the target language.

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Pre-test</th>
<th>Graduate</th>
<th>Post-test</th>
<th>Undergraduate</th>
<th>Graduate</th>
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<tbody>
<tr>
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<td>4.71</td>
<td>4.5</td>
<td>8.71</td>
<td>8.5</td>
<td>9.67</td>
</tr>
<tr>
<td>Std. deviation</td>
<td>1.90</td>
<td>1.96</td>
<td>1.76</td>
<td>1.0</td>
<td>0.96</td>
<td>0.52</td>
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<tr>
<td>Q1: Structure</td>
<td>26</td>
<td>20</td>
<td>6</td>
<td>34</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>Q2: Structure</td>
<td>27</td>
<td>23</td>
<td>4</td>
<td>32</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>Q3: Literature</td>
<td>16</td>
<td>13</td>
<td>3</td>
<td>27</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>Q4: APA</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>31</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>Q5: Structure</td>
<td>15</td>
<td>13</td>
<td>2</td>
<td>33</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>Q6: Data</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>33</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>Q7: Method</td>
<td>18</td>
<td>16</td>
<td>2</td>
<td>34</td>
<td>28</td>
<td>6</td>
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<tr>
<td>Q8: Method</td>
<td>19</td>
<td>15</td>
<td>4</td>
<td>25</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Q9: Method</td>
<td>12</td>
<td>10</td>
<td>2</td>
<td>26</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Q10: Data</td>
<td>12</td>
<td>12</td>
<td>0</td>
<td>23</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1.
Participants’ pre- and post-test

Source(s): Author’s own work
As revealed in Table 2, for undergraduates, the results of their self- and peer evaluations highlighted intrapersonal and linguistic aspects. The intrapersonal aspect was assessed highest in the self-evaluation ($M = 4.36$). The linguistic aspect was assessed highest in the peer evaluation ($M = 4.60$). Undergraduates identified the strength of the linguistic part of their peers’ portfolios. No grammatical errors were found in their portfolios, such as in Alan’s and Lucy’s portfolios:

1. There is no grammar error. (Alan)
2. All the contents are clear and correct. (Lucy)

Graduate students saw the best performance in the intrapersonal aspect in both self- ($M = 4.33$) and peer evaluation ($M = 5$). Participants’ comments clearly identified the strengths that graduate students demonstrated in their multimodal writing portfolios, particularly in the intrapersonal aspect in Alex’s and June’s portfolios:

3. Besides, the last three sections he shared were helpful for me. I learned different writing skills and useful tools from him. (Alex)
4. In addition, she shows evidence how inter and intrapersonal supports benefit her academic writing. (June)

Figure 2 illustrates Alex’s intrapersonal aspect in his portfolio. He described using different tools, such as the auto correct tool or synonyms to help him improve his academic writing.

<table>
<thead>
<tr>
<th>Table 2. Participants’ self- and pre-evaluations</th>
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<table>
<thead>
<tr>
<th>Instructor’s evaluation</th>
<th>Undergraduate Mean</th>
<th>Std. deviation</th>
<th>Graduate Mean</th>
<th>Std. deviation</th>
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<tbody>
<tr>
<td>Overall</td>
<td>4.17</td>
<td>0.05</td>
<td>4.47</td>
<td>0.34</td>
</tr>
<tr>
<td>A</td>
<td>4.32</td>
<td>1.06</td>
<td>4.67</td>
<td>0.82</td>
</tr>
<tr>
<td>B</td>
<td>3.96</td>
<td>0.92</td>
<td>4.67</td>
<td>0.82</td>
</tr>
<tr>
<td>C</td>
<td>4.07</td>
<td>0.93</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>4.32</td>
<td>0.98</td>
<td>4.5</td>
<td>0.84</td>
</tr>
<tr>
<td>E</td>
<td>4.25</td>
<td>1.00</td>
<td>4.5</td>
<td>0.84</td>
</tr>
<tr>
<td>F</td>
<td>4.11</td>
<td>1.03</td>
<td>4.5</td>
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<table>
<thead>
<tr>
<th>Self-evaluation</th>
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<th>Std. deviation</th>
<th>Graduate Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>4.19</td>
<td>0.13</td>
<td>4.02</td>
<td>0.21</td>
</tr>
<tr>
<td>A</td>
<td>4.07</td>
<td>0.86</td>
<td>3.83</td>
<td>0.93</td>
</tr>
<tr>
<td>B</td>
<td>4.20</td>
<td>0.82</td>
<td>4.17</td>
<td>0.41</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>0.82</td>
<td>3.83</td>
<td>0.75</td>
</tr>
<tr>
<td>D</td>
<td>4.25</td>
<td>1.04</td>
<td>4.17</td>
<td>0.75</td>
</tr>
<tr>
<td>E</td>
<td>4.36</td>
<td>1.10</td>
<td>4.33</td>
<td>0.52</td>
</tr>
<tr>
<td>F</td>
<td>4.29</td>
<td>0.80</td>
<td>3.83</td>
<td>0.75</td>
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<table>
<thead>
<tr>
<th>Peer-evaluation</th>
<th>Undergraduate Mean</th>
<th>Std. deviation</th>
<th>Graduate Mean</th>
<th>Std. deviation</th>
</tr>
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<tr>
<td>Overall</td>
<td>4.43</td>
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<td>4.88</td>
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</tr>
<tr>
<td>A</td>
<td>4.34</td>
<td>0.81</td>
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<td>B</td>
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<td>5</td>
<td>0</td>
</tr>
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<td>C</td>
<td>4.60</td>
<td>0.66</td>
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<td>D</td>
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<td>E</td>
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<td>F</td>
<td>4.55</td>
<td>1.08</td>
<td>4.75</td>
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</table>

**Note(s):**
A. verbal: An oral presentation on your overall lesson designs
B. visual: PPT slides or a poster of your lesson designs
C. linguistic: Grammar is correct in the lesson designs
D. interpersonal: Describe how peer reviews improve your lesson designs
E. intrapersonal: Describe how you use multimedia tools improve your lesson designs
F. logic: Describe how you use the outline/checklist/flowchart and online resources to design your lessons

**Source(s):** Author’s own work
As for the visual aspects, graduate students ($M = 5$) and the instructor were satisfied with their PowerPoint slides ($M = 4.7$). The visual aspect was identified as well-designed, as in comments on Iris’ and Jane’s portfolios:

5. The PPT slide is clear enough for readers to read. (Iris)

6. The structure is well-organized and presented clearly. The points in every section are displayed in the PowerPoint slides as well as the oral presentation. (Jane)

Figure 3 presents Iris’ portfolio on the literature review. She mainly described the benefits of content-and-language-integrated learning (CLIL) and the content area for CLIL lessons. She reviewed the empirical studies on geography CLIL lessons and theories and instructional strategies on CLIL.

Only 13 participants included all the required elements in their multimodal writing portfolios. The sections that participants included the most were title ($n = 34$) and references.
(n = 34), followed by purpose of the study (n = 32) and data collection (n = 32). The section that participants missed the most was literature gap (n = 15), followed by the research method design (n = 22) and research questions (n = 23).

Attitude toward and challenges faced for making multimodal writing portfolios

Overall, participants had a positive attitude toward the multimodal writing portfolios. Firstly, participants considered the process as preparation for their future academic writing. While Beth said, “It is the research proposal and it is the fundamental part of our research in the future,” Jane said, “I think making the portfolio can help me understand more about the academic writing presentation.” Ruby even felt that the process boosted her confidence: “To look back on our hard work for the whole semester can give us confidence to do the rest of the research paper.”

Secondly, participants regarded the multimodal writing portfolios as records of their academic writing, as Leah said: “Great, because it helped me to integrate all the things I learned.” Mary said: “I think it is an interesting process because I seldom look backwards after finishing all the work in the semester. By doing this portfolio, I can check my own learning process again.”

Some participants had a sense of achievement with the completion of multimodal writing portfolios. As Ruby said, “It can give us a sense of satisfaction and achievement after we have done the portfolio.” Alan, too, was proud of himself: “To be honest, although I didn’t do it so well, I’m still proud of myself. The accomplishment is satisfying for me.”

However, over 85% of the participants (n = 29) would like to keep this good habit of multimodal writing portfolios, like Nina: “Yes, not only because it’s required for our graduation, I think through making the portfolio, I can one day be a good researcher.” Rosa also said: “Yes, I will. It helps me to organize my research and lets me see the process and the logic of my own writing.”

However, finding relevant journal articles was considered the biggest challenge for the participants. Jade said, “The biggest challenge is to find the appropriate works of literature for my portfolio.” Ruth also said: “I felt it challenging to find references and try hard to condense them into my portfolio.”

Secondly, participants learned what should be included in the research proposal; however, they struggled to organize their research proposal into the three-minute multimodal writing portfolio. Lisa said: “There were too many contents in my portfolio, so I had to decide which part should be deleted. It was difficult for me because I thought all parts were important.” Elsa also said: “I had difficulties including all the within three minutes.” Iris agreed with Elsa: “Narrow down the needed information. It took me much time to think about how I can give out sufficient information but in an organized way. It is hard to decide the important issue that I should address in my research proposal.”

Facilitation for making multimodal writing portfolios

Three major aspects were identified by the participants as helping them to complete their multimodal writing portfolios: the class PowerPoint slides, weekly writing tasks and the instructor’s modeling. First of all, participants regarded the class PowerPoint slides as clear guidelines as Jane claimed, “The guidelines are clear to follow. I can review the lesson at home by using professor’s PPT slides.” Figure 4 shows the PowerPoint slide on the structure of the methodology section in terms of type of research method, participants and setting, data collection and data analysis. Kate elaborated: “The PPT slides in class were clear enough to help me understand the structure and the format of the academic writing. Also, the provided examples and models gave me a better idea of what we should do and how to form paragraphs with better sentences.”
Figure 5 shows the methodology section in Sara’s portfolio. Sara included all the required elements in the methodology section in terms of type of research, participants and setting, data collection and data analysis.

Writing tasks designed by the instructor facilitated participants’ writing step by step to complete their multimodal writing portfolios including the introduction, literature review and methodology sections. Figure 6 shows writing tasks for the introduction. Elsa said: “All the tasks we did in class guided me while I was doing the project. My writing was gradually constructed and developed with the embedded scaffold.” Abby said: “From my perspective, writing tasks in class assisted me a lot when I was writing my research proposal.”

Participants regarded the instructor’s modeling as useful because they could follow the sample. As Iris said, “Instructor’s modeling is important as well, since I am not a fast learner, the model can guide me to do the tasks.” Figure 7 shows the instructor’s modeling of the literature review on type of method, research method, participants, data collection, results and critique. Rosa said, “Most of the time, I used the teacher’s modeling to write my own research proposal. Reading the concrete examples directly, I can know exactly what and how to write to meet the requirements by rephrasing or revising them into my own work.”

Discussion
This study has considered the integration of multimodality academic writing into two academic writing courses among 34 EFL graduate and undergraduate students in Taiwan. In order to effectively integrate multimodal writing portfolios into academic writing instruction, issues were discussed in terms of an emphasis on the self-regulated academic writing process, multimodal writing portfolios as preparation for future researchers and the design of academic writing courses.

Emphasis on self-regulated academic writing process
In response to the first research questions, participants gained knowledge in structure of the academic writing in the post-test as in Table 1. Moreover, participants highly assessed their
multimodal writing portfolios in terms of intrapersonal and linguistic aspects. Novice researchers should foster self-regulated academic writing skills in terms of self-correction and peer-evaluation, particularly in relation to structure and grammar (Archer, 2017), providing extensive and explicit comments on themselves and their peers (Archer, 2017). Novice researchers as academic writers become more aware of the academic writing process and...
more willing to monitor their writing process and adopt strategies to improve their writing (Csizer and Tankó, 2015). Hence, academic writers with self-regulation skills can achieve better academic writing levels (Samanian and Roohani, 2018).

Multimodal writing portfolios as preparation for future researchers
In response to the second research questions, participants in this study had a positive attitude toward multimodal writing portfolios and their knowledge on academic writing particularly improved in relation to the structure of academic papers. Moreover, the multimodal writing portfolios enabled participants to keep a record of their writing and prepared participants to become competent researchers.

Such findings are in line with empirical studies (e.g. Hafner, 2014; Hafner and Ho, 2020). Novice researchers can engage actively in multimodal meaning-making and create multimodal ensembles to demonstrate their learning and knowledge of academic discourse by applying the introduction-literature review-methodology structure. They can read academic journal articles, summarize the main ideas, write and analyze with the use of quotations and citations. Ultimately, they are prepared to become members of the academic community (Jacobs, 2013).

Design of academic writing courses
In response to the third research question, participants regarded the class PowerPoint slides, the instructor’s modeling and writing tasks as beneficial to their academic writing. Rosa’s and Iris’ comments on modeling confirm the effectiveness of the instructor’s modeling of academic writing (Querol-Julía and Fortanet-Gomez, 2019). Being new to the academic discourse community, novice researchers’ knowledge of academic discourse can be constructed from the interpersonal relations between the instructor, capable peers and novice researchers through the interplay of different semiotic resources (Querol-Julía and Fortanet-Gomez, 2019; Williams, 2014). Hence, genre-based instruction on exemplary articles, instructor modeling and well-designed writing tasks should be included in academic writing courses in order to prepare novice researchers to become competent academic writers and enter the academic discourse (Archer, 2013; Dieterle and Vie, 2015).
Participants struggled in searching for journal articles relevant to their research topics, reading journal articles and writing literature reviews. In addition to the instructor of the academic writing courses modeling how to search for academic journal articles, novice researchers should be equipped with technological knowledge such as attending orientations offered by libraries or writing centers at the beginning of the semester. Such finding is accord with previous finding that learning to communicate in academic discourse consists of learning to use the appropriate register, genre and style and adopting the appropriate researcher identity to demonstrate affiliation with the academic discourse community (Hafner, 2014).

Multimodality in academic writing in higher education is important and worthy of further research (Archer and Breuer, 2016; Early et al., 2015). Multimodal pedagogy on academic writing can focus on the use of digital technologies and facilitate learners to write, communicate and demonstrate their knowledge of academic discourse through semiotic resources (Archer and Breuer, 2015, 2016).

Conclusion
This study investigated the integration of multimodal writing portfolios into two courses for novice researchers and the data analysis reached the following major findings. First, multimodal writing portfolios enabled novice researchers to be more familiar with the structure of academic paper and they had better performance in intrapersonal and linguistic aspects. Secondly, novice researchers held positive attitude toward multimodal writing portfolios because they regarded the process of making multimodal writing portfolios as preparation for their future academic writing. However, participants regarded finding relevant journal articles and including the required elements in the multimodal writing portfolios as challenging. Finally, participants highly valued the class PowerPoint slides, weekly writing tasks and the instructor’s modeling as effective facilitation for making multimodal writing portfolios.

The findings of the study provide the field of L2 writing with insights into the pedagogical development of multilingual writing portfolios and help educators to be better prepared for teaching novice researchers to comprehend and compose multimodal texts and enter the academic writing community. The framework in Figure 1 and suggestions on course designs for academic writing can inform educators on the integration of multimodality in academic discourse. Moreover, this study moves beyond general writing courses at the tertiary level and could contribute to L2 writers’ deeper understanding of how multimodal writing portfolios can be constructed.

This case study is not without limitations. Firstly, situated within only one undergraduate and one graduate course in the EFL context and based on only a limited small sample size, the findings should be interpreted with caution for other settings. Secondly, this study lasted for only one academic year: the influence of multimodal writing portfolios on novice researchers’ academic writing in the longer term remains unclear. A further longitudinal study can be conducted in the future to investigate how multimodal writing portfolios can foster novice researchers’ thesis writing or academic journal article publications.

Thirdly, this empirical study employed a case study with both qualitative and quantitative data. Other research methods might be able to illuminate novice researchers’ perspectives on the affordances of multimodal writing portfolios. Future studies can employ content analysis of learners’ multimodal writing portfolios or incorporate an experimental study to compare and contrast novice researchers’ writing portfolios in classrooms or virtual settings.

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Further reading


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