Undergraduates’ & Faculty Members’ Views on Scientific Reading & Communication in Authentic Inquiry

ABSTRACT

Scientific reading and communication have become key components in postsecondary science education. However, undergraduates have often been found to lack motivation to engage in these tasks. The present study surveyed 2098 undergraduates and 27 biology faculty members to compare their views on the importance and time cost of eight practices in authentic inquiry. Overall, the undergraduates considered scientific reading and communication less important than other inquiry practices (e.g., data analysis), whereas the faculty members ranked reading and writing highly important. The undergraduates who ranked scientific reading and communicative practices important tended to include the purposes and functions of these practices in their explanations. In contrast, the undergraduates who ranked the practices less important expressed multiple misconceptions about the applications of reading and communication, including that they are peripheral research components; they may not affect the inquiry results; they come after experiments; they are less important than other practices; and they are unnecessary. Four inquiry perspectives were identified from the respondents, including collective equality, knowledge generation, chronological order, and time investment. These perspectives significantly impacted undergraduates’ rankings on scientific reading and communication practices and six underlying perceptions.

Key Words: scientific reading and communication; authentic inquiry; college science instruction.

Introduction

Reading and communicating scientific ideas has become vital to participating in contemporary scientific research as increasingly complex scientific questions and problems call for contributions from different science communities. Accordingly, both scientific reading and communication have become key components in 21st-century postsecondary science education (National Research Council [NRC], 2003; American Association for the Advancement of Science [AAAS], 2011). Over the past decade, undergraduate science curricula have undergone a remarkable transformation to involve undergraduates in intensive literature reading and journal-style writing (Wenk & Tronsky, 2011; Libarkin & Ording, 2012; Krontiris-Litowitz, 2013; Willard & Brasier, 2014). However, despite the encouraging outcomes, some students have been found to lack motivation to engage in scientific reading and communication learning tasks (Verkade & Lim, 2016). The existing studies on this topic primarily focus on examining students’ beliefs about their abilities and measuring students’ scientific reading and writing competencies (Berger et al., 2018; Van Blankenstein et al., 2019), and only a few studies have explored the perceptions associated with students’ motivation to these practices (Hubbard & Dunbar, 2017; Addis & Powell-Coffman, 2018). This article presents a study guided by the expectancy-value-cost model of motivation (Eccles & Wigfield, 2002; Barron & Hulleman, 2015) to examine undergraduates’ and faculty members’ views on scientific reading and communication in authentic inquiry and how these views relate to their understandings of authentic inquiry.

Scientific reading, a practice closely related to science literacy, refers to critically examining and comprehending the research processes and results presented in the scientific literature (NRC, 2003). Communication in science refers to how scientists deliver ideas and discoveries orally, visually, and in writing (AAAS, 2011). During the scientific inquiry process, reading literature enables scientists to stay updated and refine their research questions and methodologies; oral presentations and scholarly writing allow them to communicate ideas, evidence, and results in the science community. Both scientific reading and communication have been stressed in postsecondary science education since early this century. For example, BIO2010 (NRC, 2003) stipulates that science faculty should integrate these activities to improve students’ scientific understanding and enhance their communication skills. The report Vision and Change (AAAS, 2011) also suggests that “practicing the communication of science through a variety of formal and informal written, visual, and oral methods should be a standard part of undergraduate biology education” (15).

Over the past decade, numerous undergraduate science curricula have been developed to involve undergraduates in reading research papers and practicing scholarly writing. These efforts have helped students understand primary literature, improve
science literacy skills, gain genre knowledge of scientific writing, enhance the scientific writing quality, and increase engagement with science (McClure, 2009; Wenk & Tronsky, 2011; Libarkin & Ording, 2012; Krontiris-Litowitz, 2013; Willard & Brasier, 2014; Holstein et al., 2015). However, scholars also have found that some students exhibit low motivation for scientific reading and communication tasks. For example, Verkade and Lim (2016) examined 89 undergraduates’ attitudes and approaches to scientific reading and writing. Twenty-four percent of the students in the study admitted they cited a paper without reading it in its entirety. 33% of the students only read the introduction and/or discussion of a paper, and 39% of the students applied surface approaches to writing tasks.

The expectancy-value-cost model of motivation suggests that people’s performance and persistence on a task are influenced by their expectancies for success, perceived task values, and associated cost (Eccles & Wigfield, 2002, Barron & Hulleman, 2015). Expectancies for success refer to people’s beliefs about their abilities to succeed on a task. Task values refer to the perceived aspects of a task that attract one to engage in the task and contain at least three subcomponents: attainment value (i.e., the personal importance of succeeding on the task), utility value (the usefulness of the task to one’s short- or long-term goal), and intrinsic value (the enjoyment of performing the task). Cost refers to the negative consequence of engaging in a task and also contains three subcomponents: effort cost (the time and effort required for a task), opportunity cost (loss of opportunities for doing other tasks), and psychological cost (the negative psychosocial results associated with the failure of a task) (Feldon et al., 2019; Perez et al., 2019). Expectancies and task values often positively predict students’ performance and persistence, while cost is often a negative motivation predictor (Eccles & Wigfield, 2002, Barron & Hulleman, 2015). Besides, people’s task perceptions and interpretations are influenced by their experiences and cultural milieu (e.g., the cultural stereotype of subject matter) (Eccles & Wigfield, 2002).

The existing studies on students’ motivation to literature reading and scholarly writing primarily focus on expectancy (i.e., the belief about one’s ability). Reviewing these studies is out of the scope of this article because the present study examines students’ motivation from the constructs of task value, cost, and cultural milieu. A few studies have investigated undergraduates’ and faculty members’ perceived task values of scientific reading and communication. Hubbard and Dunbar (2017) surveyed 147 undergraduates and 49 academics on their perceptions of scientific literature reading. More than 90% of the respondents regarded reading research papers as important for general scientific training, indicating a high utility value. Nevertheless, students could perceive a lower task value when comparing reading with other practices. For example, Addis and Powell-Coffman (2018) analyzed 372 undergraduates and 94 faculty members’ views on 20 science process skills. Both undergraduates and faculty members considered scientific reading less important than other skills for their careers, indicating a low utility value. However, both undergraduates and faculty members ranked oral and written communication as one of the most important skills.

There has been little research on the perceived cost for scientific reading and communication or the impact of a cultural milieu. Eccles and Wigfield (2002) contend that the cultural stereotype of subject matter may influence people’s task perceptions and interpretations. Thus, students’ views on scientific reading and communication may relate to their understandings of authentic inquiry. Researchers have found that many undergraduates regard authentic research as a defined process with fixed steps, a solitary activity, or a process of producing understandings or leading to exciting breakthroughs (Cartrette & Melroe-Lehrman, 2012; McComas, 1996). These incomplete understandings of inquiry may impact students’ perceptions and therefore contribute to the low motivation to perform scientific reading and communication. For example, if students regard authentic inquiry as a solitary activity, they would not perceive the necessity of reading others’ ideas or communicating with other scientists.

This article describes a survey study on 27 biology faculty members’ and 2098 undergraduates’ views on scientific reading and communication and the underlying inquiry perspectives. The study specifically focuses on examining respondents’ perceived task value and cost of these practices in the context of authentic inquiry and asks whether their inquiry perspectives influence these views. The following research questions are addressed in this effort:

- How do undergraduates and biology faculty view the relative importance of eight practices in authentic inquiry?
- How do undergraduates and biology faculty envision the relative time cost for eight practices in authentic inquiry?
- What perspectives of inquiry do undergraduates and biology faculty possess?
- How do undergraduates’ and biology faculty members’ perspectives relate to their views?
- What perceptions relate to undergraduates’ views on scientific reading and communication in authentic inquiry?
- How do undergraduates’ perceptions about scientific reading and communication relate to their perspectives of inquiry?

○ Methods

Study Context

The study context is an introductory biology laboratory course at a large public research university in the southeastern United States. This introductory biology lab course is a curriculum innovation effort that reforms biology lab activities from confirming content knowledge to developing evidence-based explanations through authentic inquiry. Here, authentic inquiry is defined as a process in which scientists generate new scientific knowledge through multiple methods and practices (Yin, 1995; Latour & Woolgar, 2013). In the lab course, multiple mini-research projects are used to involve students in making observations, forming research questions, searching and reading research literature, designing experiments, analyzing data, presenting findings, writing journal-style reports, and conducting peer reviews. This one-semester lab course is primarily taken by freshmen and sophomores because it is a prerequisite for upper-level biology courses. A small number of juniors and seniors take this course to meet various academic requirements. The total course enrollment ranges from 1000 to 1200 undergraduates every academic year.

Students demonstrated an improved inquiry ability at the end of the course, and the postcourse evaluation suggested that they enjoyed most of the inquiry activities. However, some students did not appreciate the scientific reading and communicative tasks. In the postcourse evaluations, they specifically suggested reducing or removing the deliberate scholarly writing assignments. These
students’ attitudes strongly suggested that they valued scientific reading and communication less than other practices. Therefore, a survey was distributed to examine students’ views on a large scale. Faculty members were included in the survey because their views could serve as a valuable reference point for the study.

**Population & Participants**

A total of 2325 undergraduates took the lab course during the 2014–2015 and 2015–2016 academic years, with 84% being lower-division (LD) students (i.e., freshmen or sophomores) and 16% being upper-division (UD) students (i.e., juniors or seniors). Sixty-eight percent of the undergraduates majored in a science or STEM field (e.g., health sciences and agriculture), 23% of the students studied a nonscience major, and 9% did not declare a major. The survey was completed by 2098 students, with 88% being LD students and 12% being UD students. The chi-squared test suggested that more LD students from the population responded to the survey ($\chi^2 [1, N = 2098] = 14.48, p < 0.001$).

The participants included 27 faculty members, representing 70% of the faculty in the Department of Biology at the same university. These participating faculty members’ research fields spanned over animal behavior, developmental biology, evolutionary biology, ecology, genetics, genomics, molecular biology, neuroscience, physiology, and plant ecology.

**Instrument Development & Data Collection**

A list of salient practices of scientific inquiry was generated based on the “inquiry wheel” proposed by Reiff and colleagues (2002) and “The Real Process of Science” flowchart from the Understanding Science project (2016). Some practices from the two resources were modified to meet our research goals. For example, the item communicating the findings from Reiff and colleagues (2002) was split into presenting results and writing reports, papers, or grant applications to distinguish oral and written communication. The subcomponents of the practices were avoided because some LD students who were early in their college careers might have been unfamiliar with these activities. For example, we used the item analyzing data and interpreting results to cover the activities such as statistical analysis, pattern identification, and graphing. Critical thinking and problem-solving were excluded from the survey because they are cognitive abilities and processes (Mayer & Wittrock, 2006; Fisher, 2011) and are more often referred to as skills than practices (Coil et al., 2010). The final list contained the following eight practices: formulating research questions; reading scientific literature; designing and setting up experiments; collecting data in the lab/field; analyzing data and interpreting results; writing reports, papers, or grant applications; presenting results; and collaborating with peers.

The survey consisted of three main questions. The first survey question examined respondents’ perceived cost of the eight practices in authentic inquiry by asking them to estimate the percentages of time that scientists spend on these practices, based on a total time of 100%. The second survey question investigated respondents’ perceived values of these practices by asking them to rank the relative importance of these practices in authentic inquiry, with 1 denoting the most important practice, 2 denoting the second most important practice, and so forth. Respondents could assign the same integer to multiple practices to indicate equal importance. They could add two additional practices they believed should be included in authentic inquiry for both questions. Finally, the respondents were asked to explain their rankings in a short-response question.

The survey was piloted in the lab course in fall 2013 and spring 2014 to test the question clarity and validate the content. After validating the questionnaire, the survey was distributed via Qualtrics (Qualtrics, Provo, UT) to the undergraduates enrolled in the lab course before the first lab meeting during the 2014–2015 and 2015–2016 academic years; the biology faculty members took the survey in the fall semester of 2014.

**Data Analysis**

The respondents were classified into three groups: faculty, lower-division (LD) students, and upper-division (UD) students. The survey data were analyzed using IBM SPSS Statistics (Version 26). Of all respondents, only 62 students (3%; $n = 2098$) and two faculty members (7%; $n = 27$) added additional practices. These practices either overlapped with the existing practices or were not inquiry practices (e.g., working under pressure or administration). Thus, only the eight provided practices were analyzed.

Quantitative analyses were conducted to analyze the importance-ranking and time-allocation data. After removing the outliers detected using an IQR multiplier approach (Tukey, 1977; Hoaglin & Iglewicz, 1987), Shapiro-Wilk’s tests suggested both importance ranking and time-allocation data were not normally distributed ($p < 0.05$). Therefore, nonparametric tests (i.e., Kruskal-Wallis tests and Mann-Whitney $U$ tests) were performed to analyze the datasets with equal variances based on median. Chi-squared tests were used to compare the perception prevalence among groups. The 0.05 level of probability was utilized as the criterion for significance in all data sets.

A qualitative content analysis (Hsieh & Shannon, 2005) was conducted on respondents’ explanations for identifying their inquiry perspectives and perceptions of scientific reading and communicative practices. The coding process was independent of respondents’ rankings and identities to avoid bias. Inductive coding was performed to generate the codes and categories of perspectives and perceptions. The data were coded by one coder over four rounds. In the last two rounds, the intra-rater reliability was substantial to excellent (Cohen’s kappa 0.78–0.97), with coding agreement ranging from 89% to 99%.

1. **Results**

**1. How do undergraduates and biology faculty view the relative importance of eight practices in authentic inquiry?**

Faculty and undergraduates viewed the importance of eight practices differently. Faculty ranked formulating questions the most important ($\text{Mdn} = 1$), following by reading, writing, and designing experiments ($\text{Mdn} = 2$). The LD students ranked designing experiments, collecting data, and analyzing data as the three most important practices ($\text{Mdn} = 2$); the UD students ranked designing experiments and analyzing data as the two most important practices ($\text{Mdn} = 2$), followed by formulating questions ($\text{Mdn} = 3$). Kruskal-Wallis $H$ tests showed that both LD and UD students ranked writing as significantly less important than the faculty did. The UD students ranked presenting as significantly less important than the faculty did (Figure 1A).
2. How do undergraduates and biology faculty envision the relative time cost for eight practices in authentic inquiry?

Regardless of groups, faculty and undergraduates allotted relatively more time to writing, data collection, and data analysis, and they assigned relatively less time to presenting. In terms of the actual percentages of time, both LD and UD students assigned significantly less time to writing (Mdns = 12%) than the faculty did (Mdn = 20%), and they allotted significantly more time to presenting (Mdn = 5%) than the faculty did (Mdn = 5%). The UD students assigned significantly more time to formulating questions (Mdns = 10%) than the faculty did (Mdn = 5%), and the LD students allotted significantly more time to designing and setting up experiments (Mdn = 13%) than the faculty did (Mdn = 10%). No significant differences were identified in the time allocation between the two student groups (Figure 1B).

3. What perspectives of inquiry do undergraduates and biology faculty possess?

Four types of inquiry perspectives—collective equality, knowledge generation, chronological order, and time investment—were identified from 95% of the respondent explanations (n = 2074), with faculty and undergraduates combined. The rest of the explanations (5%) did not provide sufficient information for identifying a perspective. The collective equality perspective, found in 4% of respondents, claimed that all practices were equally important and collectively contributed to authentic inquiry. A knowledge generation perspective, reflected by 51% of respondents, described authentic inquiry as a way to generate new knowledge through experiments or field investigations. A chronological order perspective, expressed by 32% of respondents, depicted authentic inquiry as a three-part sequence—pre-experiment, the experiment, and post-experiment—or indicated that these practices were executed in a chronological sequence. A time investment perspective, held by 8% of respondents, associated the importance of practice with its time investment. These four categories all concerned respondents’ perspectives on practices in authentic inquiry (Supplementary Table 1, available with the online version of this article).

4. How do undergraduates’ and biology faculty members’ perspectives relate to their views?

Overall, the respondents with a collective equality perspective (4%, n = 2074) ranked all practices highly important, with the medians ranging from 1 to 2, while the respondents holding one of the other three perspectives (91%) often ranked the eight practices at different importance levels.

In the faculty group, the three perspectives did not substantially influence the faculty members’ rankings, except for the writing practice. The faculty members expressing the chronological
order perspective (Mdn = 6) ranked writing significantly lower than the faculty members expressing the knowledge generation or time investment perspective (Mdns = 2, Kruskal-Wallis H = 10.560, d.f. = 2, p < 0.01).

In both student groups, the students expressing the knowledge generation perspective (hereafter knowledge generation students) and those reflecting the time investment perspective (hereafter time investment students) ranked most practices similarly. They both ranked data collection and analysis as more important than other practices. In contrast, the students indicating the chronological order perspective (hereafter chronological order students) ranked the practices of formulating questions and designing experience highest (Figure 2).

In terms of the reading and communicative practices, the chronological order LD students ranked reading as significantly more important (Mdn = 4) than the knowledge generation LD students did (Mdn = 5). The time investment LD students ranked writing as significantly more important (Mdn = 4) than the chronological order LD students did (Mdn = 5). The chronological order UD students ranked presenting as significantly less important (Mdn = 7) than the knowledge generation UD students did (Mdn = 6) (Figure 2).

5. What perceptions relate to undergraduates’ views on scientific reading and communication in authentic inquiry?

A total of 500, 327, and 598 students explained their ranking on the practices of reading, writing, and presenting, respectively. Based on the context of the explanations and the semantic indicators in the text, the identified perceptions fell into two dichotomous categories—positive and negative—for each of the three practices (Table 1). The positive perceptions often described the purposes or functions of these practices. In particular, 307 students (61%; n = 500) believed reading might help to initiate a study, form research questions, gain background knowledge, design experiments, or interpret data; 173 students (53%; n = 327) recognized that writing helped to earn credits, secure grants, and share information with the science community; and 185 students (31%; n = 598) perceived presenting as a way of sharing results with the science community or getting feedback. Negative perceptions were expressed by 197 students (39%, n = 500) for reading, 154 students (47%, n = 327) for writing, and 444 students (69%, n = 598) for presenting. The negative perceptions suggested a range of misconceptions about the applications of reading and communication in inquiry, including that these practices are ancillary parts of research, they come after experiments, they are less important than doing experiments or other practices, they are unnecessary, and they are unable to affect the results. No significant differences were found between the two student groups.

Students’ perceptions were consistent with their rankings. Mann-Whitney U tests showed the students with a positive perception ranked the corresponding practice higher than those holding a negative perception (Table 1).

6. How do undergraduates’ perceptions about scientific reading and communication relate to their perspectives of inquiry?

Students’ inquiry perspectives appeared to influence some of their perceptions, as demonstrated by the unequal presence of six
Table 1. Undergraduates’ positive and negative perceptions of scientific reading and communicative practices. Rankings are represented as median (IQR).

| Practices | Positive Perceptions | Percent | Ranking (Reading) | Negative Perceptions | Percent | Ranking (Reading) | Mann-Whitney U Tests |
|-----------|----------------------|---------|-------------------|----------------------|---------|------------------|---------------------|
| **Reading** *(N = 500)* | Reading helps to gain knowledge pertaining to the current study | 43% | 2 (1–3) | Reading is less important than other practices | 11% | 7(5–8) | -15.223 < 0.001 |
| | Reading helps to initiate the study and form research questions | 9% | 1(1–2) | Reading is less important than doing experiments | 7% | 6(4-8) |
| | Reading helps to design experiments | 6% | 2(1–3) | Reading is unnecessary | 7% | 7(6–8) |
| | Reading helps to interpret data | 3% | 3(2–5) | Reading comes after experiments | 6% | 6(4.5–7) |
| Writing *(N = 327)* | Writing helps to share information with the science community | 21% | 3(2–4) | Writing comes after experiments | 28% | 5(4–7) | -11.551 < 0.001 |
| | Pursuing grants is important | 16% | 2(1–3) | Writing is less important (without specification) | 13% | 6(5–7) |
| | Writing is important (without specification) | 4% | 3(2–4) | Writing is an ancillary part of research | 3% | 6(5–8) |
| | Writing requires more time | 3% | 2(1–3) | Writing is unnecessary | 2% | 6(4.5–7) |
| | Writing helps to document the experiment | 3% | 3(2–4) | Writing does not affect experimental results | 2% | 8(6–8) |
| | Writing earns credits | 2% | 1(1–1) | — | — | — |
| | Writing is an essential part of experiments | 2% | 1(1–2) | — | — | — |
| | Writing helps carry out experiments | 2% | 3(2–4) | — | — | — |
perceptions among three perspective groups (Figure 3). For reading, 10% of knowledge generation students \((n = 278)\) believed that reading was less important than experiments, whereas only 4% of chronological order students \((n = 197)\) held this perception. For writing, 46% of chronological order students \((n = 118)\) regarded writing as less important because it came after experiments, whereas only 17% of knowledge generation students \((n = 180)\) indicated this perception. For presenting, 54% of chronological order students \((n = 257)\) regarded presenting as less important because it came after experiments, whereas only 18% of knowledge generation students \((n = 309)\) indicated this perception. There were 16% of knowledge generation students who regarded presenting as less important than data collection, whereas only 7% of chronological order students expressed this perception. Finally, 43% of time investment students \((n = 28)\) perceived that presenting involved less time and effort, whereas merely 3% of knowledge generation students and 4% of chronological order students believed so (Figure 3).

**Discussion & Implications**

This study has found that a significant number of undergraduates viewed the eight inquiry practices differently from the faculty members. They generally considered scientific reading and communication as less important than other practices (e.g., data analysis) and as costing less time in authentic inquiry. In contrast, faculty members prioritized scientific reading and scholarly writing in science research and allotted more working time. These findings are partially in line with the study by Addis and Powell-Coffman (2018), who also reported that undergraduates thought data analysis was highly important and reading science papers was less important. However, Addis and Powell-Coffman (2018) reported that their students ranked oral and written communication skills highly important. This difference may be because Addis

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**Figure 3.** Statistically different distributions of six students’ perceptions about scientific reading and communicative practices across three perspective groups. The results of chi-squared tests (degrees of freedom = 2 in all cases) are present above the straight lines.
and Powell-Coffman probed students’ perceived task value based on career goals while we asked our students to consider the task values in authentic inquiry. In this sense, these two studies provide complementary information regarding students’ views in different contexts.

Only a small portion of students and faculty in this study expressed that all eight practices were equally important, while most of them ranked practices based on their contributions to knowledge generation, a chronological order, or the relevant time investment. The knowledge generation and chronological order perspectives found in undergraduates are consistent with the prior study (Cartrette & Melroe-Lehrman, 2012), but there have been no prior studies reporting the time investment perspective. Our results add to the existing research by revealing the impacts of students’ inquiry perspectives on their views of different inquiry practices. In particular, the knowledge generation students and time investment students prioritized data collection and analysis while the chronological order students aligned the practice’s importance with the executive order. However, these three perspectives did not significantly influence faculty views except for the writing practice. Since the faculty sample size was relatively small in this study, this result should be further examined in the future.

This study also adds to the existing research (Hubbard & Dunbar, 2017; Addis & Powell-Coffman, 2018) by uncovering the underlying perceptions associated with students’ views on reading and communication. We have found that these perceptions were shaped by student’s inquiry perspectives and their knowledge about the applications of scientific reading and communication in authentic inquiry. Take presenting, for example. It was ranked low for different reasons in three perspective groups: the knowledge generation students believed it was less important than data collection and analysis, the chronological order students thought it came after experiments, the time investment students believed it cost less time and effort. Our results strongly suggest that students are more likely to value scientific reading and communicative practices when recognizing the purposes of these practices in authentic inquiry. When lacking the knowledge, they tended to form various misconceptions or interpret these practices based on a linear order or time cost. For example, many students did not know when and why to read scientific literature because they stated literature should be read after investigation and was only used to check the experimental results.

From the lens of the expectancy-value-cost model, these findings suggest that the incomplete inquiry perspectives and limited knowledge hindered students from perceiving the task values of scientific reading and communication. For the same reason, the students failed to perceive these practices as effortful or intended to devote their effort to other practices. As a result, they exhibited little motivation to engage in these learning tasks.

Our findings have important implications for college science educators teaching scientific reading and communication. First, instructors must be aware that many students possess a different view of scientific reading and communication from theirs. Involving students in reading and communicative tasks may improve students’ abilities to some extent. Still, the incomplete understanding of inquiry and misconceptions may cause low motivation and resistance that hinder students from achieving their full potential. Second, instructors must consider revealing their students’ views and underlying inquiry perspectives as early in a science course as possible. Certain formative assessments, such as a small survey, slip sorting, or short entry ticket, can be used to uncover these views quickly. In our class, we used the survey to gather student responses before the first lab and compared their views and the biologists’ views in class. Many students were stunned by the amount of time that biologists spent on reading and writing and the fact that many biologists considered reading and writing more important than collecting and analyzing data. Some students regarded this as one of the enlightening moments in the lab course. One student wrote in the postcourse evaluation, “I learned a lot from having a faculty’s view on our scientific literature reviews. This is the first time that I have done anything like this, so it was good to get a professional’s perspective.” Third, instructors should help students recognize the purposes and functions of scientific reading and communication. In addition to the direct elaboration, embedding these learning tasks into discovery-based learning experiences may help students develop firsthand knowledge. Other learning experiences, such as CUREs (course-based undergraduate research experiences), may also support meaningful scientific reading and communication (Bakshi et al., 2016).

We hope this study provides useful information for postsecondary science educators, especially those teaching introductory-level courses or mentoring undergraduates’ authentic research experiences. We admit that this study only gathered data from faculty members in one science discipline. In the future, we hope to distribute this survey in other science departments to compare the students’ and faculty members’ views in multiple disciplines. Given that students expressed many misconceptions in the study, future studies may also involve gathering students’ previous reading and communication experiences to further understand the development of these misconceptions.

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