

Supporting File S4: Student Survey Data

Survey instruments in File S3 were used to poll students in 2013 and 2014. We were interested in evaluating the overall perception and satisfaction of the students with RGs. Specifically we wanted to know how RGs might facilitate learning from primary literature and contribute to self-efficacy beliefs. Below, we present an analysis of the results obtained from these surveys.

1) How Familiar Were Students With The Assigned Article Prior To Attending RGs?

Responses to Question 1 on the survey (“How familiar were you with the article prior to the reading group session?”) are quantified in Figure 1. When RGs were optional (Figure S4-1A), the majority (67%) of students reported that they were “familiar” with the assigned paper prior to RG discussions (i.e. having read the article once and understood it enough to carry out a discussion; 3 on a scale of 1-4 with 4 being “very familiar”). When the sessions were mandatory (Figure S4-1B), the majority of students (61.5%) reported being “somewhat familiar” with the assigned paper (i.e. they skimmed it over once; 2 on a scale of 1-4 with 4 being “very familiar”). Students who attended RGs when they were optional (2013) could have been a self-selected group of high-performing students, as they are more likely to both attend all course components as well as prepare diligently. It is however, still of note that these high-performing group of students also ranked the RGs as helpful to their learning (see 2 below). We therefore suggest that even top students are likely to benefit from peer-discussion, as has been demonstrated in other peer-based models (1).

2) How Helpful Were The RG Sessions To Students¹?

The majority of students found RGs helpful in developing skills to read and interpret research papers, regardless of whether RGs were mandatory or optional (73% in 2013 and 50% in 2014 gave it a ranking of 4 on a scale of 1-5, where 5 is “very helpful”). These results support the utility of peer-based learning practices in helping students dissect primary literature (Figure S4-2). Interestingly, 13% in 2013 versus 25% in 2014 found it “very helpful” (5 on a scale of 1-5). Why more students found RGs to be “very helpful” when their attendance was mandatory could suggest a slight difference in the cohort of students in each of the two years. Alternatively, perhaps the “mandatory” title promotes greater accountability, with more students engaging and benefiting more fully in RGs (D.J., personal communication, September 2015).

3) How Did RGs Contribute To Student Confidence (Self-Efficacy) In Their Ability To Dissect A Paper?

Responses to survey questions 4 and 6 are shown in Figure S4-3. When the sessions were mandatory, 55.5% of the students ranked themselves as being a “2” (on a scale of 1-5, in which 1 was “not confident at all” and 5 was “very confident”), in terms of how confident they were in approaching the paper before the RG session (Figure S4-3B). This

¹ Question 2 on the survey: “How helpful were the reading group sessions to your reading and understanding of the assigned article for each week?”

ranking changed to a “4” (on a scale of 1-5, in 5 was “very confident”) by the majority of students (60.7%) *after* they attended RGs (Figure S4-3C). When sessions were optional, the majority of students (80%) also rated themselves as a “4” on the confidence scale *after* they attended RGs (Figure S4-3A). Unfortunately, we did not ask students to report self-efficacy prior to RGs in 2013 and hence, we do not have a comparison of pre- and post-RG-based learning for this year.

Despite the differences in the initial familiarity with the assigned paper (Q 1 above) between the optional and mandatory cohorts, the majority of students in both the optional and mandatory RG ranked themselves as being a “4” on the scale of 1 (not confident at all) and 5 (very confident). These results suggest that RGs provide students with the confidence required to interpret and evaluate primary literature independently, irrespective of whether these sessions are optional (2013) or mandatory (2014). This observation is consistent with other studies that have shown that academic mentorship has the potential to increase student self-esteem, academic self-efficacy, and overall satisfaction with their academic program (2-3).

4) How Specifically Do Students Use RGs To Facilitate Understanding Of Primary Literature?

Students were asked to report on *how* they used RGs to help them read and interpret the assigned papers, in preparation for the in-class discussion. Qualitative responses to Question 3 were classified into different categories (Figure S4-4). Students predominantly used RGs to aid in the interpretation of data (55%) or experimental procedures (24%) in both mandatory and optional RGs. It is gratifying to note that the majority of students acknowledged using the RGs to develop data interpretation skills. Notably, 11% of students reported using RGs to think critically about the data in the paper. (e.g. “...*WHY certain cells are used...*”, “...*problems with methodology...*”, “*Discussing figures led to understand problems with methodology and data reported.*”). Interestingly, we were able to assess development of cooperative learning skills and interpersonal skills as students reported that RGs helped them “*gain input*” from peers and “*see how others ...think about the paper*” or “*Provided an opportunity to practice explaining concepts in front of an audience.*” This is in line with the findings of others that suggest that interpersonal skills develop substantially through cooperative learning (4). Practicing such skills in RGs may also lead to improved self-efficacy beliefs, which has been shown to be a predictor of effective learning and academic success (5).

References

1. **Smith MK, Wood WB, Krauter K, Knight JK.** 2011. Combining peer discussion with instructor explanation increases student learning from in-class concept questions. *CBE Life Sci Educ.* **10**: 55–63.
2. **Boyd PJ.** 1996. Mentoring by college faculty: Perception by students in evaluation of their satisfaction with college. PhD diss., University of Southern Mississippi.
3. **Fogg RJ.** 2002. The mentor-protege relationship in an academic setting: Contributions and outcomes. PhD diss., Kansas State University.
4. **Tanner K, Chatman LS, Allen D.** 2003. Approaches to cell biology teaching: cooperative learning in the science classroom – beyond students working in groups. *Cell Bio Educ.* **2**(1): 1-5.
5. **Zimmerman BJ.** 2000. Self-efficacy: An Essential motive to learn. *Contemp Educ Psychol.* **25**(1): 82-91.

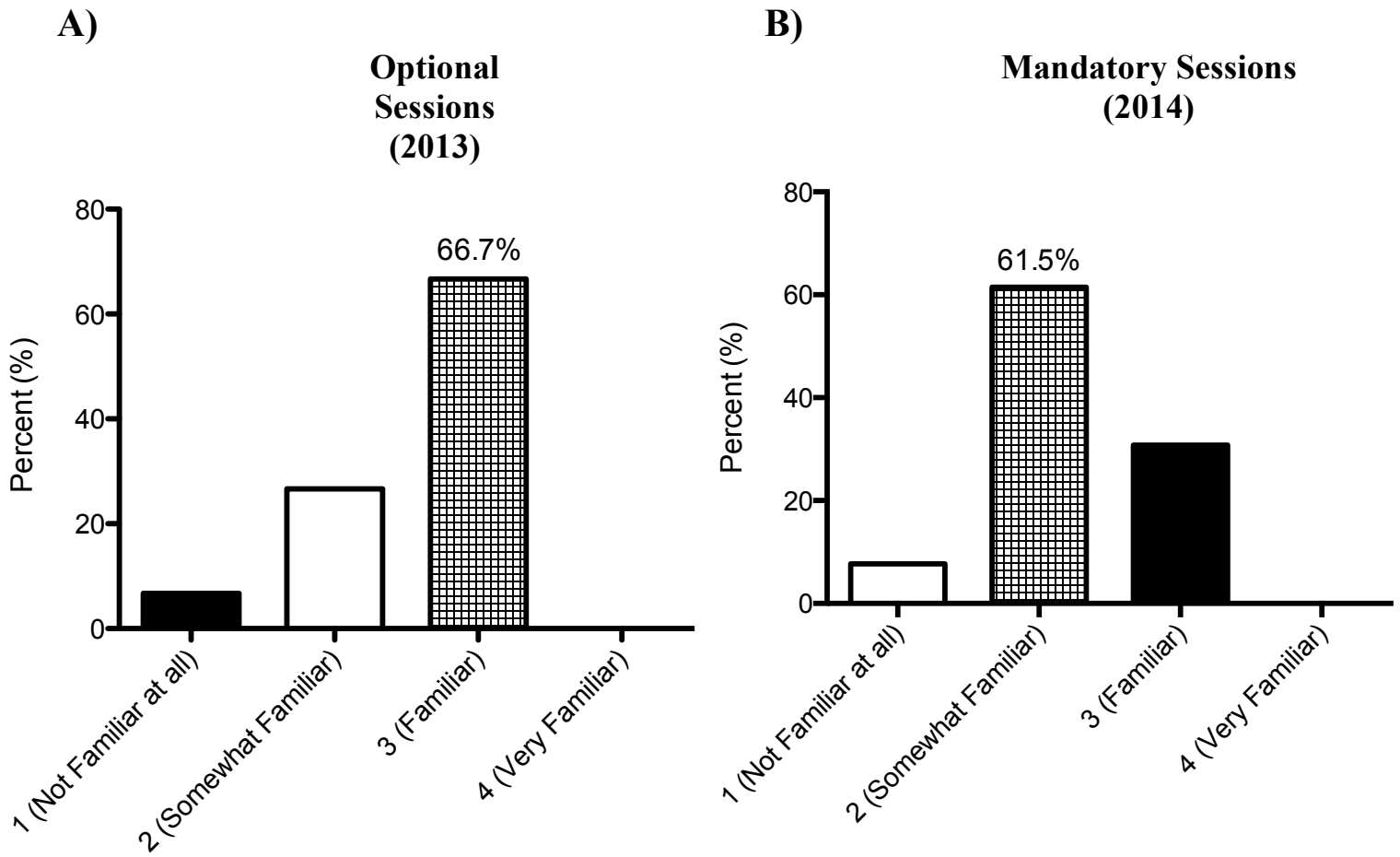


Figure S4-1: Students’ familiarity with the article prior to RGs. Survey responses to Question 1: “How familiar were you with the article prior to the reading group session?” In 2013 when RGs were optional and in 2014 when RGs were mandatory, are quantified in this figure. The 4-point scale was further specified in the survey to assist students in correctly identifying their level of familiarity as follows: 1 (Not familiar at all): Didn’t even download the article; 2 (Somewhat familiar): Skimmed the article; 3 (Familiar): Read through the article once and understood it; 4 (Very familiar): Read the article and completely understood the material. The majority response is listed as a numerical percentage above the relevant bar graph.

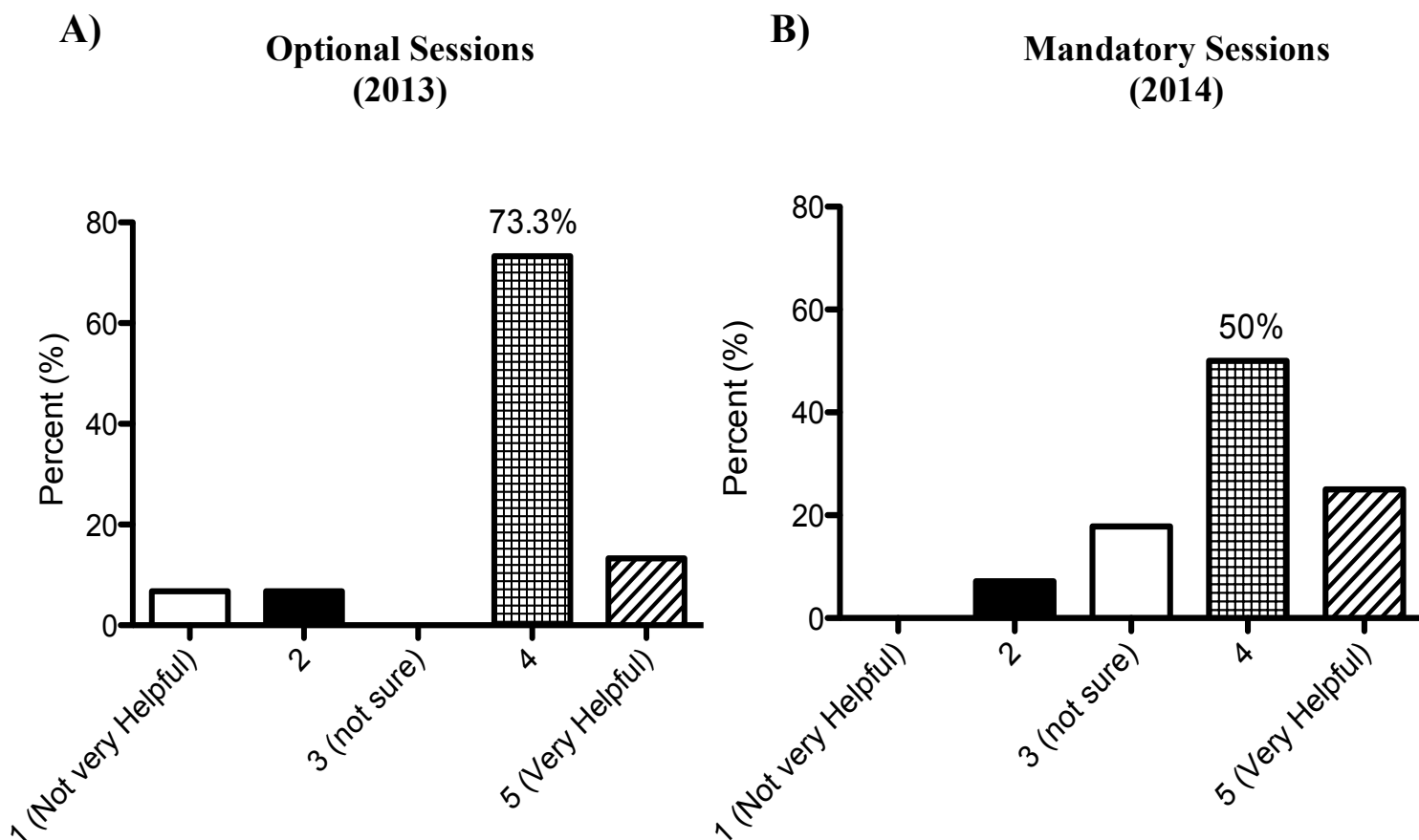
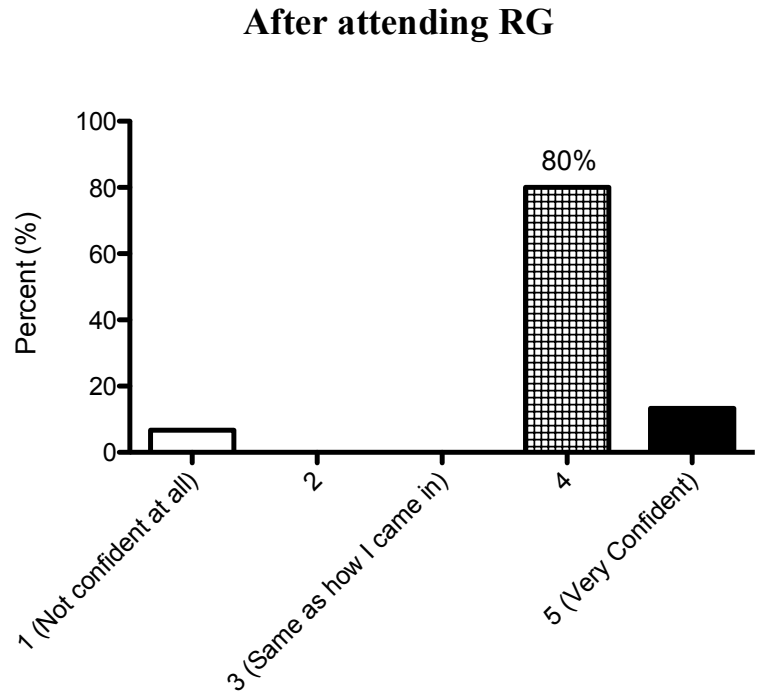


Figure S4-2: Student feedback on the helpfulness of RG sessions. Survey responses to Question 2: “How helpful were the reading group sessions to your reading and understanding of the assigned article for each week?” In 2013 when RGs were optional and in 2014 when RGs were mandatory, are quantified in this figure. The majority response is listed as a numerical percentage above the relevant bar graph.

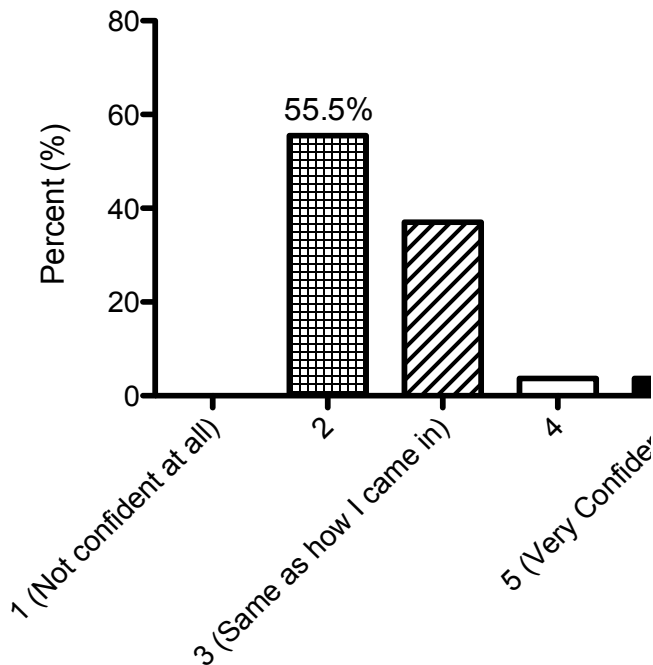
A) 2013 – Optional RG Session

After atten



B) 2014 – Mandatory RG Session

Before attending RG



C)

After attending RG

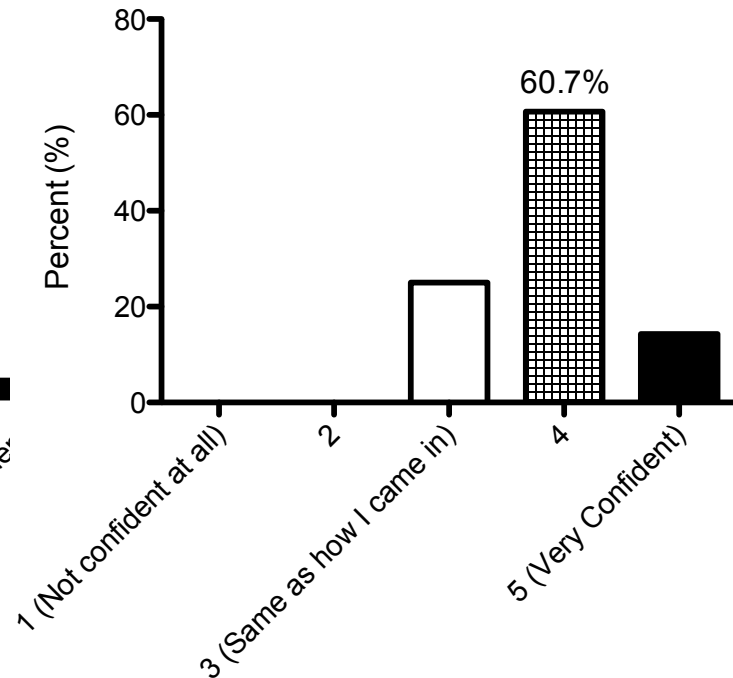


Figure S4-3: Students’ confidence in their understanding of the article after RGs. (A) Survey responses to question 4: “How confident were you about approaching/ understanding the article at the END of the Reading Group session?” in 2013 when RGs were optional and (B) Survey responses to question 4 and an additional (C) question 6: “How confident were you about approaching/ understanding the article BEFORE attending the Reading Group session?” in 2014, when RGs were mandatory, are quantified in this figure. The majority response is listed as a numerical percentage above the relevant bar graph.

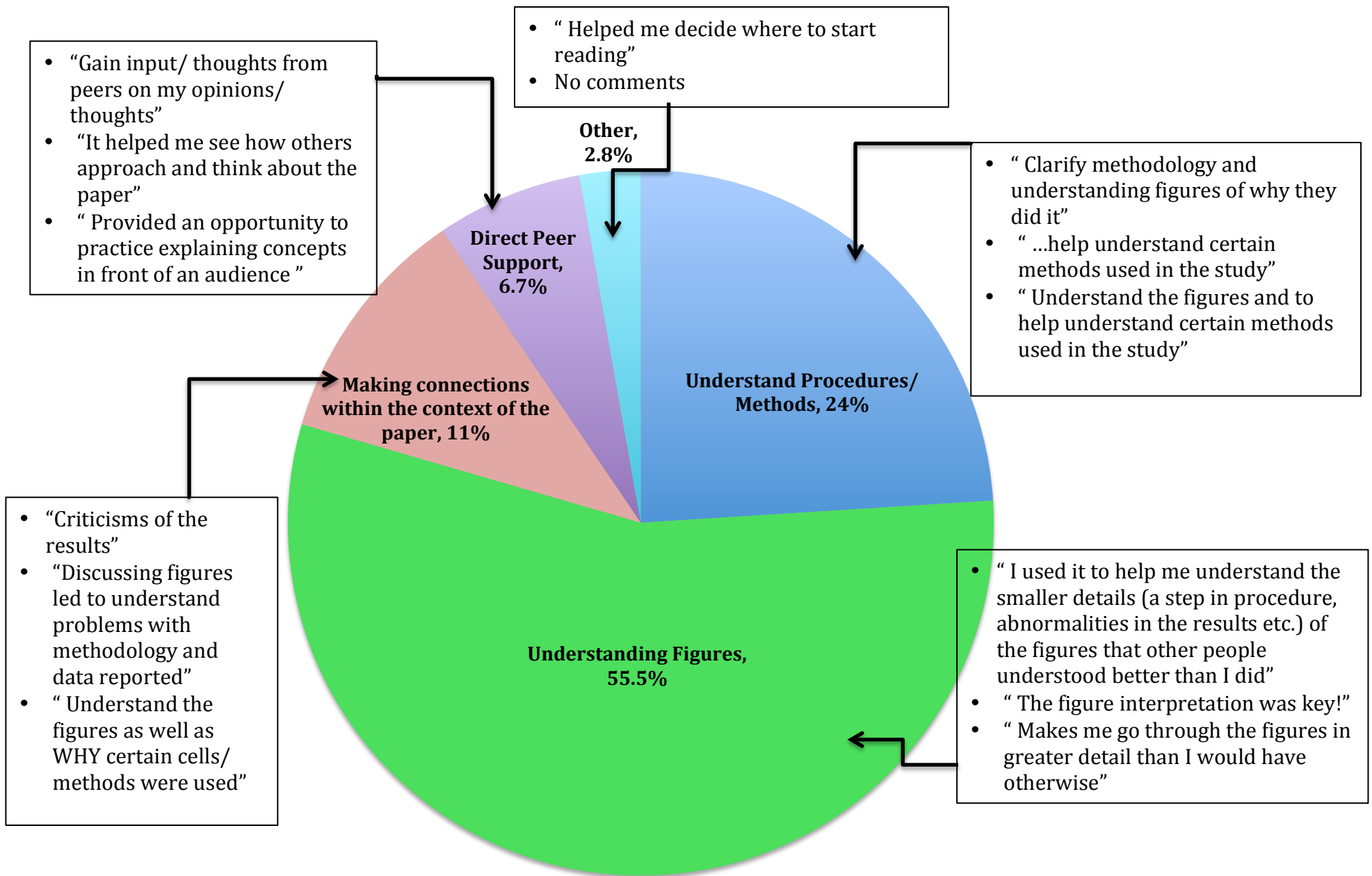


Figure S4-4: Students’ qualitative feedback on how they utilized the RGs to aid learning. Samples of direct quotations to the survey question 3: “How specifically did you use the reading group to help you with the understanding of the article?” from both the voluntary and mandatory years of RG are shown in text boxes. Responses are grouped into categories to better evaluate how students broadly utilized RGs in helping them understand primary literature.