

Too Long to Read: Assessing the Motivation Behind Graduate Student Attendance in Reading Groups

By John J. Schenk and Scott J. Steppan

Graduate-level reading groups serve as a primary forum for students to learn current and complex concepts in their field. Because graduate students lament that reading “abnormally long” articles discourage them from attending particular reading group sessions, we tested the hypothesis that attendance will decrease proportionally with page number. We examined the relationship of attendance to semester chronology, the presenter, paper type, and time allowed to read the paper. We found that there was no significant relationship between page number and attendance and that students were not selecting shorter papers on average; however, a significant relationship was found between the attendee number and semester chronology, with attendance decreasing as the semester progressed. No significant relationships existed between attendance and who led the discussion, paper type, or time allowed to read the paper. We discuss how these results can be used to maximize student attendance and how to maximize student involvement in general.

The importance of reading groups, also known as journal clubs, in graduate student training is undeniable (Graves, 1964; Honey & Baker, 2011). Through these weekly meetings, small groups of students (as well as postdoctoral scholars, lab technicians, and faculty members) stay current with the literature and advances in their field (Alguire, 1998; Klein & Lande-Diner, 2011). However, despite the central role that reading groups play in graduate education, this approach has been much less studied than other pedagogical approaches like lectures. Reading groups serve the purpose of training graduate students in several respects. First, students learn how studies are executed, ideas are conveyed, and the relevant questions in their field are being asked and then answered. Second, students are taught critical-thinking skills, which are largely developed by discussing assumptions and caveats (Arif, Gim, Nogid, & Shah, 2012; Christina & Rose, 2003). Third, students learn more advanced topics than they would in typical graduate-level courses, facilitating opportunities for students to develop ideas from readings that they will cite and integrate into their research. Fourth, students are taught written communication through example, as well as verbal communication through discussions. Fifth, within the cooperative learning environment that reading groups provide, students develop their teaching

skills by leading discussions. Finally, these groups help form the bonds that create an intellectual community by making the viewpoints, expertise, and thought process of individuals known to each other. Students are not only honing their skills and building their confidence as scientists, but these groups also can lead to new project ideas and even collaborations (e.g., Yoder et al., 2010); thus, research communities oftentimes form around reading groups. Through reading groups, students are repetitively trained on a weekly basis, and from different perspectives, and this is why they are so important and widely used across disciplines.

Given the importance of reading groups to a graduate student's education, graduate student participation in reading groups is beneficial for the success of the student, lab, department, and university. Reading group attendance in many departments is voluntary for most participants and thus may be influenced by other factors. Despite their benefits, not all students attend reading groups, and some attend irregularly. The reason students may not participate in reading groups is varied and includes personal reasons, scheduling conflicts, limited free time, personal conflicts, poorly managed or unfocused groups, lack of relevant discussions to the student's research, and timidity. Another reason that graduate students have cited for why they do not attend particular reading group sessions is the paper length. Semi-

regularly attending students have commented that they did not have the necessary time to read a lengthy paper (one longer than the average paper length) and that they, consequently, did not attend the reading group. Therefore, if lengthy papers really are discouraging student participation, we should critically assess whether long papers should be discussed in reading groups altogether.

In this study, we examine how students respond to page length when deciding on whether to attend a particular reading group; however, we really are interested in larger questions of what motivates graduate students to attend reading groups and how we, as educators, can maximize graduate-student education with reading groups as a pedagogical tool. Here, we intend to (a) stimulate consideration and study by researchers of this central pedagogical forum for graduate training, (b) derive preliminary understanding of what influences reading group participation, (c) clearly outline and promote the importance of reading groups in graduate-student education, (d) call to attention the lack of research on graduate-student pedagogy, and ultimately (e) maximize student involvement in reading groups.

Materials and methods

All data was observed from a single graduate-level reading group at a United States Research 1 university from March 2011 to December 2012, which included four semesters (2 years) and 47 sessions. Other groups exist in the department but are not offered as frequently. This reading group focuses on broad topics in evolutionary biology. The group is organized by a faculty member and is taken for credit by a minority (2–4) of students per semester, meets every week for an hour, is offered almost every semester, and has been established for over a decade. Graduate students, postdoctoral scholars, tech-

nicians, and faculty members take turns leading the discussion each week (undergraduates sometime participate, but rarely), and participation is largely voluntary. The general protocol followed is that volunteers will select a paper, then lead a brief synopsis of the paper, followed by an open discussion where anyone can contribute. Attendees are expected to read the paper prior to the meeting. General directions that the discussion takes include critical analysis of methods, assumptions, sampling, and interpretations; the paper's relevance to the presenter's research; and tangential ideas stimulated by the paper. Attendees take turns presenting papers, often by volunteering several weeks in advance to present, and select a paper to present on their own. Attendees come from multiple laboratories and departments and include master and doctoral students. Food (cookies, brownies, etc.) is irregularly provided a few times each semester without prior announcement.

We recorded the number of people that attended the reading group; the number of printed pages (including literature cited, but excluding supplementary material); the chronological order of the discussion within the semester; the presenter's status (student, postdoctoral scholar, or faculty); and whether the paper was an empirical, review, or methodological study. We did not record the identities of attendees or their attendance records. Consequently, we were unable to track the behavior of subgroups (e.g., faculty compared with students), but the majority of attendees were students (never dropping below 50% for any session and typically >70%), and attendance by faculty and postdocs was nearly consistent during a semester; thus, nearly all variation across a semester was due to variation in graduate student attendance. We sampled a single reading group to avoid confounding effects of variation

in expectations and procedures among different reading groups. We applied these data to an analysis of covariation (ANCOVA) in the R statistical framework (R Development Core Team, 2005) to determine (a) the relationship of the dependent variable attendance to page number, semester chronology, presenter status, and paper type, and (b) the relationship of the dependent variable page number to presenter status. Analyses were conducted with a Type-III ANCOVA using the CAR package (Fox & Weisberg, 2011). A second analysis was also conducted in R to explore the linear relationship between the number of attendees and (a) the page number and (b) the chronological order, although this was done only to corroborate the ANCOVA results. We recorded the number of days that participants were given to read the paper for one semester only (measured as time between e-mail announcement and discussion; $n = 14$), and we conducted a linear regression on a subset of the data to determine the relationship between the number of days given to read the paper and attendance.

We chose to focus in this study on actual behavior rather than expressed motivations; the latter as might be revealed in interviews. In addition, the potential pool of attendees (which includes attendees and nonattendees alike) was quite large (>120 people, with more than 60 on the regular e-mail list at any given time), constituting the entire ecology and evolution student body, postdocs, technicians, faculty, and other associated persons, and thus we did not conduct postsemester interviews (but see the following discussion on the need to evaluate motivation through interviews).

Results

The mean paper length for the duration of the study was 11.6 pages, with a standard deviation of 5.95 (range = 1–29). The average number of attendees was 10.7, with a

standard deviation of 3.44 (range = 6–19). Approximately 89.5% of the articles were empirical, 8.5% were method, and 2% were review papers ($n = 47$). Graduate students presented 72.3% of the papers, postdoctoral scholars presented 14.9%, and faculty members presented 12.8% ($n = 47$). The average number of days students had to read a paper was 3.64 (range = 1–5).

The ANCOVA analysis found a significant negative correlation between attendance and when in the semester the reading group occurred ($P < .001$, $R^2 = 0.31$), and this result was corroborated by the linear regression (Figure 1A). All other relationships were nonsignificant, including between attendance and the number of pages ($P = .228$). A weak but nonsignificant relationship was also found in the linear model

between page numbers and attendance ($P = .073$, $R^2 = 0.069$; Figure 1B). A significant correlation was not found between attendance and who presented the paper ($P = .329$) or the type of paper being presented ($P = .93$). Faculty members chose shorter papers on average, followed by graduate students and then postdocs (Figure 2), but this relationship was marginally nonsignificant ($P = .056$). The linear regression that tested for a relationship between when the paper was sent and attendance was not significant ($P = .405$).

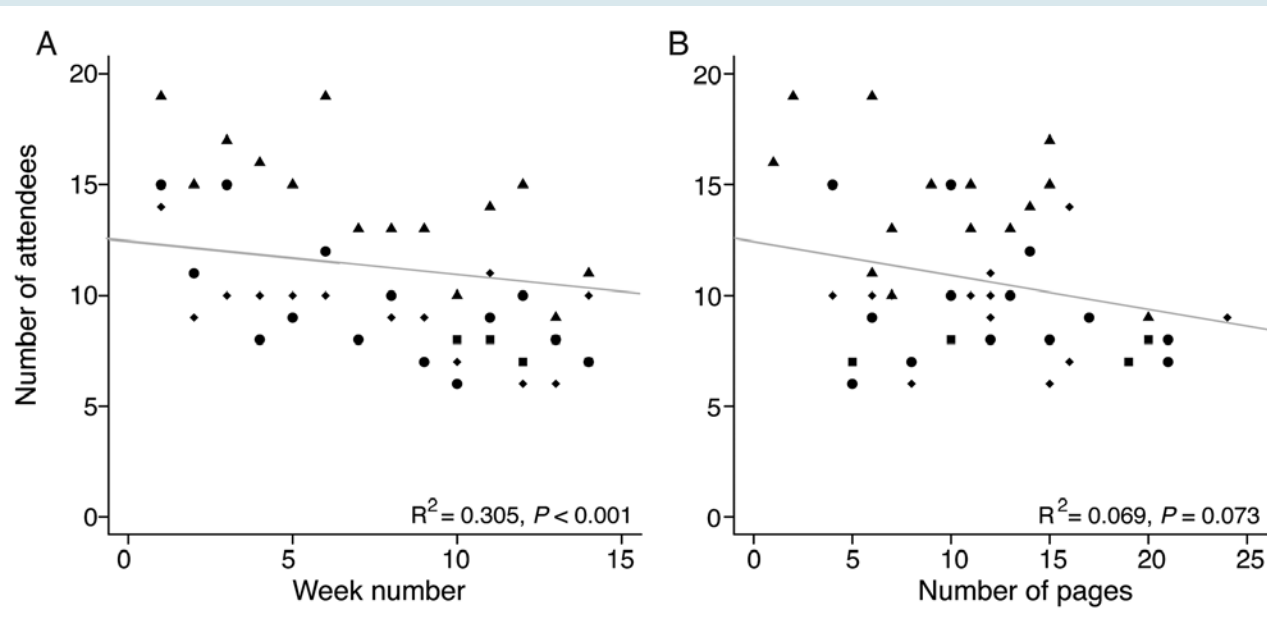
Discussion

Despite the often-overheard complaints that graduate students voice about papers being too long to read within their time constraints, our results suggest that paper length was not significantly influencing their

decision to attend reading groups. Rather, we found that the most significant influence is when in the semester the reading group occurs. This result corroborates anecdotal observations that student participation declines as the semester progresses and begs the question of why does participation decrease. A likely answer is that the optimistic estimates of productivity at the beginning of terms give way to the reality of overcommitments toward the end of the semester, and this demands more time from students to meet their deadlines before the end of the semester. Graduate students are often balancing time demands from teaching, research, and classes, and perhaps time becomes an expensive premium that students feel they can free up by skipping reading groups.

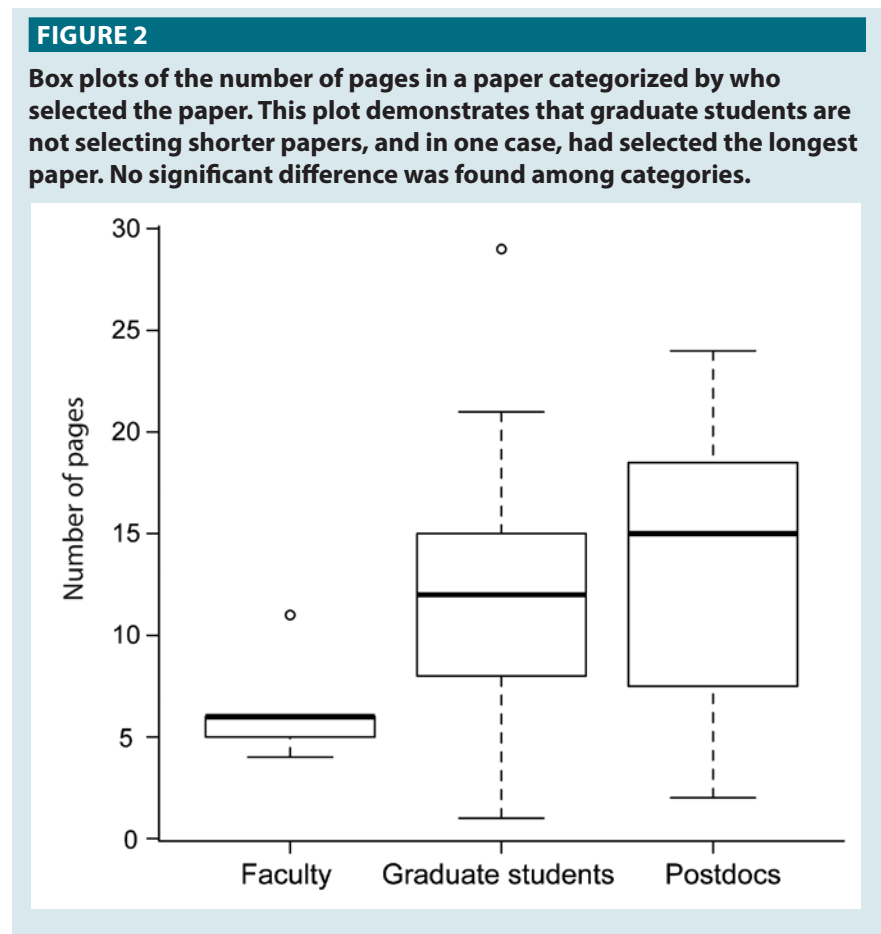
FIGURE 1

Plots of the number of attendees and (A) which week in a semester the reading group met, and (B) the corresponding number of pages in each article. The gray line through the data points represents a linear relationship between the two variables (respectively). Symbols represent data collected from the first (square), second (triangle), third (diamond), and fourth (circle) semester. The R^2 and P -values indicated at the bottom right corner of the graphs demonstrate that attendance is influenced more by when the group meets than by paper length. Despite the steep slope of the best-fit line in plot B, this relationship was not significant due, presumably, to the large spread of the data.



The student's decision to attend a reading group was not influenced by whether the paper was presented by a student, postdoc, or faculty member or by the type of paper being presented. These results are encouraging because they show that students were not self-regulating attendance to impress or satisfy the expectations of higher status colleagues, and they suggest that students believe their peers are doing an equally good job presenting papers as more experienced presenters. This contrasts with Van Derwood, Tietze, and Nagy (1991), who found higher attendance when faculty led discussions in a medical-based journal club. Our results, alternatively, might have been driven by peer pressure or by students wanting to support their peers, who may perceive similar levels of status within the community. Students were also not self-regulating attendance on the basis of the types of papers being read or favoring any particular paper type, which is ideal because this indicates that method papers, which are important but can be conceptually and mathematically challenging in evolutionary biology, are not discouraging attendance on average. In fact, the types of papers being chosen in reading groups were approximately proportional to those being published, with the majority being empirical papers.

One can ask what graduate students expect to achieve from reading groups and if their expectations coincide with the advisor's objectives. For many expectations, the two objectives directly overlap. Graduate students attend reading groups to advance their education and become more engaged scientists that are able to critically assess studies. This creates research that is more thoughtful, a mutual goal of advisors and students. Although some students attend reading groups to receive course credits or because of pressure from their advisors, most do so on a



voluntary basis, which suggests that they believe they are benefiting from attending reading groups.

Given the benefits of reading groups on graduate student's intellectual development, we should consider how we can better encourage graduate students to attend reading groups. Our results suggest that it is perhaps more important to the vitality of and attendance at journal clubs to increase the incentives to participate (e.g., the quality of interactions) than decrease the disincentives (e.g., long papers). Besides the obvious solution of bringing food to reading groups (and we are not discouraging this *very* effective strategy; Deenadayalan, Grimmer-Somers, Prior, & Kumar, 2008; Sidorov, 1995), some additional methods to encourage attendance must exist. As our results indicate, perhaps the best way to increase attendance is to be responsive

to the demands on graduate student time, especially toward the end of the semester, by increasing incentives to attend relative to competing time demands—for example, by providing more food, making the meeting intellectually and socially dynamic, or easing the strain of time limitations by making sure that enough time is allotted for students to read papers. The model that most reading groups follow is to send an e-mail that identifies which paper will be read during the next meeting, although some groups set the schedule at the beginning of the term. For the semester that we have data, these e-mails were sent 1–5 days prior. Although we did not find a significant correlation between time to read the paper and attendee number, the sample size was low ($n = 14$), and because this study was not experimental, we did not explore a wide range of the number of days

students had to read a paper. Developing a schedule of papers to read at the beginning of the semester would give all potential attendees more time to read the assigned paper and might encourage attendance (Deenadayalan et al., 2008).

Future studies should expand on the one presented here to gain a better understanding of reading group pedagogy. We observed a single reading group for four semesters, but observations of other reading groups may uncover different results among groups, departments, and disciplines. More important, we did not interview participants about their expectations for attending reading groups, and doing so may prove enlightening. This would be especially true for participants who stopped or intermittently attended the reading group. We urge that future studies be conducted to build on the one presented here to include both variation among reading groups and interviews.

In our study, we explored what motivated students to attend reading groups. Although we were able to quantify some components of what influences graduate student attendance in reading groups, we had to rely on anecdotal evidence in our discussion because of the paucity of data on reading group pedagogy (Alguire, 1998; Hartzell, Veerappan, Posley, Shumway, & Durning, 2009; Sidorov, 1995). This was especially true outside the clinical medicine literature, where we were unable to find a single article on graduate-level reading groups while searching on Web of Knowledge (<http://apps.webofknowledge.com>), despite its ubiquitous use in science education. Not only is there a lack of information on reading group pedagogy, but also graduate student pedagogy in general has lagged behind in research efforts. The lack of conversation about how to best optimize reading groups in an academic setting is surprising given its importance in train-

ing graduate students, and it leaves many unanswered questions on how to best optimize reading groups. Appropriate theoretical frameworks and methodologies exist that can help researchers to qualitatively and quantitatively explore the nature of learning that takes place in these communities (Wenger, 1998). A research agenda oriented to exploring issues related to graduate student education and reading groups specifically has the potential to investigate multiple questions within these group contexts—for example: (a) should student participants choose papers or should a senior advisor select them (with or without input from students; Hartzell et al., 2009); (b) what should be the focus and goals of discussion groups (e.g., learning new methods, studying good case studies, criticizing papers; Alguire, 1998); (c) what role should the presenter take (e.g., moderator of discussion, lecturer); (d) should participants be asked to construct structured summaries (Dzara, Jian, & Soltys, 2012); (e) what role should argumentation take (Baird, 2012; Driver, 2000; Klein & Lande-Diner, 2011); (f) how long should meetings be held for; (g) how much time should be spent, proportionately, on broader theoretical ideas, caveats, assumptions, methods, interpreting the data, and presentation of the results; (h) what role should faculty members have during discussions (Graves, 1964); (i) what is the optimal group size (Graves, 1964); (j) should attendance be mandatory (Deenadayalan et al., 2008; Sidorov, 1995); and (k) what are the best settings to facilitate discussions (Graves, 1964; Jouriles et al., 1996) and further graduate students' membership in these communities? We also point out that conducting successful reading groups is as much art as science, dependent on the personalities of the participants but especially that of the lead instructor(s). In conclusion, hav-

ing students attend reading groups is only the first part of the story; how to encourage participation (both solicited and nonsolicited) and maximize pedagogical goals (e.g., skill development, satisfaction) once they are in the room are the other parts. We urge educators to start having serious conversations that critically assess how to best encourage student attendance and participation in these groups. ■

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