

From Presenter-Opponent to Authors-Reviewers: Flipped Classroom Designs for a Journal Club

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Journal Club as an Active Learning Strategy

A journal club is an educational session in which a group critically examines a scientific article, providing a forum for collective engagement with recent research or the evaluation of published findings and concepts of shared interest. It is a long-standing pedagogical format with a well-established structure: one member presents a pre-selected research article to the group, typically covering the background, concepts, results, methods, and implications, followed by a collective critique (Borrego & Newswander, 2008). While traditional structures remain common, they have disadvantages such as “variable audience engagement and inconsistent preparation” (Fu et al., 2025). Thus, innovative active learning approaches that are learner-centered should be explored to better align with participants’ learning goals and to promote engagement (McGlacken-Byrne et al., 2020).

Journal clubs can be understood and improved through pedagogical frameworks that emphasize learning as a social and active process. For example, Social Cognitive Learning Theory (SCLT) highlights the role of observation, interaction, and feedback in learning, which are central to discussion-based formats such as journal clubs, where participants practice critical scholarly behaviors together (Fu et al., 2025). Research on the flipped classroom further supports this approach by showing that shifting content acquisition to individual preparation (material for the journal club is prepared in advance by the presenter)

enables in-class time to be devoted to activities such as analysis and evaluation (Bounds & Boone, 2018). In addition, studies on peer instruction and debate in graduate education demonstrated that structured role-taking encourages deeper engagement and disciplinary thinking (Williamson & Paulsen - Becejac, 2018). Together, these perspectives frame the journal club as an active-learning environment well suited to flipped, role-based instructional designs in doctoral education. New Classroom Design for a PhD Student Journal Club For the purposes of this project, I explored opportunities in improving engagement and achieving learning objective with flipped classroom and role-taking concepts in a PhD student course termed Advanced Topics in Biomaterials Science and Engineering. The course was taught at the Technical University of Denmark, Department of Health and Technology (DTU Health Tech). The course aims to introduce key topics in biomaterials science and engineering while developing students' skills in critical reading of the research literature and scientific presentation. These goals are addressed through participant-led paper presentations and discussion, in other words in a journal club format. Presented research article topics span a broad range of subjects within the field and are chosen in collaboration with the students and guided by the instructor. There were six sessions with six doctoral students in attendance. Learning objectives of the course can be found in Appendix A.

To move beyond the traditional journal club format, I tested two alternative setups designed to increase student preparation, participation, and in-class discussion. Both formats followed a flipped classroom approach, with students preparing in advance and using class time for structured, role-based discussion and critical exchange.

Presenter–opponent

In the *presenter–opponent* format, one student prepared and presented a selected research article, while another student was assigned as opponent. The presenter introduced the relevant background of the field and the study in a 15 min PowerPoint presentation. The opponent prepared comments and questions in advance, focusing on reproducibility of methods, rigor in testing the hypothesis and supporting the claims, as well

as novelty and relevance to the field. In-class discussion was led by the exchange between presenter and opponent, with other students entering the discussion at their own initiative.

Authors–reviewers

In the *authors–reviewers* format, students were divided into two groups of three and assigned the roles of authors and reviewers one week in advance. The session began with a 15-minute PowerPoint presentation of the selected manuscript, after which the class split into author and reviewer groups to simulate the peer-review process. Both groups were given five minutes to discuss internally and assign preliminary scores (1–10) for novelty, rigor, clarity, and impact. A moderated discussion then followed, focusing on these criteria and on how the study could be strengthened. After the discussion, both groups revisited their scores, and a final decision was made regarding the suitability of the manuscript for its intended journal.

The motivation for introducing the *presenter–opponent* and *authors–reviewers* formats was to increase student engagement and to shift greater responsibility for discussion and analysis to the participants, with the *authors–reviewers* format in particular intended to involve more students simultaneously. My role in these sessions was primarily facilitative, adopting a master–apprentice approach in which I guided the discussion without directing it, intervening only to steer the conversation when needed. To evaluate the formats, I prepared a list of critical aspects for each study that ideally should be addressed during discussion, and I quantified the number of points raised independently by the students, those requiring instructor input, and novel insights that had not been anticipated. In addition, I examined whether assigned roles influenced students’ interpretation of the study, including potential bias arising from attachment to the presented work, and whether group-based roles mitigated this effect. Finally, students completed a questionnaire at the end of the course to provide feedback on their experience with the two formats (individual answers provided in *Appendix B*).

Instructors Perception on Novel Learning Formats

From my perspective, student engagement was generally higher and more evenly distributed in the authors–reviewers format, although differences between individual students remained and were influenced by the topic of the paper. I observed that working in groups appeared to reduce extreme or unsupported judgments, which in my opinion comes from diffused responsibility within the team. When analyzing the discussion outcomes, I found that approximately 72% of the critical aspects I had identified in advance were raised independently by the students, while about 19% required some level of guidance from me, and roughly 9% represented novel insights from the students. While this distribution indicates solid preparation and broad coverage, I would have hoped for a higher proportion of novel ideas and critique.

Regarding grading categories (novelty, rigor, clarity, and impact), the reviewers tended to assign lower scores than authors, yet by the end of each session both teams generally reached agreement. This suggests that, while there was role-related bias initially, the discussion was constructive and that suggestions were effectively exchanged. However, the “impact” category consistently produced the largest discrepancies between groups and was difficult for students to evaluate, likely because it requires deeper knowledge of the field and is less “tangible” than the other criteria. I also noticed that students did not feel they learned much from discussing this category. Based on these observations, we decided that the “impact” category should be revised or removed in future iterations.

Regarding my role as an instructor, I found it challenging at times to maintain a clear facilitative role while keeping the learning objectives in mind. In some sessions, I successfully limited my interventions and allowed the discussion to develop organically, whereas in others I intervened too extensively, including delivering longer explanations without clearly stating what I wanted the students to take away. In these moments, I shifted from my intended master–apprentice role to that of an active discussant, which occasionally led the conversation toward scientific details at the expense of core skills such as critical reading. I

also realized that it was easy to lose sight of the course learning goals during technically rich discussions. In future offerings, I plan to more explicitly articulate learning objectives during the session and to conclude each class with a brief synthesis of key concepts and discussion strategies practiced that day.

In discussion with my educational supervisor, we agreed that it would be beneficial to conclude each session with a brief reflection on the concepts learned that day and a clear statement of participation expectations for all group members. We also discussed leveraging group dynamics in preparation, including collaborative presentation development and pre-discussion argument planning. Finally, we considered introducing post-session tasks, such as a short reviewer-author report. However, increasing pre- and post-session workload in accordance with the role-playing model might be viewed negatively by the students.

Student Perception on Novel Learning Formats

Overall, students valued both discussion formats and generally favored a combination rather than a single approach. The presenter–opponent format was consistently described as supporting deeper, more detailed analysis of specific figures, methods, and claims, particularly with respect to rigor and critical reading. In contrast, the authors–reviewers format was perceived as more inclusive and comfortable, especially for students working outside their immediate research area. Several students noted that working in groups reduced pressure, increased willingness to speak, and led to broader voluntary participation across the class.

Student opinions differed on whether role-taking reduced or introduced bias. Some students felt that group discussion and predefined evaluation criteria supported more balanced, evidence-based argumentation, while others reported a tendency toward defensiveness or competitiveness when assigned to the “author” role. These observations suggest that role assignment can shape how students interpret and defend a study, with effects varying by personality and group dynamics.

From a practical perspective, students noted that the authors–reviewers format required more preparation time from all participants, as

everyone needed to thoroughly evaluate the paper in advance, whereas the presenter–opponent format placed greater responsibility on a smaller number of students. Paper selection also emerged as an important factor, with large or complex manuscripts described as difficult to prepare for and discuss effectively in either format. Despite these differences, students generally found the instructions clear for both formats and agreed that each supported the intended learning outcomes in complementary ways, reinforcing the value of alternating or combining formats within the course.

Conclusion

This project indicated that introducing the presenter–opponent and authors–reviewers formats had a positive impact on student engagement, preparation, and in-class discussion, helping students practice critical reading, evaluation, and giving feedback. Each format had different strengths: the presenter–opponent format encouraged deeper analysis of specific aspects of the paper, while the author–reviewer format fostered broader participation and reduced individual bias. The results of student questionnaire suggest that alternating between the two throughout the semester could combine these benefits and keep discussions lively. Finally, the experiments with journal club formats also reinforced the importance of the role of the facilitator: expectations and learning goals should be clearly communicated; discussions guided without taking over; activities should be explicitly linked to the intended learning outcomes, in line with active, social learning principles.

References

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Appendix A

General course objectives

The course goal is to give knowledge about subjects in and to introduce critical reading of the research literature in biomaterials science and engineering, i.e. the synthesis, processing, analysis, and application of materials for in vitro and in vivo biological use, and give the participants presentation training. This is accomplished by reading papers presented by the other participants and by presenting papers. A final report on a literature study is prepared and peer reviewed by another course participant and finally handed in at the end of the course.

Learning objectives

A student who has met the objectives of the course will be able to:

- prepare pedagogical slides for a digital presentation of a scientific subject.
- become acquainted with scientific papers in different areas of biomaterials science and engineering.
- analyze and review the scientific methods used in a research publication.
- evaluate and give constructive criticism of presentations given by others.
- convey academic content in a field where the student is not an expert.
- critically read a paper and identify its strengths and weaknesses.
- describe how a review of a paper is performed.
- perform a comprehensive literature search within a scientific area.
- describe the background for a scientific area.
- make correct references to the scientific literature

Content

The course covers a range of subjects in the field of biomaterials science and engineering. Areas are defined in collaboration with the students, and the teacher will ensure broadness in the subjects. The course will include

training in comprehensive literature search, as well as a number of tutorials on broadly applicable methods and tools in

biomaterials science and engineering. The specific content of the course changes from semester to semester depending on the teachers and guests participating in the course and on the interests of the participating students. Students will be required to prepare themselves for each of the presentations by reading background material.

Appendix B

Student 1

1. Which discussion format did you prefer? Why?

“I would say that preferred a mix of the two. The single presenter and the grouped reviewers. It worked well having a single person/presenter having read the paper in detail (easier to follow the thoughts of one presenter than a group of "authors"). The grouped discussion/reviewers make it more chill and laid back, which worked well for our small group format, while I think we still got to discuss the paper all around. For students it matters a lot to be comfortable in the setting, and I think the single presenter (having read the paper in detail) and the grouped reviewers (speaking as a group) achieved this in one of the best ways I have experienced.”

2. In which format did you feel more comfortable participating, and what contributed to that?

“Think my last sentence above describes this.”

3. Did the group format help balance participation among students?

“I think the main thing balancing participation was how detailed the reviewers read the papers and prepared questions. In the sessions where we had two mega-papers it was hard for me to

motivate myself to read and understand it all, while the papers presenting only one idea were a lot more digestible. With that said, I think that the group discussion made more people talk overall, not only the reviewers, but also the author group. It was clear that we collectively spoke more and had less involvement from Johan/You in the group discussions.”

4. Which format better supported evidence-based, less biased argumentation?

“To me it seemed like the single presenter/opponent dove more into depth in single figures/methods of the paper and tried to assess whether these actually proved what the authors claimed, while the grouped discussion more considered the paper in general. I think this also contributes to why I found it easier to engage in the grouped discussion when the paper was not on topics related to my research.”

5. How clearly did you understand your role in the group format (“author” or “reviewer”)?

“Very clear. And again, nice to not be the only one in that role.”

6. How would you rate the level of guidance from the course responsible (too much, too little, appropriate)?

“In the grouped sessions it was just perfect. In the single presenter/opponent I feel like the instructors steered the discussion towards what they thought should be discussed and would not move on (finish the discussion of that paper) before this was thoroughly discussed. I think that this in-depth format can work very well, but it was not what I expected from the course. In general, I think that our discussions were interrupted too much in the single presenter/reviewer format. This often happens with Johan, and I know that he is aware - maybe this was the plan with the course, if it was, then the plan wasn’t clear to me.”

7. Was the role of the course responsible during discussions clear to you?

“The above answers. In the single session, no. In the grouped discussions, yes - and to a large extent the course responsible was redundant. In fact, for the last session without a course responsible present we did a grouped discussion.”

8. Which format better supported the intended learning outcomes (critical reading, assessing rigor/novelty, giving feedback)?

“I think that the single presenter/opponent focused more on critical reading, possibly because of involvement from course responsible, but the grouped discussions made us (all as a whole) think more about the content of the paper. I am not sure that I have enough knowledge on the topics to assess the novelty of the paper. Novelty was clear to me when there was a single hypothesis, but for the mega-papers it became a bit blurry. Giving feedback worked better in the grouped discussion.”

9. Did one format require clearer instructions or preparation than the other?

“I didn’t feel so. If the instructions were clear before I started reading the paper everything went well.”

10. Do you have suggestions for improving the discussion format for future sessions?

“We clearly dove deeper and were more focused on specific studies in the single discussion. On the other hand, I think most of us liked the setting more in the grouped discussions. I think involvement of the course responsible is fine, but keep it to one figure/study and dwell on that - not all topics that are touched on. The mega-papers were clearly a mouthful . I would recommend to stay away from these or mark the sections and figures to be discussed when the list of papers are sent out.”

Student 2

1. Which discussion format did you prefer? Why?

“I preferred the "authors/reviewers" format as there were some criteria for grading or reviewing the exposed paper. Also that worked as a team work activity where the different points of view we had were discussed and, as people were with different areas of expertise or research, that was a nice way gather a more strong justification of why each grade was given.”

2. In which format did you feel more comfortable participating, and what contributed to that?

“I felt more comfortable in the "authors/reviewers" one as I felt more accompanied at the time of questioning the exposed paper. This was also due to my lack of knowledge on bio-printing-related research; that was the main topic in almost all exposed papers. So, it felt relaxing to be able to discuss my ideas before saying them out loud.”

3. Did the group format help balance participation among students?

“I think it encouraged a more active group, not only the presenter and one opponent. Everyone had a chance to participate.”

4. Which format better supported evidence-based, less biased argumentation?

“I would guess the "authors/reviewers" as there were more ideas around, instead of just one that could have a more biased argumentation.”

5. How clearly did you understand your role in the group format (“author” or “reviewer”)?

“I fully understood it”

6. How would you rate the level of guidance from the course responsible (too much, too little, appropriate)?

“I think it was enough. Both professors were also really active during the class, making challenging questions and helping the whole group to understand the presented results from each paper.”

7. Was the role of the course responsible during discussions clear to you?

“Yes”

8. Which format better supported the intended learning outcomes (critical reading, assessing rigor/novelty, giving feedback)?

“I think both accomplished the learning goals of the course. It was more about the dynamic of the discussion after the presentation that changed, but overall, both formats work well.”

9. Did one format require clearer instructions or preparation than the other?

“I consider both formats were well explained in advance before the session.”

10. Do you have suggestions for improving the discussion format for future sessions?

“I would really like, for future courses, to encourage people to choose papers that can combine all areas of expertise from the students or either for them to stick to their research and not try new topics (as I did).”

Student 3

1. Which discussion format did you prefer? Why?

“As the person presenting during the group's authors/reviewer session, it made my job a lot more collaborative when defending the work and answering questions, so that was a bonus. I think it also made the others prepare a bit deeper and more thoughtfully. I did feel a slight tone of competitiveness/defensiveness that I think always accompanies a debate, which I believe shifted the main learning practices from the day from being critical of a third party's published work to defending the experimental choices that "you" (authors) made. Overall, the same messages and learning outcomes were achieved.”

2. In which format did you feel more comfortable participating, and what contributed to that?

“I did not feel more or less comfortable during either format.”

3. Did the group format help balance participation among students?

“Yes!”

4. Which format better supported evidence-based, less biased argumentation?

“I am a competitive person, so it is hard for me not to get a bit of a winners vs losers mentality when placed into 2 groups. As a result, I felt slightly biased in my defense on the author's side.”

5. How clearly did you understand your role in the group format (“author” or “reviewer”)?

“Yes!”

6. How would you rate the level of guidance from the course responsible (too much, too little, appropriate)?

“Appropriate”

7. Was the role of the course responsible during discussions clear to you?

“Yes - properly explained both in email prior to meeting & reiterated at the start of the session.”

8. Which format better supported the intended learning outcomes (critical reading, assessing rigor/novelty, giving feedback)?

“They both supported the learning outcomes just through different approaches and lessons.”

9. Did one format require clearer instructions or preparation than the other?

“Both formats had equally clear instructions.”

10. Do you have suggestions for improving the discussion format for future sessions?

“To eliminate this "competitive" energy in the author vs. reviewer debate, one could consider scoring both presented papers prior to revealing scores and discussing critiques (fx. Present paper 1, score, present paper 2, score, reveal scores for both, discuss paper 1, discuss paper 2).”

Student 4

1. Which discussion format did you prefer? Why?

“I would say a combination of both formats. I think that the author/reviewer format helps you realize how you categorize and rank the novelty of a publication better and the presenter/opponent format provides a deeper/more detailed critical discussion”

2. In which format did you feel more comfortable participating, and what contributed to that?

“I felt equally comfortable participating in both formats”

3. Did the group format help balance participation among students?

“Yes”

4. Which format better supported evidence-based, less biased argumentation?

“I think it depends on people’s personalities. Some people feel more comfortable and less defensive when they’re part of a team rather than presenting or arguing alone, while others feel a stronger need to advocate for their team when they’re representing one side making them more biased.”

5. How clearly did you understand your role in the group format (“author” or “reviewer”)?

“It was very clearly communicated and defined from the guidelines for both formats”

6. How would you rate the level of guidance from the course responsible (too much, too little, appropriate)?

“It was appropriate and mainly guiding the discussion when needed”

7. Was the role of the course responsible during discussions clear to you?

“Yes, for both formats”

8. Which format better supported the intended learning outcomes (critical reading, assessing rigor/novelty, giving feedback)?

“Both of them did. I think that the author/reviewer format helps you realize how you categorize and rank the novelty of a publication better and the presenter/opponent format provides a deeper/more detailed critical discussion”

9. Did one format require clearer instructions or preparation than the other?

“None of the formats required further instructions but the author/reviewer format required more detailed preparation from all students in every class”

10. Do you have suggestions for improving the discussion format for future sessions?

“I would suggest a combination of both formats for future sessions”