



**Teaching peer reviewing to medical students through authentic peer reviews: How to build the next generation of scholars**  
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Résumé de l'article

Énoncé des implications de la recherche

L'évaluation par les pairs est une étape essentielle de la production d'une littérature scientifique de bonne qualité. Traditionnellement faite par des professionnels confirmés dans leur domaine de compétences, il est rare que les étudiants, même ceux des cycles supérieurs, participent aux comités de lecture. Un cours novateur a permis à 18 étudiants en médecine (9 par année) de réaliser des évaluations par les pairs pour la Revue canadienne de l'éducation médicale (CMEJ). Les commentaires positifs et les compétences acquises sont décrits dans une lettre des étudiants à l'éditeur. Bien qu'à l'origine ce cours ait été créé pour profiter aux étudiants, il a également contribué à combler un déficit notoire de pairs évaluateurs.

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## Teaching peer reviewing to medical students through authentic peer reviews: how to build the next generation of scholars

Comment former la relève de chercheurs en médecine : enseigner l'évaluation par les pairs en faisant participer les étudiants à un comité de lecture

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### Implication Statement

The peer review process is a critical step in producing sound scientific literature, traditionally conducted by professionals well-established in their field. It is uncommon for students, even at the graduate level, to contribute. Faculty created a novel course in which 18 medical students (nine per year) delivered peer reviews to the *Canadian Medical Education Journal (CMEJ)*. The positive feedback and competency gained is described in the students' Letter to the Editor. While this course was initially created to benefit students, it has also helped to address a known deficit in peer reviewers.

### Énoncé des implications de la recherche

L'évaluation par les pairs est une étape essentielle de la production d'une littérature scientifique de bonne qualité. Traditionnellement faite par des professionnels confirmés dans leur domaine de compétences, il est rare que les étudiants, même ceux des cycles supérieurs, participent aux comités de lecture. Un cours novateur a permis à 18 étudiants en médecine (9 par année) de réaliser des évaluations par les pairs pour la *Revue canadienne de l'éducation médicale (CMEJ)*. Les commentaires positifs et les compétences acquises sont décrits dans une lettre des étudiants à l'éditeur. Bien qu'à l'origine ce cours ait été créé pour profiter aux étudiants, il a également contribué à combler un déficit notoire de pairs évaluateurs.

### Introduction

The peer review process is a critical step in producing sound scientific literature, traditionally conducted by professionals well-established in their field. It is common for students, even at the graduate level, to contribute to the process.<sup>1-3</sup>

Eighteen medical students enrolled in a peer review training course (Fall 2021 and Fall 2022) where they served as actual peer reviewers for the *Canadian Medical Education Journal (CMEJ)*. This presented a rare opportunity for medical students to write peer reviews and a novel way to address a well-recognized gap in teaching peer review.<sup>3</sup>

### Description of innovation

A repurposed journal club, created by an experienced peer reviewer, provided a platform that allowed students the benefit of a traditional journal club with the opportunity to critique manuscript submissions as independent peer reviewers for the *CMEJ*. Participants were pre-selected for the course based on their status as a teaching fellow for the medical school's curricular year. These students have completed their second or third years of medical school.

Structured as a weekly, one-hour seminar, the curriculum consisted of 15 sessions (Table 1): two orientation sessions; two faculty-modeled peer review sessions; nine group peer

review sessions; and two debriefing sessions. A *CMEJ* editor assigned one manuscript to the week's leading student in the week prior to the student's in-class presentation (Figure 1). The student deidentified the manuscript before distributing it to the class. During their assigned class session, the student presented a summary and critique of the manuscript before soliciting comments from students and faculty. Another student served as scribe to preserve

the discussion. After the session, the student used the scribed notes to write a peer review, following examples from the faculty-led sessions. The student reviewer followed *CMEJ's* reviewer guide and shared this draft with the faculty member within one week of their class-led review. The faculty member provided edits before the student submitted it to the *CMEJ* portal.

Table 1. Research design and analysis topics discussed per course session.

Weekly Session	Session Type	Topics Discussed (led by faculty)
1	Orientation	role and ethics of peer review register with the <i>CMEJ</i>
2	Orientation	professionalism in providing feedback how to present a research article
3	Faculty-led peer review	teaching evidence-based medicine pretest/posttest design t-test usage
4	Faculty-led peer review	longitudinal survey design purpose of tables and figures
5	Student-led peer review	scoping review
6	Student-led peer review	needs assessment multi-site study Delphi study response rate and bias descriptive statistics
7	Student-led peer review	demographic representation of sample data visualization
8	Student-led peer review	qualitative design
9	Student-led peer review	Likert scaling
10	Student-led peer review	systematic review
11	Student-led peer review	review of research design and methodology
12	Student-led peer review	review of research design and methodology
13	Student-led peer review	selecting a journal section for a manuscript
14	Debrief	students provided course feedback
15	Debrief	applying new skills in the future discussed pros/cons of traditional journal club vs. re-purposed journal club

When manuscripts introduced topics unfamiliar to the students (e.g., statistical analysis), the faculty member included educational briefings to ensure an informed discussion (Table 1). As the student-led sessions progressed, the faculty member transferred increasing levels of leadership to the students to bolster their skills and confidence.

It is important to note that this arrangement was facilitated by the faculty member's strong relationship with *CMEJ*. The faculty member serves as a senior section editor and worked closely with *CMEJ's* editorial board to arrange this opportunity. The *CMEJ* editors adjusted their flow of assigning manuscript reviews to ensure students' assignments occurred weekly. Faculty guaranteed *CMEJ* a quality review by (1) contributing to class discussion to ensure critical points were made for inclusion in the peer

review and (2) live editing with each student for clarity and writing excellence. This extra step required additional time, so reviews were submitted to the journal three weeks from initial manuscript assignment.

## Outcomes

Students earned grades for their oral presentation, written peer review, and timeliness of submitting their review to *CMEJ* based on rubrics published in the course syllabus (Appendix A). Students also earned contribution points each class by offering substantive comments during the discussion. Six students from the first edition of the course (Fall 2021) provided feedback, indicating they were "building skills that would have a purpose beyond this class" and "at first it was very intimidating, but later it became so fun." A student said they were "surprised by...the passion this course gave me for medical education"

and another would “try to pursue a spot at a future institution doing this kind of work.” Students from the second edition of the course (Fall 2022) wrote a letter to *CMEJ* describing their newly developed skills and confidence.<sup>4</sup> Once students completed the course, they could continue to serve as peer reviewers for *CMEJ*. According to *CMEJ* metrics extracted on 1/19/2023, 11 students wrote a combined total of 16 additional peer reviews after completion of the course. These 11 students are helping to remedy the deficit in journal peer reviewers.

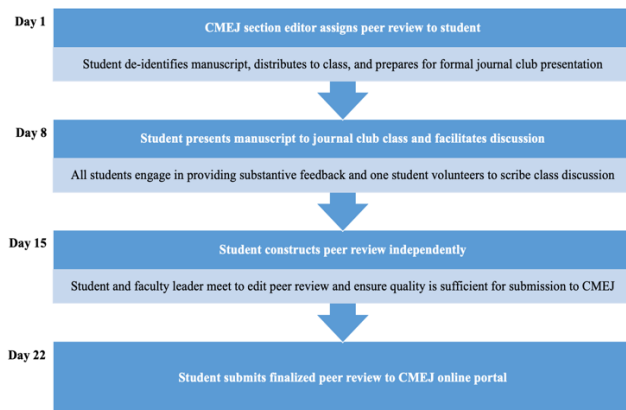


Figure 1. A 22-day cycle for each student to submit their peer review to CMEJ.

## Suggestions for next steps

Limitations include small cohort size and not assessing peer-reviewing ability prior to the course. Others should consider adopting a similar model that teaches graduate students to peer review journal manuscript submissions, beginning with cultivating a relationship with a journal editor in order to secure peer review assignments for students. Guaranteeing the review’s quality and timeliness is crucial.

**Conflicts of Interest:** The authors have no conflict of interest to declare.

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## Appendix A. Course syllabus and rubric

Class Contribution Rubric (for each Journal Club session when you are not the Presenter)			
Outcome	Points	Total	Comment
<i>Discusses manuscript's merits and limitations:</i> <ul style="list-style-type: none"> <li>• Demonstrates understanding of study</li> <li>• Arrives to class prepared to contribute opinions about manuscript's merits and limitations</li> </ul>	1 0		
<i>Professionalism:</i> <ul style="list-style-type: none"> <li>• Addresses authors and peers with respect</li> <li>• Adheres to ethics of peer review, especially does not share any aspect of manuscript outside of class and does not use author's study or information from author's study.</li> </ul>	1 0		
Total: Add the total for each outcome to determine the total points.			<b>Total Points:</b> _____/2

Presentation Rubric				
5 Accomplished	4 Developing	3 Acceptable, but Needs Development	2 Needs Significant Development	1 Unacceptable
<ul style="list-style-type: none"> <li>○ Requires no prompting</li> <li>○ Detailed discussion and in-depth understanding</li> <li>○ Highest level of achievement</li> <li>○ Organized, proficient delivery</li> </ul>	<ul style="list-style-type: none"> <li>○ Clarification needed with minor prompt</li> <li>○ Above average detail and understanding</li> <li>○ Mostly organized &amp; clear delivery</li> </ul>	<ul style="list-style-type: none"> <li>○ Clarification needed on several prompts</li> <li>○ Average detail and understanding</li> <li>○ Average delivery</li> </ul>	<ul style="list-style-type: none"> <li>○ Requires directed questioning to prompt information</li> <li>○ Detail with some understanding</li> <li>○ Delivery below average</li> </ul>	<ul style="list-style-type: none"> <li>○ Extensive clarification needed</li> <li>○ Limited detail and minimal understanding</li> <li>○ Instructor has to intervene for accuracy of information</li> <li>○ Delivery entirely inappropriate</li> </ul>
Outcome	Points	Total	Comment	
<i>Assesses fit with journal and section</i> <ul style="list-style-type: none"> <li>• Gives rationale for opinion on appropriateness for journal and for journal section</li> </ul> <i>Description of Relevance:</i> <ul style="list-style-type: none"> <li>• Provides sufficient background information for study</li> <li>• Identifies educational purpose/importance</li> <li>• Identifies study question/objective(s)</li> </ul> <i>Overall Presentation Delivery:</i> <ul style="list-style-type: none"> <li>• Organization and Preparedness                             <ul style="list-style-type: none"> <li>○ Information delivered logically</li> </ul> </li> <li>• Communication and Presentation                             <ul style="list-style-type: none"> <li>○ Pronunciation</li> <li>○ Confidence</li> </ul> </li> </ul>	1 2 3 4 5			
<i>Complete Overview &amp; Explanation of Methods:</i> <ul style="list-style-type: none"> <li>• Appropriately explains:                             <ul style="list-style-type: none"> <li>○ Study design</li> <li>○ Exclusion/inclusion criteria</li> <li>○ Study groups (if applicable)</li> <li>○ Additional information as needed</li> </ul> </li> </ul>	1 2 3 4 5			
<i>Complete Explanation of Discussion &amp; Analysis:</i> <ul style="list-style-type: none"> <li>• Appropriately explains:                             <ul style="list-style-type: none"> <li>○ Data and Statistical Analysis</li> <li>○ Results</li> <li>○ Discussion</li> </ul> </li> </ul>	1 2 3 4 5			

<ul style="list-style-type: none"> <li>○ Conclusions</li> </ul>			
<b>Educational Evaluation &amp; Practice Application</b> <ul style="list-style-type: none"> <li>• Critique of:                             <ul style="list-style-type: none"> <li>○ Strengths &amp; Limitations</li> <li>○ Statistics</li> </ul> </li> <li>• Addressed author's conclusion and whether results justify conclusion</li> </ul>	1 2 3 4 5		
<b>Ability to Answer Questions</b> <ul style="list-style-type: none"> <li>• Answers logically and accurately</li> <li>• Ability to think under pressure</li> <li>• May attempt to answer if unsure, but clearly specifies uncertainty if necessary</li> </ul> <b>Overall Presentation Delivery:</b> <ul style="list-style-type: none"> <li>• Organization and Preparedness                             <ul style="list-style-type: none"> <li>○ Information delivered logically</li> </ul> </li> <li>• Communication and Presentation                             <ul style="list-style-type: none"> <li>○ Pronunciation</li> <li>○ Confidence</li> </ul> </li> </ul>	1 2 3 4 5		
Total: Add the total for each outcome to determine the total points.			<b>Total Points:</b> _____/25

<b>Written Peer Review Rubric</b>				
5 Accomplished	4 Developing	3 Acceptable, but Needs Development	2 Needs Significant Development	1 Unacceptable
<ul style="list-style-type: none"> <li>○ Addresses all elements</li> <li>○ Clear, logical writing</li> <li>○ 0-1 grammar error</li> <li>○ Consistently professional tone conveys respect to author</li> <li>○ Gives opinion about whether needed changes can be addressed (e.g., wrong study methods could not be changed)</li> <li>○ Highest level of achievement</li> </ul>	<ul style="list-style-type: none"> <li>○ Missed 1 or fewer bulleted elements</li> <li>○ 2-4 grammar errors</li> <li>○ Mostly organized &amp; clear writing</li> </ul>	<ul style="list-style-type: none"> <li>○ Missed 2 bulleted elements</li> <li>○ 5-7 grammar errors</li> <li>○ Writing is coherent but needs more organization</li> <li>○ 1 instance of using unprofessional tone that conveys disrespect to author</li> </ul>	<ul style="list-style-type: none"> <li>○ Missed 3 bulleted elements</li> <li>○ 8-9 grammar errors</li> <li>○ Writing has good ideas but is difficult to follow</li> </ul>	<ul style="list-style-type: none"> <li>○ Uses unprofessional tone that conveys disrespect to author</li> <li>○ Missed 4+ bulleted elements</li> <li>○ 10+ grammar errors</li> <li>○ Writing lacks clarity</li> <li>○ Writing lacks organization</li> </ul>
<b>Outcome</b>	<b>Points</b>	<b>Total</b>	<b>Comment</b>	
<b>Complete Overall Review:</b> <ul style="list-style-type: none"> <li>• Acknowledges student's conflicts of interest as a reviewer</li> <li>• Acknowledges student's own limitations as a reviewer</li> <li>• Begins with summary of study (without critique)</li> <li>• Appropriately gives feedback on:                             <ul style="list-style-type: none"> <li>○ Author's writing clarity</li> <li>○ Author's logical flow</li> <li>○ Integrity among content of manuscript, title, and conclusion</li> <li>○ Match among 1) manuscript's objectives / hypotheses, 2) study design/methods, and 3) conclusions</li> <li>○ Relevance of conclusions for medical education, especially novelty</li> <li>○ Author provided statement of conflict of interest and funding source</li> <li>○ Manuscript's fit with the journal</li> <li>○ Manuscript's fit with CMEJ's Brief Reports section</li> </ul> </li> </ul> <p>- Has a study design - Situates study within medical education theory</p>	1 2 3 4 5			

<ul style="list-style-type: none"> <li>- Uses quantitative or qualitative analytic techniques</li> <li>- Cites peer-reviewed scientific literature <ul style="list-style-type: none"> <li>• Suggests additional literature for author to include in review, if needed</li> <li>• Uses professional tone that conveys respect to author</li> </ul> </li> </ul>			
<p><i>Complete Review of Title and Abstract:</i></p> <ul style="list-style-type: none"> <li>• Appropriately gives feedback on: <ul style="list-style-type: none"> <li>○ Title matches study</li> <li>○ Title is brief and free of acronyms</li> <li>○ Abstract describes the study</li> <li>○ For quantitative study, abstract has Intro, Methods, Results, Conclusion sections</li> </ul> </li> <li>• Uses professional tone that conveys respect to author</li> </ul> <p><i>Complete Review of Introduction</i></p> <ul style="list-style-type: none"> <li>• Appropriately gives feedback on: <ul style="list-style-type: none"> <li>○ Clear statement of purpose / hypothesis</li> <li>○ Author's discussion of background for study (i.e., literature review)</li> <li>○ Author's justification for study</li> </ul> </li> <li>• Uses professional tone that conveys respect to author</li> </ul>	1 2 3 4 5		
<p><i>Complete Review of Methods</i></p> <ul style="list-style-type: none"> <li>• Appropriately gives feedback on: <ul style="list-style-type: none"> <li>○ Selection of study design for purpose</li> <li>○ Execution of study design</li> <li>○ Author's explanation of reasons for study design</li> <li>○ Study participants</li> </ul> </li> <li>- Inclusion/exclusion criteria fit study's purpose/hypothesis</li> <li>- Demographics fit study's purpose/hypothesis <ul style="list-style-type: none"> <li>○ Sampling method adequately described</li> <li>○ Sampling method's validity for study's purpose/hypothesis</li> <li>○ Study's instruments/surveys described well and provided</li> <li>○ Study's procedure explained with sufficient detail</li> <li>○ Study's procedure was followed</li> <li>○ Statistical analysis appropriate for study's purpose/hypothesis</li> <li>○ Statistical analysis appropriate for study design</li> <li>○ If qualitative, followed standards for reporting qualitative research</li> <li>○ Statement of IRB approval is provided and sufficient</li> <li>○ Author obtained informed consent from participants</li> <li>○ Procedure for obtaining informed consent sufficiently described</li> </ul> </li> <li>• Uses professional tone that conveys respect to author</li> </ul>	1 2 3 4 5		
<p><i>Complete Review of Results</i></p> <ul style="list-style-type: none"> <li>• Appropriately provides feedback on: <ul style="list-style-type: none"> <li>○ All statistical results provided (not just p-values)</li> <li>○ Statistical data in correct notation (e.g., uses "r" for correlation)</li> <li>○ Results presented clearly</li> </ul> </li> </ul>	1 2 3 4 5		

<ul style="list-style-type: none"> <li>○ Tables and/or figures supplement author's writing</li> <li>○ Tables and/or figures clear and logical</li> <li>● Uses professional tone that conveys respect to author</li> </ul>			
<p><i>Complete Review of Discussion and Conclusion:</i></p> <ul style="list-style-type: none"> <li>● Appropriately gives feedback on:             <ul style="list-style-type: none"> <li>○ Author explained how results relate to study's purpose/hypothesis</li> <li>○ Clear explanation of the meaning and implication of results</li> <li>○ Conclusions, applications, and generalizations respect study's limitations (e.g., based on study design or response rate)</li> <li>○ Study's limitations are acknowledged</li> <li>○ Student suggests other study limitations author omitted</li> <li>○ Author suggests future research</li> <li>○ Adequate number of references</li> <li>○ References complete and in proper citation</li> </ul> </li> <li>● Uses professional tone that conveys respect to author</li> </ul>	<p>1 2 3 4 5</p>		
<p>Total: Add the total for each outcome to determine the total points.</p>			<p><b>Total Points:</b> _____/25</p>



<b>Submission of Peer Review Rubric</b>			
<b>Outcome</b>	<b>Points</b>	<b>Total</b>	<b>Comment</b>
<i>Polished final peer review:</i> <ul style="list-style-type: none"> <li>• Accepts all edits/revisions from instructor</li> <li>• Corrects grammar edits arising after accepting Track Changes</li> </ul>	3 0		
<i>Registered as peer reviewer for CMEJ journal</i> <ul style="list-style-type: none"> <li>• Completed by Aug. 5</li> </ul>	3 0		
<i>Peer review submitted to CMEJ</i> <ul style="list-style-type: none"> <li>• Submitted to CMEJ within two weeks from student's journal club presentation</li> </ul>	4 0		
Total: Add the total for each outcome to determine the total points.			<b>Total Points:</b> _____/10