

Exercises in Critical Appraisal: A Novel Approach to Teach Critical Appraisal to Medical Students during the COVID-19 Pandemic

Wafa Nabi MS4 and Dr. Colleen Croniger

Problem

This report demonstrates a novel approach for teaching critical appraisal skills to medical students, piloted during the COVID-19 pandemic which resulted in a reliance on remote learning to continue medical education.¹ This report comments on the effectiveness, convenience, and potential for improvement of remote learning courses.

This course addressed the need for critical appraisal instruction with a clinical lens. Students regularly encounter situations on the wards where, faced with a specific patient case, their literature search yields scientific papers with opposing recommendations. Therefore, it is imperative for students to develop critical appraisal skills to rationalize their implementation of clinical decisions in the context of patient care, an approach to critical appraisal that has been lacking from medical curricula as evidenced by the dearth of such courses reported in the literature.

Approach

“Exercises in Critical Appraisal” was developed as a self-study, elective, remote learning course at Case Western Reserve University School of Medicine at the onset of the COVID-19 pandemic in March 2020 to allow students to continue their learning while social distancing.

This was offered as an elective course for all medical students regardless of prior training. The course was offered on a rolling basis without a cap on the number of students, rendering it available to all interested medical students at any time of the year. Over the course of two weeks, students were tasked with writing four summaries that analyze the strengths and limitations of sets of pre-selected articles with opposing recommendations published in high-impact journals. Students were asked to explain their rationale for adopting the recommendations of either article in each set. Students shared and discussed their analyses with each another via online forums (Google Currents). Supplemental reading materials were provided in the syllabus to guide students’ analyses.

Students were evaluated on the basis of effort to receive a pass/fail grade. This method of evaluation was chosen because of its studied effect on bolstering students’ psychological health while maintaining levels of academic performance.²

Student feedback was gathered anonymously via an end-of-course survey administered through Google Forms. 9 months after the first offering of the course, students’ cumulative responses through the end-of-course survey were tabulated and coded into themes by two reviewers simultaneously.

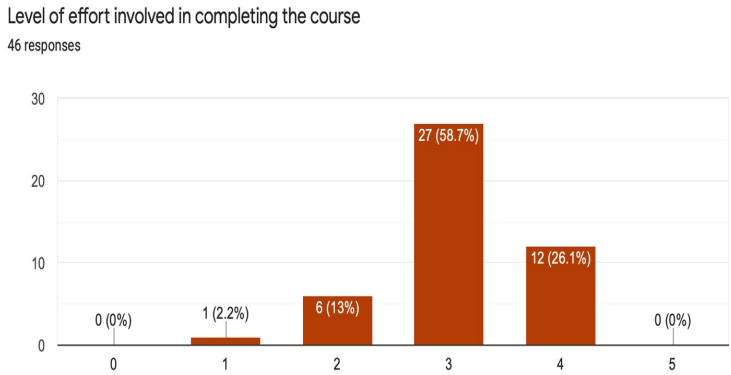


Figure 2: Bar graph summarizing student responses regarding level of effort involved in completing the course, with 0 signifying no effort at all and 5 signifying maximum effort. Graph courtesy of Google Forms.

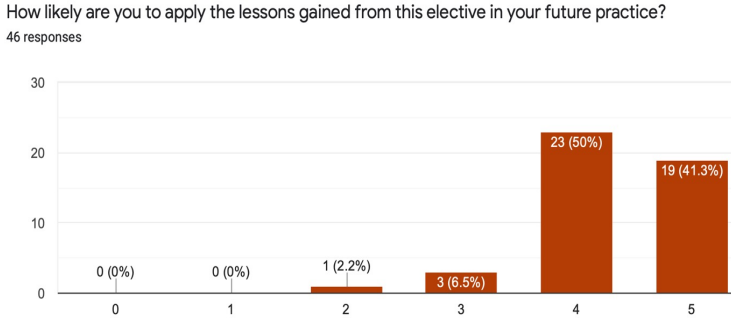


Figure 3: Bar graph summarizing student responses to the question “How likely are you to apply the lessons gained from this elective in your future practice?” with 0 signifying “very unlikely” and 5 signifying “highly likely.” Graph courtesy of Google Forms.

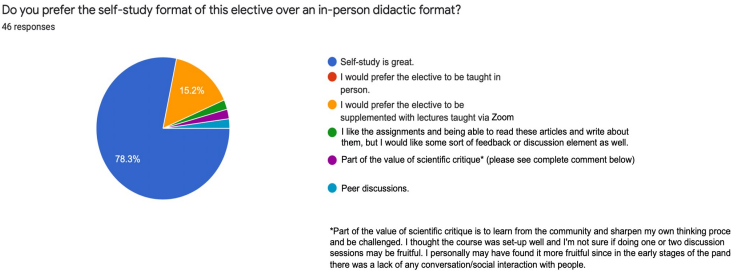


Figure 4: Pie chart summarizing student responses to the question “Do you prefer the self-study format of this elective over an in-person didactic format?” Chart courtesy of Google Forms.

Outcomes

Forty-six students responded to the survey since March 2020 (66% response rate).

Students appreciated the range of articles provided as well as the opportunity to read papers thoroughly, in contrast to the practice of scanning papers for salient details. Moreover, students appreciated the creation of online forums to allow for further discussion. Students also ascribed value to the course’s self-paced and remote format.

Some students noted that this course offered them a unique opportunity for critical appraisal in context of the course’s focus on clinical application. Students’ comments reflected the course’s success in addressing a gap in the curriculum and providing a novel way for Research and Scholarship curricula to have clinical applicability. One student noted, “This course forced me to take the time to thoroughly evaluate and compare studies, something that I have not taken the time to do in as much detail before. It gave me great practice for applying studies to my future clinical practice.”

Another student commented, “Comparison of potentially conflicting and highly relevant findings in high impact journal articles is a practice that we are not regularly exposed to in medical school or clinicals but is an important part of incorporating clinical research into effective and forward-thinking clinical practice. This course prompted me to consider the most important aspects including sample size, randomization, and external validity in weighing these findings and addressing them to decide whether article findings can and should be applied to certain clinical situations in the future.”

The most common suggestions for course improvement involved providing supplemental readings to help direct students’ analysis as well as an avenue for feedback regarding submitted essays (18.2% and 14.5% respectively). Students commented that they wanted some direction regarding whether or not their analyses were appropriate. Both suggestions were eventually implemented in the course with the provision of articles from the JAMA series “Users’ Guide to the Medical Literature” and with the creation of Google Currents forums to allow students to discuss their analyses. This resulted in a high level of discussion that allowed students to learn from one another. For instance, what follows is one comment posted by a student on another student’s analysis:

“I did not agree, and felt that the Ziegler trial was better and would recommend use of HA-1A. While the CHESS trial had a larger number of hospitals included (increasing external validity as you noted), I think this adds too much variance and opportunity for confounding variables in the study. We both noted the focus on different institutions (academic vs community hospitals) in the studies, and the inclusion of more institutions in the CHESS trial, but we had different interpretations of the value of this for adding confounding variables vs increasing the generalizability of the study’s findings. You noted that the authors are consultants to the developing company, which I did not!”

Furthermore, students reported that the course lacked interactivity. Students commented that introductory and debriefing sessions would have augmented the course, in addition to a peer or expert discussion and other “teamwork activities.” Some noted the need for more communication with classmates to compensate for the lack of social interaction that was exacerbated by social distancing practices.

Moreover, students appreciated the provision of structure by including an essay outline that provided a format for their final submissions. Some students appreciated that the papers to be compared were chosen for them and that students did not have to go about selecting the articles to analyze. One student remarked,

“I really feel like I gained a lot from this elective. I have struggled in the past with trying to figure out how to interpret and analyze clinical trials, and I think having the chance to sit down and formally tweeze apart a paper was very helpful. Having the papers provided beforehand was helpful; I don’t know that I would have known how to find appropriate papers on my own.”

Students scored the level of effort required to complete the course as 3.1/5 on average. More than 70% of students rated the course’s contribution to their level of skill/knowledge as “very good” or “excellent,” noting the lack of prerequisite knowledge or skill required to achieve these outcomes. Most students (>90%) agreed or strongly agreed that learning objectives were clear, course assignments were organized and well-planned, and that the course workload was appropriate. Students also found the course to have great applicability for their careers as physicians, with an average score of 4.3/5 for applicability.

Students also noted that they preferred the self-study format (78.3%) of the course. While no students suggested conversion to an in-person format, 15.2% of students suggested supplementing the course with opportunities for video conferencing. Of the enrolled students, 97.8% cited the course’s availability for remote learning as the reason behind pursuing the course.

Overall, student responses indicate that critical appraisal with a clinical lens is a lacking but highly relevant and applicable skill that students appreciated the opportunity to learn, especially in a remote setting that was not only convenient but also effective in its achievement of learning outcomes.

Next Steps

The course is currently being offered as a remote learning two-week elective to all medical students. Due to the course’s success and positive feedback, it has been integrated as part of the permanent longitudinal Research and Scholarship curriculum at Case Western Reserve University School of Medicine.

Since its first offering, the course has evolved in response to student feedback via the end-of-course survey. Projecting beyond the COVID-19 pandemic, we expect that this course will continue via remote learning due to its convenience and efficacy. As the course expands, we hope to supplement the course with video conferencing options to provide introductory and debriefing forums for students to facilitate discussion with peers and expert faculty, as suggested by students in their end-of-course feedback.

Learning Objectives	Evidence of Learning Objective Attainment in Student Feedback
To increase students’ exposure to landmark papers that have influenced guidelines forming the basis of evidence-based patient care.	“The papers were ones that I never really read. I appreciated being aware of some important papers.”
To promote critical thinking in literature appraisal by analyzing the strengths and limitations of the articles provided.	“The forced critical analysis... I feel like I don’t really have time to read through papers carefully as a student. It was [useful/valuable] that it was a feature of the course.”
To develop clinical decision-making that is informed by the systematic, logical assessment of clinical trials.	“Comparison of potentially conflicting and highly relevant findings in high impact journal articles is a practice that we are not regularly exposed to in medical school or clinicals but is an important part of incorporating clinical research into effective and forward-thinking clinical practice. This course prompted me to consider the most important aspects including sample size, randomization, and external validity in weighing these findings and addressing them to decide whether article findings can and should be applied to certain clinical situations in the future.”
To develop critical analysis skills for literature review that may be applied to the assessment of articles’ generalizability and external validity for use in future evidence-based patient care.	“This course forced me to take the time to thoroughly evaluate and compare studies, something that I have not taken the time to do in as much detail before. It gave me great practice for applying studies to my future clinical practice.”

Figure 1: Evidence of learning objective attainment in students’ feedback via the end-of-course survey