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Using Professional Expectations to Improve Research and Reading Behaviors with Pre-Professional Health Students

Carolyn Schubert and Jennifer Walsh

Introduction

Critical reading in health and medicine requires development of skills across the academic, social, and civic environments. In the academic environment, accreditation bodies for health profession programs require student learning outcomes or competencies related to finding, evaluating, and using professional literature to base practice decisions on the best evidence.¹ These standards are then interwoven into a professional code of ethics that guides healthcare practice. These requirements are described by accrediting bodies using terms such as evidence-based practice (EBP), scientific method, and critical thinking. These requirements align closely with the Association of College & Research Library's

(ACRL) *Framework for Information Literacy for Higher Education*, providing an opportunity for librarians to collaborate with faculty on curricular interventions.²

While EBP is not a new concept, professionals continue to struggle with translating these academic skills into professional practice. Research conducted on the use of EBP by health practitioners revealed challenges with developing clinical questions, critical appraisal of research, and applying research knowledge into practice.³ These same challenges are experienced by students.⁴ Students also encounter challenges with translating their academic skills into the realities of work practices.⁵

In an effort to overcome these barriers and develop a more authentic approach to build student EBP competence in preparation for professional practice, a dietetics course instructor and librarian collaborated on a scaffolded approach to teaching critical reading and appraisal skills. This chapter presents the methodology, evaluation from student observation and survey feedback, and instructor reflections from the initial implementation of the approach.

Critical Reading Connections

Dietetics is one of the many health professions that focuses on developing research and EBP skills as a core component of practitioner education. The governing bodies of dietetics education and registration, the Accreditation Council on Education in Nutrition and Dietetics (ACEND) and the Commission on Dietetic Registration, have instituted educational standards and registration exam content, respectively, to prepare students to contribute as professionals to ongoing research. Specific mentions of desired skills include using the scientific method, thinking critically, and analyzing evidence.⁶ Upon finishing a supervised practice, students must complete the Registration Examination for Dietitians to earn the credential of Registered Dietitian Nutritionist (RDN), which includes questions that require interpretation and reporting of evidence-based research findings. The Code of Ethics for the Nutrition and Dietetics Profession continues to reinforce EBP as guiding principles and standards for professional competence in their professional careers.⁷

Throughout their academic career, students are often acculturated to cursory heuristics for reading and evaluating information for their assignments. Currency, or the date of publication, author credentials, and source of publication are the most common techniques students use to evaluate information.⁸ Students also tend to evaluate library resources less rigorously than general web resources as they trust that the sources are scholarly and peer-reviewed.⁹ In terms of using information, researchers have found that undergraduates and faculty focus heavily on staying within a single source to evaluate reliability while fact checkers skim and review additional sources to evaluate reliability.¹⁰ Nutrition and dietetics research is plagued with challenges to critical reading and appraisal. There are numerous scientific and political considerations with nutrition research.¹¹ Many factors affect diet, and the interaction of environment, genetics, and lifestyle results in many confounding variables. The validity of food intake is often limited due to self-report and recall bias. Research funding by the food industry and limitations from publishing only positive results are exacerbated by the interest to misuse results for the benefit of

marketing. Finally, it is challenging to decipher legitimate sources from illegitimate online journals that are often operating for profit without consideration of research ethics and rigor.¹² The ability to navigate fact from misinformation is critical to dietitians' ability to develop care plans and counsel clients effectively.

Teaching Strategies

We taught at James Madison University, a teaching-focused institution with a large number of health professions programs, including an accredited Didactic Program in Dietetics. Students apply and officially enter the Dietetics program as a cohort of about thirty in their junior year. The Senior Seminar in Dietetics course is offered fall of senior year. Jennifer, a dietetics faculty member and instructor for the Senior Seminar, and Carolyn, the health professions and nursing liaison librarian, have collaborated on scaffolding information literacy and critical reading in the course. Jennifer is the primary instructor; Carolyn provides some lectures but also helps inform overall course design and assessment. Course objectives include how to read and evaluate research articles in nutrition and critically analyze the quality of research. Students develop a full research proposal on a dietetics topic of interest as a final assessment at the end of the semester. To help prepare students with understanding the professional literature and standards for review according to their discipline, students learn about the Evidence Analysis Library (EAL) process and products through tutorials and worksheets.

The EAL was established by the Academy of Nutrition and Dietetics (AND) in 2004 as an evidence analysis review process to identify and evaluate existing published research to support the answers to specific food, nutrition, and dietetics research questions.¹³ The process starts with a scoping review of a topic to inform what to research further. Each topic pursued is documented and organized as a project within the EAL. Outcomes of the projects inform practice guidelines that are published and/or represented in the Nutrition Care Manual (NCM). Dietetic practitioners consult the NCM for patient care decisions. Dietetics students learn about NCM as a resource for EBP.

We use two specific forms from the Academy of Nutrition and Dietetics to evaluate articles in the EAL: Worksheet Templates and Quality Criteria Checklists (QCC). The Worksheet Templates are organized into fourteen sections each with items to identify parts of an article, such as recruitment, variables, and data analysis, and summarize them. The QCC requires the reviewer to respond to four relevance questions and ten validity questions each with multiple sub-questions. The QCC asks critical questions, such as if blinding was used with participants, to interrogate the strength or weakness of research methods and reporting techniques to check for potential bias. The answers to each question get marked as either Yes, No, Unclear, or N/A. The end of the sheet provides instructions on how to aggregate those individual question answers into an overall score of either Positive, Neutral, or Negative. These standardized evaluation techniques provide a consistent approach to study evaluation across different reviewers. In the official EAL context, individual reviewers are dietitians. In our context, individual reviewers are students. It is also easier to compare articles on similar topics. EAL materials are linked in the Supplemental Materials section of this chapter.

Instructional Design

Critical reading was a major component in part of a larger scaffolding of content across the course. For the scaffolding development, Carolyn and Jennifer used backward design to design the instruction. Backward design is a technique that starts with considering the intended outcomes or outputs of a scenario and then mapping backward what evidence would demonstrate those results and finally what instructional activities are needed.¹⁴ We developed the lesson plans using research about dietetic intern perceptions and use of EBP. Carolyn's prior research about undergraduate nursing student EBP competency development in clinical education also informed the approach.¹⁵ We also considered the competencies needed to be an entry-level registered dietitian. Carolyn anchored each lesson plan with the James Madison University Libraries' Information Literacy Goals and learning outcomes (see the Supplemental Materials) which incorporate the ACRL Framework.¹⁶ To help with aligning goals, outcomes, and activities, Carolyn used an adaptation of Megan Oakleaf's lesson plan template.¹⁷ We used this lesson plan template to organize sessions with mini-lectures, activities, self-reflection, and post-class application activities.

Prior to the critical reading instruction, Carolyn and Jennifer rotated teaching some foundational information literacy and research methods content. Carolyn first introduced an instructional lesson on research question development. Carolyn then taught about information searching. Next, Jennifer introduced study designs, research article components, and ethical research practices in the next two classes. Carolyn's lesson plans and presentation slides are available on Project CORA.¹⁸

Critical Reading for Appraising Research

Once students have a focused research question and foundation for identifying relevant articles, Carolyn leads a lesson to foster deep critical reading and contextualize articles into a scholarly conversation using discipline-specific criteria. This class involves multiple activities in which students practice, get feedback, and again learn how to review an article and assess scientific rigor and bias. Recognizing that learning is social, the research proposal occurs in pairs, and all activities in this section are completed in pairs.

To help further their skills with reading scholarly dietetics and nutrition sources, Carolyn introduces the students to forms outlined in the EAL Manual and website. Carolyn and Jennifer assign the same nutrition-related article for everyone to read before the first class on critical reading. The Worksheet Template and QCC are several pages long each and can be overwhelming on first review. Therefore, Carolyn introduces the forms in parts, focusing the approach in a way that matches Carolyn's experience with students learning to read journal articles.

First, the main research question and the outcome(s) of the study are identified at the beginning of the form. Reading for this purpose helps ensure that both the research question and the outcomes are related and presented appropriately in the article. Students often conduct this type of reading when looking to find a relevant article, so it is an accessible starting point for this conversation and use of the research analysis templates. Students are asked to spend about ten minutes answering questions from the templates that relate

to the purpose of the pre-assigned article. Brief discussion and debrief follow, regarding how to find these components in the article.

Advancing to the next, more challenging step of the review process, Carolyn focuses on the template questions about examining research participants. By identifying inclusion/exclusion criteria and recruitment methods for the Worksheet Template, students are then more informed to make a judgment if there was selection bias in participant recruitment as asked on the Quality Criteria Checklist. Many of these elements are highlighted in visualizations within an article using standardized reporting tools commonly used in the health sciences like CONSORT (Consolidated Standards of Reporting Trials, a tool used to analyze the quality of clinical trials), so some time is spent teaching students about reading visualizations like figures or data tables as well as reading the text to answer these questions.

Students are then given ten more minutes to work through some initial identification, discussing more of the QCC questions, and making a judgment on whether they trust the article. Keeping active judgment as part of the conscious process in each stage is key to making reading less of a passive activity. Engagement with the texts through the use of specific question prompts is also intended to re-center the students as the ones to decide if a resource is worth reading or not reading, instead of reading to satisfy an assignment requirement.

The final step in the lesson is to unpack questions about the interventions used in the study and the results, which we have found is the hardest information for students to process. The initial step is to understand what is being measured and how information in the results can be mapped clearly. Students are introduced to the relevant QCC questions related to interventions and interpretation of results but are not expected to answer them at this time. You can see how Carolyn clustered the questions in the shared teaching materials on Project CORA. Given the complexity of interpreting these parts of a research article, the librarian demonstrates and models an example of how to identify and outline one of the interventions in an article.

DATA COLLECTION SUMMARY EXAMPLE

	Timing of Measurements	Dependent Variables	Independent Variables	Control Variables
	Frequency of measurements	Things affected by change	Things making a change	Things consistent across
Intervention Interest	Cumulative interest over 6 weeks	Response to recruitment	Recruitment (Email, Flyer, In-Person)	
Adherence	2 weekly posts x 12 wks	Like and Seen by responses	Health Education posts	Facebook
Retention	Pre + Post	# of participants	Study duration	Length of study

Figure 11.1

Example slide from the presentation that presents both categories from critical reading handouts and what the answers look like from a specific article.

After this demonstration, students are asked to complete the work on a second intervention example on their own. Carolyn concludes with a slide demonstrating the correct answer, so students get overall feedback.

After this lesson, students are assigned a second research article to read for the next class and asked to attempt the Worksheet Template and QCC forms on their own. In class, they bring in their draft Worksheet Template and QCC form to meet in small groups and discuss how they completed each item on the forms. Since they have prepared ahead of time, students are willing to discuss the assignment with peers, learn from one another, and identify areas where there are common gaps in understanding. Following small groups, Jennifer facilitates a review of the forms by inviting responses from each small group and addressing areas needing clarity. Following this second article exercise, students are expected to find, read, and complete the forms for an article they find on their own that is relevant to their research question. Students submit the completed forms as part of an individual graded assignment. Jennifer reviews and gives feedback on this one article. Students later submit forms for two more articles they intend to use in their research proposal.

Discussion

This approach has been used twice with different cohorts of students. During the first iteration, Carolyn became a co-instructor for the course, completing Jennifer's additional lessons and the corresponding grading. The extended experience helped Carolyn see where students were and where they need to grow. For example, students indicated they were comfortable reading articles during the database searching exercises. However, questions about some of the concepts on the Worksheet Template forms, such as the identification of different types of studies, different types of variables, and the statistical analysis versus the results, indicated a gap that needed more educational intervention. Therefore, we changed the approach during the second iteration to move more slowly through the process of using the EAL forms to identify parts of the articles and critically appraise them. Through classroom discussion and final course reflection statements, students had also suggested more opportunities for reading an article and using the forms together before completing them on their own. The approach described in this chapter includes the improved lesson plan.

Before the second iteration of this scaffolded approach, in 2020, the COVID-19 pandemic required the course to be taught online. In keeping with the overall course delivery adaptation, we chose to have online synchronous Zoom meetings. Technology did require some changes, such as rethinking the timing for hands-on activities. Pairing or grouping students together online actually took more time than simply turning to people sitting nearby. So, we tried to cluster hands-on time to be a bit longer (ten minutes instead of three to five minutes). Students also needed more specific guidance on concrete tasks or questions to complete during this time.

Student feedback via end-of-class surveys and an end-of-course survey has been positive. Jennifer observed progression throughout the course in interpreting research

for practice and developing research proposals at the conclusion of the course. Students reported the literature search tools invaluable, often indicating the usefulness of narrowing a search. They found the worksheet in developing their research questions helpful, though this was an area some would have liked to practice further. The EAL worksheets were useful for students to identify areas to consider when analyzing research. Students shared increased comfort reading peer-reviewed publications and knowledge using peer-reviewed publications in dietetics practice at the conclusion of the Senior Seminar in Dietetics course. Most also agreed in the survey that they know how peer-reviewed publications can be used by a dietetics practitioner. The activities students identified as being supportive to their development were the sessions with Carolyn, learning to use the QCC forms, and reviewing different types of research individually and then collectively.

Conclusion

Our work as a team provided a good balance to develop instructional interventions to support critical reading skills development. Carolyn's experiences with the earlier phases of researching the literature and observations about student struggles during consultations helped provide unique insight into student experiences with reading scientific literature. Jennifer's experience as a dietetic practitioner and faculty member embedded through the curriculum gave great insight into skills learned before the course and needed afterward. Having two perspectives also helped check our individual biases or inaccessible terminology to make all of the teaching more accessible. The challenges in nutrition research create more need for transparency, consistency, and reproducibility. The open sharing of their critical reading forms made it easier to teach students the standards for their profession and give them resources to continue to critically read articles in the future.

Supplemental Materials

- Academy of Nutrition and Dietetics' Evidence Analysis Library, <https://www.andeal.org/>
- Academy of Nutrition and Dietetics' Evidence Analysis Library Manual and Critical Appraisal Forms, <https://www.andeal.org/evidence-analysis-manual>
- James Madison University Libraries' Information Literacy Goals and learning outcomes, <https://cdn1.lib.jmu.edu/wp-content/uploads/JMULibrariesInformationLiteracyGoals.pdf>
- Lesson plans and slides, <https://www.projectcora.org/assignment/critical-reading-strategies-dietetics-students>

Notes

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