

Use of Journal Clubs Within Senior Capstone Courses: Analysis of Perceived Gains in Reviewing Scientific Literature

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INTRODUCTION

Whereas graduate students, postdoctoral fellows, and medical students routinely use journal clubs as a way to read and stay abreast of new developments in the recent published literature, most undergraduate programs do not use journal clubs to teach *how* to read the scientific literature. Rather, students are told to read a scientific paper for class and then to present or use it in grade-based assignments, but without training as to how to critique the article. Up to 72% of graduating college seniors are not proficient in critical thinking skills, and there was little improvement in seniors tested in 2010 compared with those tested in 2004.¹ For dietetic students, the Accreditation Council for Education in Nutrition and Dietetics requires a core competency in “integrating scientific information and research into practice” with “interpretation of research literature” as one of the knowledge foundation cores.² Published articles describing the use of an undergraduate journal club describe gains by undergraduates in their perceived abilities to review the literature.³⁻⁵

Inclusion of a journal club component within a required nutrition course, especially for dietetic students, who may have little room in their curriculum for the additional coursework, could meet core required Accreditation Council for Education

in Nutrition and Dietetics competencies and improve critical thinking skills in undergraduate students. The purpose of the study was to determine whether a journal club component could be incorporated into a senior capstone course and whether this format would be as beneficial as a standalone-type journal club class (usually 1 credit elective courses) or a summer undergraduate research program that included a journal club component⁶ when all 3 were assessed for perceived gains in critical thinking skills. A senior capstone class without a journal club component was used as a negative control for the study.

IMPLEMENTATION

A journal club component was added to a required writing-intensive capstone class. This class was then compared with either the capstone course alone (negative control) or 2 formats of journal clubs: 1 as a standalone course and 1 as part of an undergraduate summer research program (positive controls) (Table). No students overlapped among the 4 formats because those enrolled in the summer research program were exempt from the senior capstone course and all remaining students took either the control capstone course or the one with journal club included. Students who took the standalone journal club format were also required to take a senior capstone course but there

was no overlap of students during the years when the study was conducted.

For each of the journal club formats, articles were assigned to students at least 1 week in advance and students were expected to come to class prepared to discuss the article. The articles were independently chosen for each course format. Discussions on the articles, which were independent for each course, were based on student participation and the individual papers chosen focused on evaluating the robustness of the study methodology, the results and implications of the research, and the limitations of the study. For the senior capstone course, inclusion of the journal club component required approximately one third of the class time, once per week. At the end of the semester, students were asked to complete a standard course evaluation survey, which contained an additional 10 questions designed to test critical thinking skills. These additional questions were modified with permission from an online standardized survey⁷ available from the Critical Thinking Community⁸ through the Foundation for Critical Thinking.

Individual responses were compiled, averaged, and analyzed using unpaired Student *t* tests, including an F distribution for sample variance and Bonferroni multiple test correction, which resulted in a correction to $P \leq .02$ for significance.

RESULTS

Compared with students in the senior capstone course without a journal club, students in the senior capstone course with an included journal club reported a significant difference in their perceived ability to distinguish facts from assumptions (4.4 ± 0.6 compared with 3.8 ± 1.0 ; $P \leq .02$), with trends toward higher scores for some other measures of critical thinking skills, including their ability

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Table. Class Size and Format of 4 Class Types Used to Assess Impact of Journal Club Inclusion for Undergraduates

Class Type	Group	Total Students (Responding to Survey), n	Student Level	Journal Club Required	Research Review Article Required	Research (Lab or Community) Required
Senior capstone course plus journal club	Test group	20 (14)	Seniors	Yes	Yes	No
Senior capstone course	Negative control group	126 (93)	Seniors	No	Yes	No
Summer research program	Positive control group	10 (10)	Rising juniors and seniors	Yes	Yes	Yes
Journal club elective class	Positive control group	21 (21)	Freshmen, sophomores, juniors, and seniors	Yes	No	No

to evaluate literature and data, and their perceived strength in asking scientific questions (Figure A). There was a similar finding when the senior capstone course with an included journal club was compared with those in an elective standalone journal club course (Figure B): the researchers found an increase in perceived data

analysis skills in students in senior capstone course with journal club compared with those in the standalone journal club course (4.4 ± 0.8 compared with 3.7 ± 0.6 ; $P \leq .02$). Compared with students in the summer research program, students in senior capstone course with a journal club did not report a difference their

perception of reading and interpreting the scientific literature, with gains in their perceived ability to distinguish facts from assumptions, compared with students in the summer research program (4.4 ± 0.6 compared with 3.7 ± 0.8 ; $P \leq .02$) (Figure C).

CONCLUSIONS AND IMPLICATIONS

The results provide evidence that adding a journal club component to a required capstone course can increase students' perceived abilities to understand and critique the scientific literature that are similar to, and in some cases better than, journal club courses or summer research programs. The questions used in the survey asked specific critical thinking skills that relate to reading the scientific literature.

Students in the summer research program, which combined summer research, journal club, journal article readings in their research area, and a final paper, scored themselves similarly to the senior capstone course with a journal club, which suggests that an academic year course can lead to an increase in perceived critical thinking skills comparable to that obtained by doing undergraduate research. This is an important finding because many departments are unable to fund large numbers of students doing undergraduate research.⁹

Overall, the study results support the inclusion of a journal club in senior capstone courses, especially those

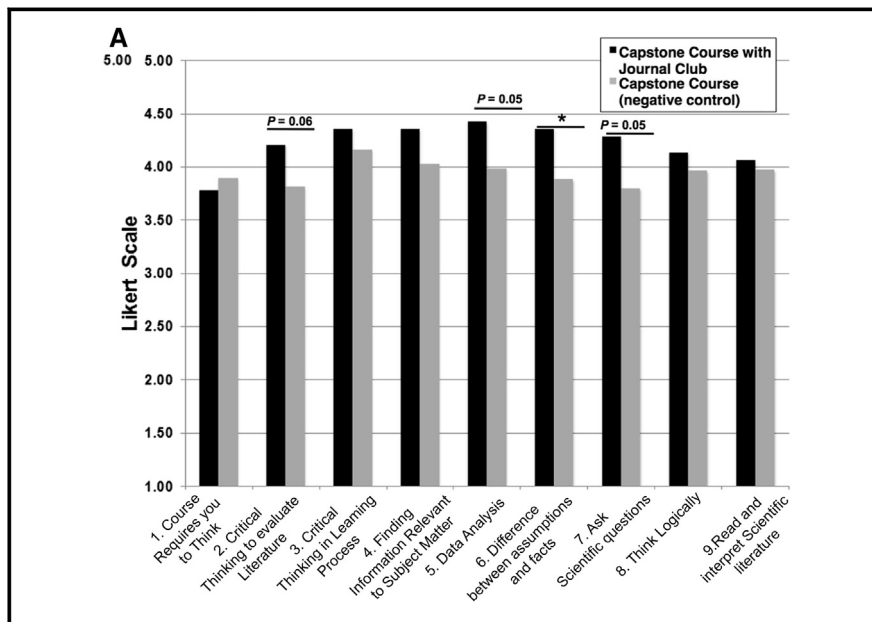


Figure. Comparison of critical thinking survey results between senior capstone course with journal club component and other types of courses including or not including a journal club component. (A) Comparison between senior capstone course with journal club (black bars) and senior capstone course without journal club (gray bars, negative control). (B) Comparison between senior capstone course with journal club (black bars) and journal club alone (gray bars, positive control). (C) Comparison between senior capstone course with journal club (black bars) and a summer research program with journal club (gray bars, positive control). For all graphs, average Likert scores (1 = low to 5 = high) are shown. * $P \leq .02$, based on Bonferroni multiple test correction, which lowers alpha from $P \leq .05$ to $P \leq .02$.

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