

Research on High-Impact Teaching Methods Related to Deep Learning

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Purpose of the Study

Deep learning focuses on meaningfulness, which requires understanding and applying the material, using it to solve problems, and integrating knowledge from various sources and domains. More specifically, deep learning employs multiple strategies, such as reading and combining information from a variety of sources, discussing subject matter with others, reflecting, applying knowledge to real world situations, integrating information, and considering diverse perspectives (Biggs, 1989; Nelson Laird, Shoup, & Kuh, 2005).

Using end-of-course student ratings of instruction, we measured student perceptions of observed teaching methods as well as progress on learning objectives emphasized by instructors. Analyses were performed at the class level, with average student ratings of progress on learning outcomes serving as the dependent variable and average ratings on teaching methods serving as the predictor variables. Interesting relationships between teaching methods utilized and student progress on deep learning outcomes are discussed.

Method

Instrumentation. IDEA Student Ratings of Instruction (SRI) is a two-form system. Using the *Objectives Selection Form*, Instructors identify the relevance of 13 learning objectives for their course. Students report their progress on the same learning objectives and their perceptions of instructor use of teaching methods and student/course characteristics. The 40-item *Diagnostic Feedback* form includes 19 teaching methods, 13 learning objectives, six student and course characteristics, and two summary measures.

Sample. The analytic sample included medium-sized classes (15 - 34 students) with at least 10 responses and a response rate of 75% or higher. Previous research has suggested the relationships between teaching methods and learning objectives varied by the combination of student motivation level and class sizes (Hoyt & Lee, 2002). We took course motivation into account and classified medium classes into quintiles (*ns* ranged from 1,918 to 2,285).

Relationships between Teaching Methods and Relevant Learning Objectives

An assumption of IDEA SRI is that the relationships between teaching methods and relevant learning objectives are distinctive for each objective. To investigate which teaching methods were most important for explaining student progress on each learning objective, we employed Bayesian Model Averaging (BMA), a technique that can account for model uncertainty and provide estimated posterior probabilities that student ratings of the frequency of each teaching method are associated with progress on a given learning objective.

BMA was conducted using an R package *BMS*. Within each subsample, separate analyses were conducted on each learning objective, including only classes where the instructor rated the learning objective as relevant. We used .9 as a cut-off criterion for the posterior effect probability. The patterns of important teaching methods varied among the subsamples with various levels of motivation, confirming the need to control for motivation. The table below summarizes the significant explanatory variables (indicated by item number on *Diagnostic Feedback*) included in the best models for each objective in medium-size classes within the middle 20% of motivation level. BMA results for other subsamples are presented in the supplemental document.

Teaching Methods Significantly Related with Progress on Learning Objectives in Medium-Size Classes within the Middle 20% Motivation Level

Learning objective	Relevant teaching method
1. Understanding subject matter	6, 8, 10, 13
2. Diverse perspectives	2, 13, 16
3. Applications	4, 8, 10, 12, 15, 18
4. Professional skills, viewpoints	4, 6, 13, 14, 15
5. Team skills	5, 14, 15
6. Creative capacities	2, 12, 15, 18
7. Broad liberal education	2, 13
8. Communication skills	2, 5, 7, 9, 15, 16, 18
9. Information literacy	9, 10, 14, 18, 19
10. Ethical reasoning	2, 8, 16
11. Critical analysis	2, 8, 16, 18
12. Civic engagement	8, 10, 12, 16
13. Quantitative literacy	15

Note. $n = 2,159$. Deeping learning objectives are in bold text. Deep learning teaching methods are highlighted in red.

Teaching Methods

1. Found ways to help students answer their own questions
2. Helped students to interpret subject matter from diverse perspectives (e.g., different cultures, religions, genders, political views)
3. Encouraged students to reflect on and evaluate what they have learned
4. Demonstrated the importance and significance of the subject matter
5. Formed teams or groups to facilitate learning
6. Made it clear how each topic fit into the course
7. Provided meaningful feedback on students' academic performance
8. Stimulated students to intellectual effort beyond that required by most courses
9. Encouraged students to use multiple resources (e.g., Internet, library holdings, outside experts) to improve understanding
10. Explained course material clearly and concisely

11. Related course material to real life situations
12. Created opportunities for students to apply course content outside the classroom
13. Introduced stimulating ideas about the subject
14. Involved students in hands-on projects such as research, case studies, or real life activities
15. Inspired students to set and achieve goals which really challenged them
16. Asked students to share ideas and experiences with others whose backgrounds and viewpoints differ from their own
17. Asked students to help each other understand ideas or concepts
18. Gave projects, tests, or assignments that required original or creative thinking
19. Encouraged student-faculty interaction outside of class (office visits, phone calls, email, etc.)

References

- Biggs, J. B. (1989). *Approaches to the enhancement of tertiary teaching*. Higher Education Research and Development, 8, 7-25.
- Hoyt, D. P., & Lee, E.-J. (2002). *Technical Report No. 12: Basic data for the revised IDEA system*. Manhattan, KS: The IDEA Center.
- Nelson Laird, T. F., Shoup, R., & Kuh, G. D. (2005, May). *Measuring deep approaches to learning using the National Survey of Student Engagement*. Paper presented at the the Annual Meeting of the Association for Institutional Research, Chicago, IL.

