Using Course-Embedded Assessment: Defining and Assessing Critical Thinking Skills of MIS Students

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The paper focuses on using a rubric for the assessment of critical thinking skills, which is mainly used for assurance of learning. The objectives are (1) to define the skill set that serves as a basis for common expectations related to problem solving skills, (2) to use the Critical Thinking Rubric to measure student progress toward achieving these skills, (3) to help refine the instrument and the assessment process, (4) to identify areas of concern in critical thinking, and (5) to enhance the culture of assessment in the School of Business.

INTRODUCTION

Critical thinking is the ability to understand and articulate a well-reasoned argument. Laudon defined critical thinking as "the sustained suspension of judgment with an awareness of multiple perspectives and alternatives" (Laudon, 2013). The School of Business is mission driven, with a focus on graduating leaders with good problem-solving skills. Our mission has helped drive our commitment to student and program assessment.

School of Business Mission
The School of Business will be students' preferred choice for a high-quality business education delivered in a liberal-arts environment.
We cultivate a community of learners by emphasizing:
- A rigorous, broad academic experience;
- Effective communication skills;
- Highly selective admission of students primarily from the Midwest;
- Teaching, while valuing applied and instructional scholarship and service.

School of Business Objectives
In support of the School of Business's mission, the objectives of the business programs naturally involve students, curriculum, faculty and resources. The School of Business must assess the outcomes of objectives for accountability and continuous improvement.
Students are the focus of our educational institution. The student objectives of the business degree programs are:
- to attract and retain students with superior academic qualifications and demographic diversity comparable to the university's student population;
- to prepare students for business and professional positions in the public and private sectors;

- to graduate students qualified for admission to select professional or graduate programs;
- to prepare students for future leadership and service opportunities; and
- to assist in making career and educational decisions.

A curriculum provides the framework for preparing young men and women to contribute to a global society in which diversity, changing technology and difficult ethical decisions are prevalent. The curriculum objectives of the business degree programs are:
- to offer business degrees that build upon a liberal arts and sciences foundation including calculus, statistics and foreign language. Specifically, the business programs will further develop written and oral communication, computer, quantitative, and critical thinking skills;
- to develop fundamental business knowledge in the areas of accounting, legal environment of business, organizational behavior, finance, marketing, production, information systems, economics and statistics, which are integrated with the completion of a senior capstone course;
- to increase study abroad and other institutional opportunities for business and accounting students.

PROJECT OBJECTIVES

The objectives of the project are:
1. To define the skill set that serves as a basis for common expectations related to problem solving skills.
2. To use the Critical Thinking Rubric to measure student progress toward achieving these skills.
3. To help refine the instrument and the assessment process.
4. To identify areas of concern in critical thinking.
5. To enhance the culture of assessment in the School of Business.

Critical Thinking Competencies
Quite often, a program's mission and learning objectives are so broad and lacking in precision that they are difficult to assess. For example, our school of business adopted a mission statement that included graduating problem-solvers as one of its goals. To make the goal assessable, we had to identify the competencies that critical thinkers demonstrate and describe them in measurable levels of performance. We identified eight broad critical thinking competencies:
1. Identifies, summarizes, and appropriately formulates the issue, question to be answered, problem to be solved or decision to be made.
2. Identifies and considers contexts, situational factors, assumptions, methodologies, or interdisciplinary concerns.
3. Considers other approaches, perspectives or standpoints, methodologies or methods, literature reviews, multiple interpretations, sampling, ways of knowing, or interdisciplinary approaches and conclusions, theses, hypotheses, answers, solutions, or interpretations.
4. Presents, develops, and communicates own approaches, methodologies or methods, perspectives or standpoints, interpretations, or ways of knowing.
5. Presents, interprets, analyses, and/or assesses appropriate supporting evidence, observations, data, information, and citations, using validated techniques.
6. Identifies and assesses conclusions and decisions and further implications or consequences.
7. Demonstrates self-reflection and documents the use of critical thinking skills.
8. Communicates effectively demonstrating clarity and precision, organization, and mechanical correctness.

We developed descriptions of four levels of performance for each competency. The levels we identified we labeled as emerging, growing, developing, and mastering (see Appendix 1).

Using the first competency "Identifies, summarizes, and appropriately formulates the issue, question to be answered, problem to be solved or decision to be made" as an example, emerging-level performance exhibits a lack of skill. Growing performance is characterized by identifying and summarizing the issue in a confused or incorrect way. Developing-level performance is characterized by identifying and summarizing the issue though some aspects are incorrect or confused. Mastering-level performance exhibits clear identification and summarization of the issue, including key details, insightful or creative purpose, strong connections among ideas, and an enlightening, memorable conclusion.

Limitations of Course-Embedded Assessments

If the course-embedded assessments come from courses taught by a small number of faculty members, these instructors may perceive that their teaching effectiveness is being evaluated. Such a perception may lead to resistance to the use of course-embedded methods. Recall that the literature suggests that direct assessment of critical thinking should occur in a context specific situation like a class assignment. However, it is also possible that the assignments used for the course-embedded assessments may not prompt students to demonstrate each of the critical thinking competencies. This has certainly been an issue with the research competency at the author's institution.

The results from the course-embedded critical thinking assessment can certainly provide a broad-brush perspective about the achievement of learning goals related to critical thinking. For those faculty members who like "crunching" numbers, the lack of statistical analyses may lessen the credibility of the results. Qualitative assessments may be viewed as less precise or informative. Although the assessment results may signal the need for curricular or pedagogical changes, the information does not explicitly tell the faculty which changes to make or how to make needed changes to the curriculum. While responding to the signals from the assessment outcomes, faculty members draw upon professional experiences, the scholarship of teaching and learning, and other sources to develop and revise the curriculum and pedagogical approaches appropriately.

RECOMMENDATIONS

Business graduates must possess and demonstrate proficient problem solving and critical thinking skills, therefore, it is important that business schools take student learning seriously and be held accountable for developing a skills assessment plan.

Faculty members should fully explain the rubric and communicate expectations to students before the assignment of projects. They should also identify assessable learning objectives.

Closed-loop data collection from a course-embedded assessment method is not sufficient. The data must be converted to information that can guide decision-making and lead to action.

Prior to using the course-embedded assessment rubrics, faculty members must be trained to appropriately rate student critical thinking.

The selection of assessment points is important. Many factors play into the decision about where and when to assess student critical thinking.

REFERENCES

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APPENDIX 1: CRITICAL THINKING SKILLS RUBRIC

1. Identifies, summarizes, and appropriately formulates the **issue**, question to be answered, problem to be solved or decision to be made.

Emerging	Growing	Developing	Mastering
1	2	3	4
Fails to or does not attempt to identify and summarize the issue.	Identifies and summarizes the issue in a confused or incorrect way.	Identifies and summarizes the issue though some aspects are incorrect or confused.	Clearly identifies and summarizes the issue including key details.

2. Identifies and considers **contexts**, situational factors, assumptions, methodologies, or interdisciplinary concerns.

Emerging	Growing	Developing	Mastering
1	2	3	4
Does not connect issue to context, or attempts but fails to do so.	Presents context superficially or connects to issue in a limited way.	Presents and explores relevant contexts in relation to issue, but with some limitations.	Approaches issue with clear sense of scope and context. May consider multiple relevant contexts.

3. Considers *other* **approaches**, perspectives or standpoints, methodologies or methods, literature reviews, multiple interpretations, sampling, ways of knowing, or interdisciplinary approaches and **conclusions** theses, hypotheses, answers, solutions, or interpretations.

Emerging	Growing	Developing	Mastering
1	2	3	4
Treats other approaches or conclusions superficially or misrepresents them.	Acknowledges other approaches or conclusions with limited or inaccurate analysis.	Analysis of other approaches and conclusions is clear and mostly accurate.	Analysis of other approaches and conclusions is accurate and insightful.
Little or no evidence of attending to or integrating others' approaches or conclusions.	Attempts or begins to integrate others' approaches or conclusions, but clear insight lacking.	Makes some clear integral use of others' approaches and conclusions.	Insightfully integrates treatment of others' approaches into own reasoning to deepen own approach.

4. Presents, develops, and communicates own **approaches**, methodologies or methods, perspectives or standpoints, interpretations, or ways of knowing.

Emerging	Growing	Developing	Mastering
1	2	3	4
Approach is clearly inherited, without ownership or integration.	Approach is clearly inherited, but with some attempt of integration.	Approach developed in relation to other approaches, although some aspects may have been adopted uncritically.	Approach is thoughtfully developed and integrated.
Approach is unclear or simplistic.	Approach is clear but generally flawed.	Approach is generally clear, although gaps may exist.	Approach is sophisticated and is developed clearly throughout.

5. Presents, interprets, analyses, and/or assesses appropriate **supporting evidence**, observations, data, information, citations, using validated techniques.

Emerging	Growing	Developing	Mastering
1	2	3	4
No indication of search, selection, or source evaluation skills.	Shows inadequate skills in searching, selecting, and evaluating sources.	Shows some adequate skills in searching, selecting, and evaluating appropriate sources.	Shows excellent skills in searching, selecting and evaluating appropriate sources.
Evidence is lacking, simplistic, inappropriate, or unrelated to the topic.	Some evidence may be inappropriate or related only loosely to conclusions.	Evidence is appropriate— exploration may be routine or gaps may exist in relation to conclusions.	Appropriate and salient evidence is thoroughly developed and clearly supports conclusions.
Does not distinguish among fact, opinion, and values; seems unaware of problems of bias or holds opinions in face of counterevidence.	Attempts or begins to distinguish fact, opinion, values may mention without developing issues of bias.	Distinguishes among facts, opinions, and values, may recognize some issues of bias, and opinions are responsive to evidence.	Demonstrates understanding of complex relationships between facts, opinions, and values in light of available evidence; recognizes bias, including selection bias.

6. Identifies and assesses **conclusions** and decisions and further **implications or consequences**.

Emerging	Growing	Developing	Mastering
1	2	3	4
Fails to present conclusions; or conclusion is a simplistic summary or unrelated to stated evidence. Fails to identify implications or consequences.	Presents conclusions as relative or only loosely related to evidence, lacking insight into context or approaches. Identifies some relevant consequences or implications with weak attempt to link to conclusion.	Presents conclusions as following from the evidence. Shows some insight into context or approaches. Conclusions provide some linkage to relevant consequences and implications.	Conclusions are tailored to fit the best available evidence within the context and in relation to relevant approaches. Conclusions provide evidence for, discuss, and extend relevant implications, and consequences.

7. **Demonstrates** self-reflection and **documents** the use of critical thinking skills.

Emerging	Growing	Developing	Mastering
1	2	3	4
Little or no evidence of reflection or self-assessment.	Attempts some reflection or self-assessment of own approach, but lacking insight.	Some evidence of insightful reflection or self-assessment of own approach.	Engages in deeply insightful reflection or self-assessment of own approaches.

8. **Communicates** effectively demonstrating clarity and precision, organization, and mechanical correctness.

Emerging	Growing	Developing	Mastering
1	2	3	4
In many places, language (word choice) obscures meaning.	Language occasionally interferes with communication.	In general, language does not interfere with communication.	Language clearly and effectively communicates ideas.
Work is unfocused and poorly organized; lacks logical connection of ideas.	Basic organization is apparent; some transitions connect ideas, but some gaps or confusions.	Basic organization is clear; transitions connect most ideas, although some may be rote.	Organization is clear and cogent; transitions between ideas enrich presentation.
Grammar, syntax, voice or other errors are repeated, frequent, and distracting, or show lack of proofreading.	Some errors are repeated or distracting; some copy-editing errors should be caught by proofreading.	Errors are not overly distracting or frequent, or attempts at more complex structures lead to occasional errors.	Errors of grammar, syntax, voice, etc. are minimal, even when using complex structures.
Style is simplistic, inconsistent, or inappropriate; little to no attention to discipline, genre, or audience.	Some attempt at appropriate style, but with major lapses or inconsistencies; begins or attempts to attend to discipline, genre, or audience.	Style is generally consistent and appropriate for discipline, genre, and audience, may be occasional lapses.	Style is consistent, sophisticated, and appropriate for discipline, genre, and, audience.
Format is absent, incorrect, or distracting; citations are absent or used or documented incorrectly.	Format is flawed or occasionally distracting; citations are uneven, inconsistent, or incorrectly documented.	Format is appropriate although at times inconsistent. Most sources cited and used correctly, appropriate style is employed.	Consistent use of appropriate format. All sources cited and used correctly; shows understanding of disciplinary, economic, legal and social aspects of using information.