

Effects of Multiple Choice Versus Free Response Assessment on Cognitive Processing

Spencer Schrock, Adam Uliana, Scott Berman
SC 297C, The Pennsylvania State University

Background and Significance

- Multiple-choice questions (MCQ) quickly became the cornerstone of large-scale testing
- No shortage of criticism in educational community
- Little debate about free response ability to demonstrate high level thinking
- Opponents of multiple-choice format claim that little more than knowledge-level thinking can be measured, the lowest level in Bloom's taxonomy
- Proponents of argue that the multiple-choice format can test more than knowledge-level thinking (with the exception of synthesis)
- Acknowledge that it is more difficult to write test items that require more complex thinking, but it's not impossible

Bloom's Taxonomy:

- Comprehensive hierarchy for classifying learning objectives
- Among most widely recognized of such schemes
- Moves from lowest order processes to the highest

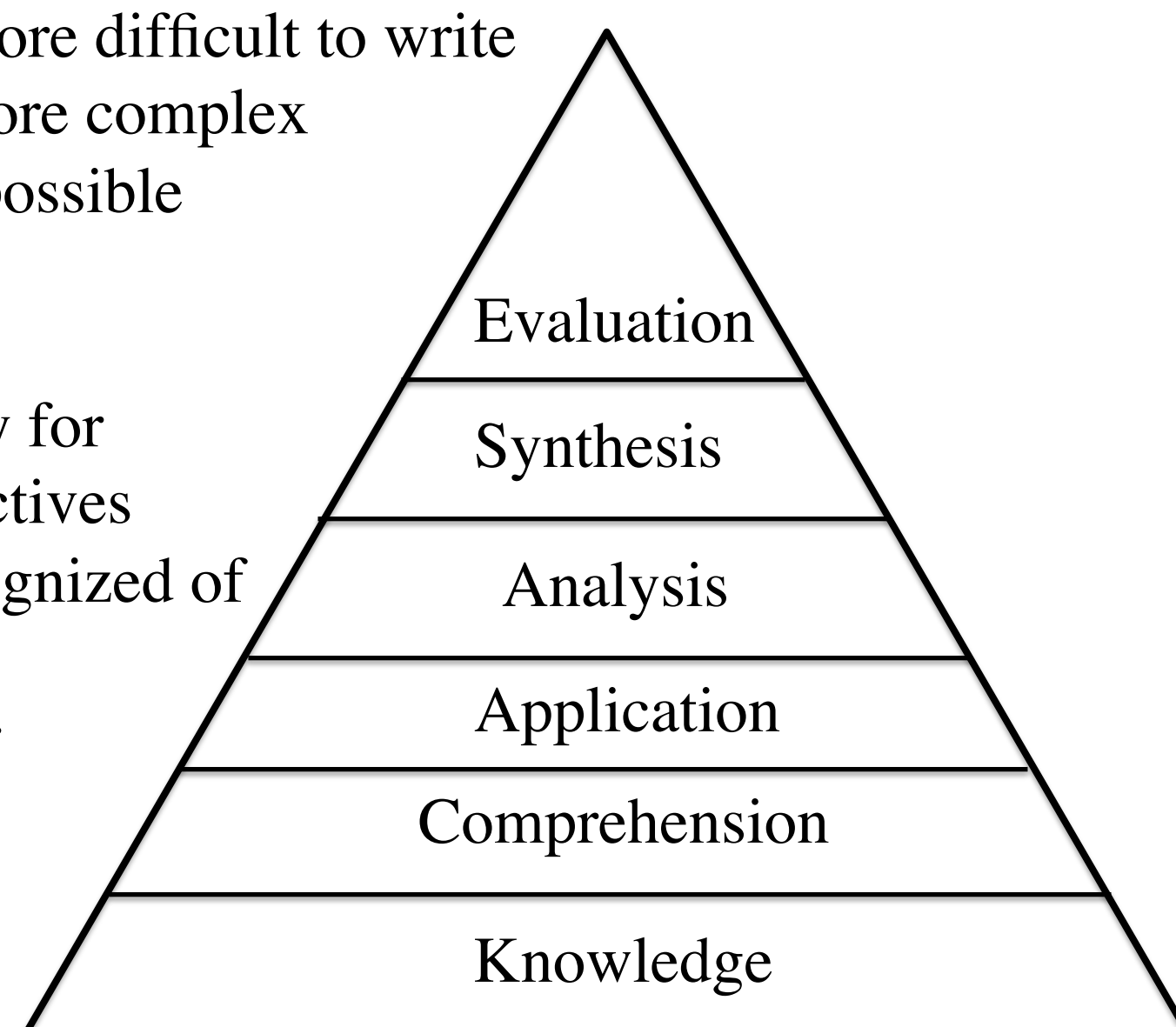


Figure 1. Bloom's Taxonomy

Pros and Cons

MCQ Exam

Free Response

Pros:

- Quick and easy evaluative method
- Readily applicable to large class sizes
- Can cover various topics and vast amounts of material
- Process of elimination test strategy beneficial for student performance

Cons:

- Expectation of MCQ exam lowers study time
- Negative suggestion effect-Exposure to false information (wrong answer choices on MCQ tests) causes processing of incorrect information

Pros:

- Shallow or rote memorization cannot be utilized to the exclusion of deeper learning processes
- Partial credit can be awarded
- More insight into student thought process

Cons:

- Takes longer time to grade
- Not as objective as MCQ exams
- Difficult to apply to larger class sizes

Data

	MCQ Exam	Essay
Surface Strategies	3.39	2.94
Surface Motives	3.28	3.05
Perceptions: Lower Abilities	3.72	3.01
Deep Strategies	2.85	3.26
Deep Motives	2.47	2.94
Perceptions: Higher Abilities	2.73	3.95

Figure 2. Means of approaches to learning and perceptions of abilities involved by type of assessment (based on interview questions scaled 1-5)

Passage Type	Number of MCQ Answer Options		
	2	4	6
Initial test, read	90%	77%	74%
Initial test, not read	72%	50%	39%
Cued-recall test, read	67%	61%	61%
Cured-recall test, not read	34%	28%	26%

Figure 3. Students took a MCQ test based on reading comprehension with half of the questions based on read passages and the other half based on passages not read. The percentage of their correct answers are shown. Questions contained two, four, or six answer options with only one being correct. When later tested of the same type of questions in the cued-recall test, the students' scores decreased significantly.

Format/Subject	Factor 1	
	Class 1	Class 2
Multiple Choice		
Knowledge	0.514	0.754
Comprehension	0.555	0.686
Application	0.676	0.646
Analysis	0.702	0.405
Free Response		
Knowledge	0.483	0.575
Comprehension	0.412	0.788
Application	0.669	0.632
Analysis	0.692	0.642

Figure 4. Common factor loadings for intersubtest correlations for two classes

Results

- Students significantly more likely to employ shallow learning in preparation for MCQ exam
- Students significantly more likely to employ deep learning strategies in preparation for free-response-type assessment
- Students perceive that MCQ exams assess lower levels of intellectual abilities
- Greater student preference for assessment via free response over MCQ examination
- Findings provide substantial support for evidence that student's perceptions may intervene and act as filters, influencing the choice of student's learning approaches
- Students are strategic and employ different learning strategies in different situations
- Incorrect MCQ answer options interfere with student learning
- With the right test framework, comparison between MCQ and free-response assessments shows fairly high corrected correlations at all taxonomic levels

Conclusions

- Poorer exam preparation and perception by students, shallower learning such as through memorization, and negative suggestion effects by incorrect answer options all found in MCQ exams can inhibit cognitive processing
- Free response assessment has demonstrated greater flexibility and exercise control over student learning of course material
- However, carefully written multiple choice tests have the opportunity to test deeper cognitive levels as accurately as free response exams test

References

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