Building More Valid Tests

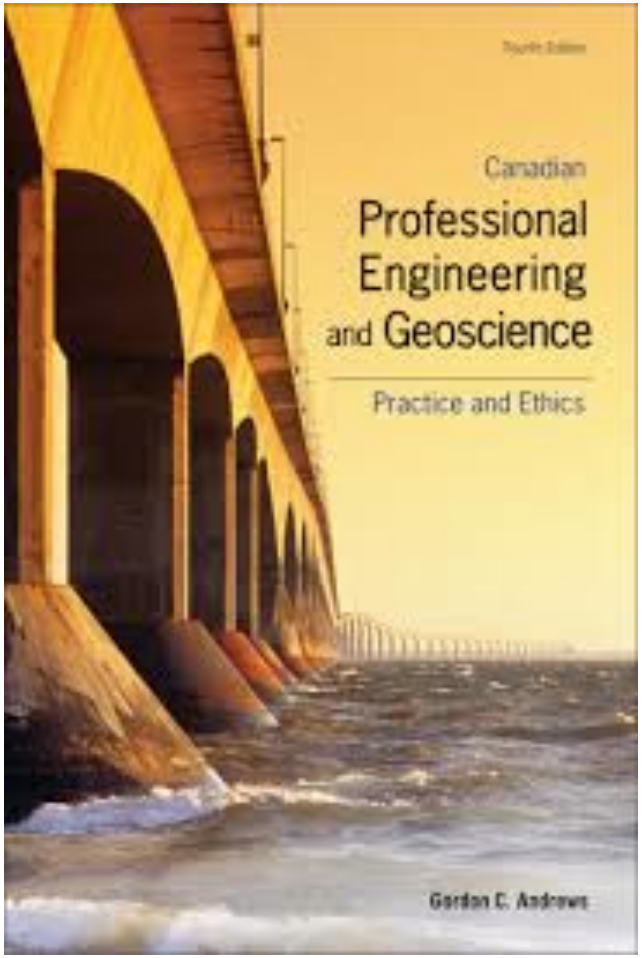
Ken Cor B.Sc. Eng., Ph.D.

University of Alberta Faculty of Pharmacy Pharmaceutical Sciences

Building a test is like building anything…

…you need a plan

Step 1: List the knowledge and skills you intend to assess



Step 1. List knowledge and skills you intend to assess

A. PROFESSIONALISM

- A.1 Definition and Interpretation of Professionalism and Professional Status
- A.2 The Roles and Responsibilities of Professionals in Society
- A.3 Engineering and Geoscience Professions in Canada; Definitions and Scopes of Practice
- A.4 The Value of Engineering and Geoscience Professions to Society
- A.5 The Roles and Responsibilities of Professionals to Management

B. ETHICS

- B.1 The Role of Ethics in Society; Cultures and Customs
- B.2 Classical and Modern Ethical theories and Principles
- B.3 Codes of Ethics of Professional engineers and Geoscientists in Canada
- B.4 Ethical Standards and Codes and Their Relationship to the Conduct of a Professional
- B.5 Common ethical issues and Dilemmas; Making Ethical Decisions

C. PROFESSIONAL PRACTICE

- C.1 Professional Accountability for Work, Workplace Issues, Job Responsibilities and Standards of Practice
- C.2 Relations with Other Professionals and Non-professionals; Business Practices
- C.3 Statutory and Non-Statutory Standards and Codes of Practice
- C.4 Insurance, Risk Management and Quality Management; Due Diligence
- C.5 Environmental Responsibilities and Sustainable Development
- C.6 Use of Software, Computers and Internet-based Tools; Liability for Software Errors
- C.7 Documentation Authentication and Control
- C.8 Duty to Inform; Whistleblowing

D. COMMUNICATION

- D.1 Legal, Ethical and Practical Aspects of Communication
- D.2 The Professional Relationship
- D.3 Communication Skills

Step 2. Determine weighting based on instruction and course activities

A. PROFESSIONALISM (15%)

- A.1 Definition and Interpretation of Professionalism and Professional Status (15%)
- A.2 The Roles and Responsibilities of Professionals in Society (15%)
- A.3 Engineering and Geoscience Professions in Canada; Definitions and Scopes of Practice (45%)
- A.4 The Value of Engineering and Geoscience Professions to Society (10%)
- A.5 The Roles and Responsibilities of Professionals to Management (15%)

B. ETHICS (35%)

- B.1 The Role of Ethics in Society; Cultures and Customs (5%)
- B.2 Classical and Modern Ethical theories and Principles (15%)
- B.3 Codes of Ethics of Professional engineers and Geoscientists in Canada (25%)
- B.4 Ethical Standards and Codes and Their Relationship to the Conduct of a Professional (25%)
- B.5 Common ethical issues and Dilemmas; Making Ethical Decisions (30%)

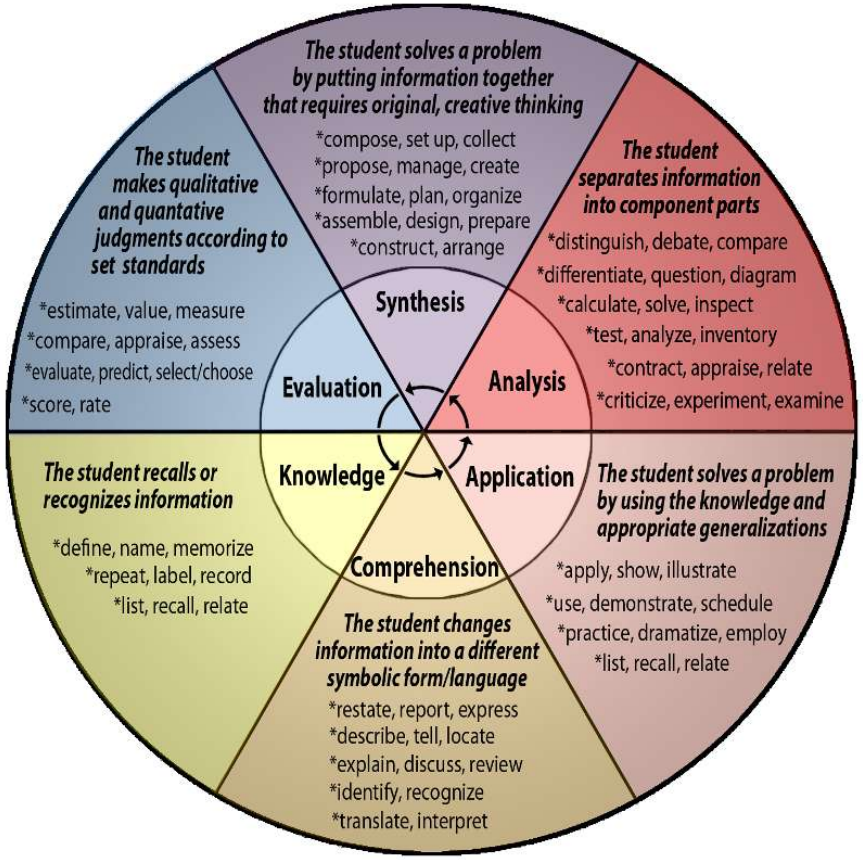
C. PROFESSIONAL PRACTICE (45%)

- C.1 Professional Accountability for Work, Workplace Issues, Job Responsibilities and Standards of Practice (20%)
- C.2 Relations with Other Professionals and Non-professionals; Business Practices (10%)
- C.3 Statutory and Non-Statutory Standards and Codes of Practice (10%)
- C.4 Insurance, Risk Management and Quality Management; Due Diligence (10%)
- C.5 Environmental Responsibilities and Sustainable Development (20%)
- C.6 Use of Software, Computers and Internet-based Tools; Liability for Software Errors (10%)
- C.7 Documentation Authentication and Control (10%)
- C.8 Duty to Inform; Whistleblowing (10%)

D. COMMUNICATION (5%)

- D.1 Legal, Ethical and Practical Aspects of Communication (40%)
- D.2 The Professional Relationship (40%)
- D.3 Communication Skills (20%)

Step 3. Choose a model to define levels of learning

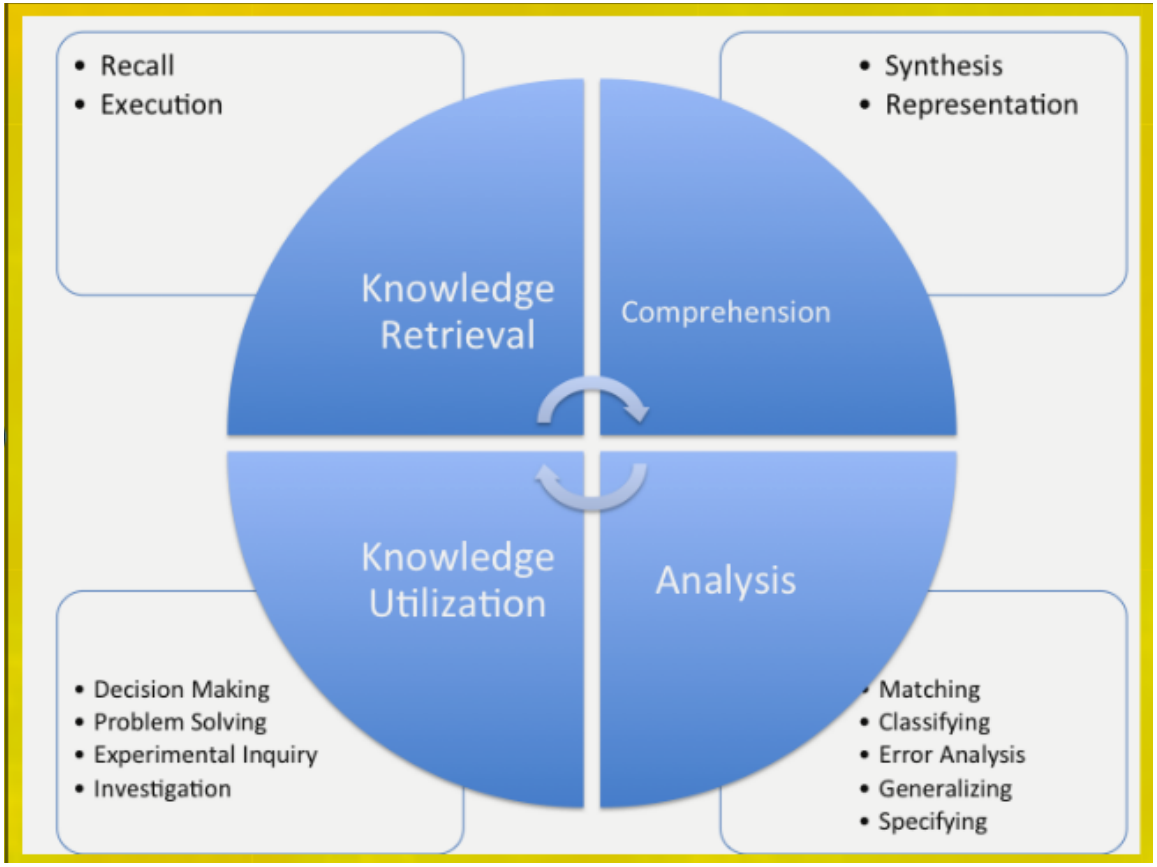


See March 12 presentation on learning objectives and Bloom's Taxonomy @ http://www.cme.engineering.ualberta.ca/NewsEvents/NewFacultyForums/Presentations%20Winter%202013.aspx

Step 3. Choose a model to define levels of learning

Adapted from: Anderson, L. W. and David R. Krathwohl, D. R., et al (2000)
A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Allyn & Bacon

Step 3. Choose a model to define levels of learning



Step 4. Determine weighting for levels of learning based on instruction

B. ETHICS (35%)	Content Weight	Knowledge Retrieval	Comprehension	Analysis	Knowledge Utilization
B.1 The Role of Ethics in Society; Cultures and Customs	(5%)	25%	75%		
B.2 Classical and Modern Ethical theories and Principles	(15%)	100%			
B.3 Codes of Ethics of Professional engineers and Geoscientists in Canada	(25%)	100%			
B.4 Ethical Standards and Codes and Their Relationship to the Conduct of a Professional	(25%)	25%	50%	25%	
B.5 Common ethical issues and Dilemmas; Making Ethical Decisions	(30%)			50%	50%

Result: Test Blue Print/Table of Test Specifications

		Knowledge Retrieval	Comprehension	Analysis	Knowledge Utilization
A. PROFESSIONALISM (15%)	Content Weight				
A.1 Definition and Interpretation of Professionalism and Professional Status	(15%)	50%	50%		
A.2 The Roles and Responsibilities of Professionals in Society	(15%)	100%			
A.3 Engineering and Geoscience Professions in Canada; Definitions and Scopes of Practice	(45%)	100%			
A.4 The Value of Engineering and Geoscience Professions to Society	(10%)		100%		
A.5 The Roles and Responsibilities of Professionals to Management	(15%)	50%	50%		
B. ETHICS (35%)					
B.1 The Role of Ethics in Society; Cultures and Customs	(5%)	25%	75%		
B.2 Classical and Modern Ethical theories and Principles	(15%)	100%			
B.3 Codes of Ethics of Professional engineers and Geoscientists in Canada	(25%)	100%			
B.4 Ethical Standards and Codes and Their Relationship to the Conduct of a Professional	(25%)	25%	50%	25%	
B.5 Common ethical issues and Dilemmas; Making Ethical Decisions	(30%)			50%	50%
C. PROFESSIONAL PRACTICE (45%)					
C.1 Professional Accountability for Work, Workplace Issues, Job Responsibilities and Standards of Practice	(20%)	50%	50%		
C.2 Relations with Other Professionals and Non-professionals; Business Practices	(10%)	50%	50%		
C.3 Statutory and Non-Statutory Standards and Codes of Practice	(10%)	100%			
C.4 Insurance, Risk Management and Quality Management; Due Diligence	(10%)	75%	25%		
C.5 Environmental Responsibilities and Sustainable Development	(20%)	50%	50%		
C.6 Use of Software, Computers and Internet-based Tools; Liability for Software Errors	(10%)	100%			
C.7 Documentation Authentication and Control	(10%)	100%			
C.8 Duty to Inform; Whistleblowing	(10%)	50%	50%		
D. COMMUNICATION (5%)					
D.1 Legal, Ethical and Practical Aspects of Communication	(40%)	100%			
D.2 The Professional Relationship	(40%)	100%			
D.3 Communication Skills	(20%)	100%			

What to do next?

- tag current questions for content/skills and level of learning
- create blue prints for current exams/assignments
- check that the blue prints align with course instruction and activities
- write new questions and start to build a question bank - remember to tag for content and level of learning (Moodle can do this!)
- evaluate your test/assignments after they are administered

A Simple Statistic to Evaluate Questions

- the correlation between the question score and the score on the rest of the test/assessment
- we expect a positive correlation - i.e. scoring well on the question should be associated with scoring well on the rest of the test
- negative correlations likely indicate a problematic question
- expect magnitudes between -.3 and .3 for multiple choice questions and between -.6 to .6 for questions worth more than one mark