Critical Thinking, Active-Learning Techniques in a Learner-Centered Environment

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Abstract

Educators are challenged to seek out and utilize new learning techniques to enhance the education of students and to measure student learning and performance to ensure quality courses and programs. Presented is a five-step process, which provides educators with a useful means in which to move their courses, in any discipline, toward one that inspires and encourages the development of critical thinking skills with emphasis on high-impact activities in a learner-centered (student engaged) environment. Educators must find practical ways to bring critical thinking into instruction, both structurally and tactically. Beginning at the course level, institutions can ensure their programs have an outcomes assessment program that moves them to achieve and maintain accreditation. Higher education institutions can than begin to compare results between courses, between online and face-to-face courses, between educators, between programs, and/or compare to external results as evidence of meeting accreditation standards.

Keywords; Education, Learning Techniques, Critical Thinking, Active Learning, Learner-Centered, Student Performance Assessment, Accreditation

Section 1

Literature Review

Accreditation, lifelong learning, and the encouragement of standardized testing is the focus of the Federal Higher Education Panel (Field, 2006). Members of the panel continue to push for evidence of learning. This has accrediting agencies reviewing curricula for inclusion of employment level critical thinking skills. One such body, the AACSB (an international accreditation body for business schools), is calling for business majors to be critical thinkers. Additionally, as cited in Desai, Berer, and Higgs (2016) the results of surveys conducted by the Chronicle of Higher Education (Supiano, 2013) and by the Association of American Colleges and Universities (2013 Press Release), found that American adults and employers want colleges to produce graduates who can think critically and creatively, and can communicate orally and in writing.

Lifelong employability requires knowledge, the ability to apply that knowledge in multidisciplinary, team-oriented, and dynamic environments, and lifelong learning (Bedrow & Evers, 2011). The directive for lifelong learning calls for a different mindset, one that embraces reflection and self-learning. Educators must effectively prepare students as lifelong learners to ensure a seamless transition to work environments (Bedrow & Evers, 2011). Evidence is mounting that "knowing" is not enough. Being able to apply that knowledge to analysis, decision making, and problem solving within team-based, complex environments is essential for success (Bedrow & Evers, 2011).

In the learner-centered paradigm, educators focus less on transferring factual knowledge to learners and more on developing a learning environment that empowers learners to construct knowledge for themselves (Webber, 2011). An active learning environment provides opportunities for interaction and involvement around clear objectives (Smart & Csapo, 2007) where educators empower learners to become involved in their learning. Active learning strategies develop more engaged students, with deeper learning and a greater ability to solve problems and think critically (Smart & Csapo, 2007). As stated by Islam (2015), "Critical thinking . . .better control of your own learning and empathy for other points of view" (para. 1). Critical thinking, as defined by the Foundation for Critical Thinking (n.d.), "is that mode of thinking—about any subject, content, or problem—in which the thinker improves the quality of his or her thinking by skillfully analyzing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities, as well as a commitment to overcome our native egocentrism and sociocentric" (para. 2).

Section 2

Description of the Practice to be Modeled

The author, and a colleague, has developed and propose the following five-step *Process for the Development of Higher-Level Thinking Skills* which can be implemented in virtually any teaching setting (including online) to create a more active learning environment (grounded on objectives) and to move learners toward critical (higher-level) thinking based on adequate assessment. The aim is for learners to value the study of the discipline, engage with the content, persist when the work gets difficult, grow from guidance and critique, and connect theory to application and practice. See Figure 1.

Section 2.1

Step 1: Determine Learning Outcomes and Objectives

Considering the importance of a course, its placement in a program, and its role in providing a base of discipline knowledge, an educator should carefully identify key learning outcomes and objectives that recognize what learners should know when they exit the course. The development of well-written outcomes and objectives will greatly accelerate a learner's movement into higher-level thinking (Ball & Garton, 2005). To make critical thinking happen, these learning outcomes and objectives, as well as the linked activities and assessments, must require students to perform and demonstrate higher-level thinking. Thus, an effectively designed course should target a specific behavior (consider using Bloom's Taxonomy action verbs for critical thinking, see http://www.teachthought.com/learning/249-blooms-taxonomy-verbs-for-critical-thinking/), introduce and practice the desired behavior, and end with the learner exhibition of the behavioral response. See Table 1. Additional information for writing learning objectives and measurable outcomes can be found at http://sa-assessment.uoregon.edu/Resources-and-Training/Writing-Student-Learning-Outcomes. "Creative teachers, as effective teachers, decide which methodology, approach or activities to use depending on the objectives of the lesson and the learners in the class" (Jamili, 2017, para. 5).

Section 2.2

Step 2: Facilitate Learning through High-Impact Activities

To make learning more meaningful, educators should develop high-impact activities. Activities, experiences, or interventions that are focused around clear objectives develop more engaged learners, with deeper learning, and a greater ability to think critically (Smart & Csapo, 2007). For learners to foster understanding and stimulate intellectual growth, they must pose arguments, state opinions, and critique evidence using primary and secondary sources. A "Padagogy" Wheel V4.0 by Carrington at http://tinyurl.com/padwheelposter is a comprehensive online directory of apps for education which identifies 400 Apps by the Blooms cognitive domain categories. The art of interactive discussion begins with establishing what is known and allows the educator to extend beyond to develop new ideas and understandings. Clasen and Bonk (1990) posited that although many strategies exist that can impact learner thinking, educator questions have the greatest impact. They went on to indicate that the level of learner thinking is directly proportional to the level of questions asked. When educators plan, they must consider the purpose of each question and then develop the appropriate level and type of question to accomplish the purpose.

Consider direct activities (direct experience with a concept), indirect activities (simulated experience, apply in a related situation), reflection ("think time"), and questioning (interactive discussion) that foster critical thinking. See Table 2. Some examples of "thinking questions" are:

- What evidence can you find…?
- What changes would you recommend…?
- How would you adapt to…?

Additional examples of asking thinking questions to ensure deeper learning are presented at https://notjustanybrickinthewall.wordpress.com/2012/09/15/blooms-taxonomy-a-practical-approach-for-deeper-learning/.

Section 2.3

Step 3: Allow Frequent Opportunities to Practice before Assessment

Practice is necessary to master any skill; learners must have the opportunity to practice the knowledge, skills, attitudes, and behaviors that will be evaluated. Learners become responsible for their own learning when educators create a supportive environment by providing clear expectations (announcements, detailed syllabus, discussions, ice-breakers), monitoring class activities (observations, statistics), and carefully tracking student participation (attendance, use of clickers, digital tracking software, seating charts, teaching diary). Collecting feedback from students about what they have, or have not learned (chain notes, memory matrixes, online surveys, two-minute papers, may present the need to offer opportunities for re-learning (demonstrations, panels, podcasts, reproductions, workbooks) and expose areas in need of improvement (examples of missing links, screen shots). See Table 3. Sample student feedback gathering forms are available at http://cft.vanderbilt.edu/guides-sub-pages/student-feedback/. Practice improves learning; making the learning more permanent.

Section 2.4

Step 4: Continue to Review, Refine, and Improve

Teachers should strive to continually refine their courses to ensure that their instructional techniques are in fact moving learners toward critical thinking. Feedback, like assessment, compares criteria and standards to student performance in an effort to evaluate the quality of work (Ko, 2004). When assessing a course, and prior to providing opportunities to practice what is to be assessed, learners must first understand the standards by which they will be assessed (examples of high-quality work, rubrics). Next, learners should be provided with constructive and relevant feedback by the educator and peers, as well as assessing their own performance (guided questioning, self-reflections). Stenger (2014) provided five research-based tips for providing meaningful, timely student feedback.

1. Be as specific as possible
2. The sooner the better
3. Address the learner's advancement toward a goal
4. Present feedback carefully
5. Involve learners in the process

Learner feedback can then be used to improve instruction (peer and/or supervisor observations, student evaluations of educator effectiveness, self-evaluation) and learner performance (compare value of feedback to standards, document changes and review and modify often). See Table 4.

Section 2.5

Step 5: Assess Learning Outcomes and Objectives

Learner achievement should be measured based on learning objectives, course and program outcomes, and specific discipline knowledge. Assessment data can be collected from the learner (anonymous questionnaires, interviews), through reflection on activities what worked or need improvement, as well as through test results (item analysis, quality standards). This measurement can provide an immediate and significant source of information for the outcomes-based assessment process in evaluating a particular course, departmental program, curriculum, instructional techniques, specific learning activities, and learner achievement. When reviewing the course, educators should pay particular attention to alignment.

See Table 5. For some practical assessment strategies (summative and formative) see
http://www.cte.cornell.edu/teaching-ideas/assessing-student-learning/measuring-student-learning.html.   This step
facilitates the continuous review of learning objectives and course outcomes to ensure they are still relevant
(compare evidence with standards, ensure measurability, accrediting agency reviews, network with placement
services).

Section 4

Discussion

The successful implementation of the *Process for the Development of Higher-Level Thinking Skills* in any
learning environment requires the thoughtful consideration of current instructional techniques and the
commitment to embrace changes and differences so as to flourish in a critical thinking, active-learning, high-
impact, learner-centered environment. Once accomplished at the course level, comparative results can be made
between courses, between online and face-to-face courses, between educators, between programs, and/or
compared to external results as evidence of meeting accreditation standards.

Figure 1. Process for the Development of Higher-Level
Thinking Skills
Source: Limbach & Waugh, 2012

Table 1

Step 1: Determine Learning Outcomes and Objectives

Lower-level Thinking Skills →   Higher-level Thinking Skills →

Remember	Understand	Apply	Analyze	Evaluate	Create
Recall or recognition of specific information	Determining the meaning of given information	Using strategies, concepts, principles, and theories in a given situation	Breaking information down into component elements and detecting how the parts relate to one another	Judging the value of ideas, materials and methods by developing and applying standards and criteria	Putting together ideas or elements to develop an original idea/product
Outcomes	**Outcomes**	**Outcomes**	**Outcomes**	**Outcomes**	**Outcomes**
Definition, Fact, Label, List, Quiz, Reproduction, Test, Workbook, Worksheet	Collection, Examples, Explanation, Outline, Show and tell, Summary	Demonstration, Diary, Illustrations, Interview, Journal, Performance, Presentation, Sculpture, Simulation	Appraise, Breakdown, Discover, Discriminate, Distinguish, Focus, Inspect, Investigate, Isolate, Prioritize, Question, Reason, Research, Separate	Agree, Argue, Conclude, Convince, Deduct, Defend, Grade, Influence, Interpret, Justify, Measure, Perceive, Persuade, Recommend, Validate	Adapt, Build, Convert, Discover, Discuss, Elaborate, Formulate, Invent, Model, Originate, Revise, Speculate, Transform, Visualize
Learning Objectives	**Learning Objectives**	**Learning Objectives**	**Learning Objectives**	**Learning Objectives**	**Learning Objectives**
Choose, Copy, Define, Duplicate, Listen, Match, Memorize, Recall, Recite, Select, Show, Write	Ask, Cite, Demonstrate, Discuss, Estimate, Express, Generalize, Illustrate, Indicate, Infer, Match, Predict, Relate, Rephrase	Act, Build, Calculate, Choose, Connect, Construct, Develop, Employ, Interpret, Link, Model, Plan, Relate, Select	Abstract, Chart, Checklist, Database, Graph, Mobile, Report, Spreadsheet, Survey	Critique, Debate, Edit, Itemize, Judge, Quiz, Report, Summarize	Advertisement, Film, Media product, Painting, Project, Song, Story
Actions	**Actions**	**Actions**	**Actions**	**Actions**	**Actions**
Describe, Find, Identify, List, Locate, Name, Retrieve, Recognize, State	Classify, Compare, Contrast, Exemplify, Explain, Infer, Interpret, Paraphrase, Summarize	Carry out, Contrast, Discover, Execute, Implement, Show, Solve, Use	Attribute, Categorize, Classify, Compare, Deconstruct, Differentiate, Examine, Integrate, Organize, Outline, Structure	Assess, Check, Detect, Evaluate, Experiment, Hypothesize, Monitor, Recommend, Predict, Test	Combine, Construct, Create, Design, Devise, Invent, Plan, Produce, Role-play, Suppose

Table 2
Step 2: Facilitate Learning through High-Impact Activities

Lower-level Thinking Skills ⟶   Higher-level Thinking Skills ⟶

Remember	Understand	Apply	Analyze	Evaluate	Create
Direct Activities	**Direct Activities**	**Direct Activities**	**Direct Activities**	**Direct Activities**	**Direct Activities**
Flash cards, Identifying, Listing, Memorize/recall, Multiple choice, Note taking, Outlining, Social networking	Annotating, Blog journaling, Boolean searches, Commenting, Identify parts, Guided discovery, Tagging, VoiceThreads	Demonstration, Diagraming, Drawing, Editing, Interviewing, Manipulations, Observations, Operating, Photographing, Scrapbook, Sharing, Uploading	Charting, Judging, Linking, Mashing, Media clipping, Plotting, Summarizing, Surveying, Reverse engineering, Reviewing, Rating, Validating,	Article review, Blog commenting, Collaborate, Debating, Hypothesizing, Itemizing, Judge, Opinion Validating, Outline, Recommending, Reporting	Animating, Authentic projects, Blogging, Directing, Filming, Podcasting, Presentations, Programming, Publishing, Videocasting
Indirect Activities	**Indirect Activities**	**Indirect Activities**	**Indirect Activities**	**Indirect Activities**	**Indirect Activities**
Brainstorming, Google search, Listen-read-discuss, Small group discussion	Buzz group, Mind mapping, Panel discussion, Posing arguments, Social networking, Task group	CAD projects, Gaming simulations, Inquiry learning, Open discovery, Student-lead discussion	Data analysis, Identifying contradictions, Interpreting results, Online simulations, Testing conclusions	Case studies, Online quizzing, Problem solving	Podcasts, Role-playing, Screen casting, Stories, Systematic problem solving, Video Games
Reflection	**Reflection**	**Reflection**	**Reflection**	**Reflection**	**Reflection**
Class discussions, Contracts and logs, Writing blogs	Directed readings, Directed writings, Essays, Forums, Group activities	Class presentations, Experiential research paper, Journaling, Quotes	E-mail discussion groups, Peer Critique, Personal Narrative, Portfolios	Peer editing, Photo essay, Self-evaluation	Community mural, Portfolios, Publications, Service learning projects
Questions	**Questions**	**Questions**	**Questions**	**Questions**	**Questions**
Can you find…? Can you identify…? Can you list…? How did…happen? How would you describe…? What is…? When did…? Where is…? Who was…? Why did…?	Can you explain…? How would you compare…? How would you rephrase…? How would you summarize…? What can you infer about…? Which is the best answer…? Which statements support…? Will you interpret…?	Can you implement…? How would you apply…? How would you develop…? How would you show…? How would you solve…? How would you use…? What links can be made…? What questions would you ask in an interview?	Can you differentiate…? How would you categorize…? How would you discover…? What conclusions can you make…? What evidence can you find…? What is the relationship…? Why do you think…?	Can you predict…? Can you propose an alternative for…? How might you detect…? How would you persuade…? How would you test…? What changes would you recommend…? What ideas justify…?	Can you invent…? Can you think of an original way to…? How would you adapt to…? How would you design…? How would you improve…? What could be done to…? What revision would you make for…? What would happen if…?

Table 3

Step 3: Allow Frequent Opportunities to Practice before Assessment

Create Supportive Environment	Monitor Class Activities	Track Student Participation	Collect Feedback from Learners	Expose Areas Needing Improvement	Offer Re-learning Opportunities
Announcements, Detailed syllabus, Discussion, Ice breakers, Introductions	Number of log-ins/post, Observation, Statistics (participation time)	Attendance, Clickers, Digital tracking software, Seating charts, Teaching diary	Chain notes, Memory matrixes, One-sentence summary, Online surveys, Two-minute paper, Votes	Clarifications, Examples of missing links, Real-world examples, Remediation, Sample works, Screen shots	Demonstration, Game, Panel, Podcast, Quiz/test, Reproduction, Workbook

Table 4

Step 4: Continue to Review, Refine, and Improve

Teacher Feedback	Peer Feedback	Learner Self-Feedback	Improve Instruction	Improve Learner Performance
Examples of high quality work, Pretest/post-test, Rubrics	Based on grading rubric, Based on observation, Clear expectations, Examples of useful/useless feedback	Based on a scoring guide, Guided questioning, Provide adequate think-time, Self-reflection of knowledge gained (journal)	Peer observer, Student evaluations of instructor effectiveness, Supervisor observer, Teaching expert observer, Videotaping and self-evaluation	Compare value of feedback to standards, Document changes, Keep or modify changes, Periodic review of changes

Table 5

Step 5: Assess Learning Outcomes and Objectives

Learner	Activities	Test Results	Learning Objectives	Relevant Course Outcomes
Anonymous questionnaires, Learner interviews, Personal conversations	Document activities that worked or need improvement, Gather student feedback, Immediate reflection post activity, Review/compare grades pre-change	Alignment with objectives, Item analysis, Review of highly missed questions, Use quality standards	Compare evidence with standards, Ensure measurability, Set standards to measure against	Accrediting agency reviews, Network with hiring managers, Outside observer reviews, Review current literature, Work with placement services

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