International Journal of Teaching and Learning in Higher Education 2017, Volume 29, Number 3, 551-559
http://www.isetl.org/ijtlhe/ ISSN 1812-9129

Designing Instruction for Critical Thinking: A Case of a Graduate Course on Evaluation of Training

Aubteen Darabi and Thomas Logan Arrington
Florida State University

As students graduate and enter the workforce, they face the job market's demand for critical thinking (CT) skills. The demand is caused by the market's increasing need for providing professional services that require performing complex tasks. In response to this demand, institutions of higher education are expected to prepare their graduate through incorporating courses in their curricula that promote CT skills. While the definition of CT is contested across various scientific fields, several approaches to designing CT-based instruction have been proposed. This paper presents an application case of "immersion" and "infusion" approaches, borrowed from Ennis (1989), to a graduate course on evaluation of training and examines the results in terms of the critical thinking VALUE rubric developed by the American Colleges and Universities (AACU). We contend that successful application of these approaches depends heavily on relevant complex scaffolds that induce learners' immersion in CT and allow infusion of instructional features that support their CT activities. In our case, we used Systems Thinking to scaffold learners' immersion and adopted Human Performance Technology (HPT) to infuse learning activities aimed at CT. We finally examined our procedures and outcomes by using the AACU Value Rubric milestones.

The emphasis on cultivating critical thinking (CT) skills in students across all ages has been growing in the past decade. Educational standards for K-12 education emphasize improved CT as an outcome (e.g., Common Core Standards and 21st Century Skills), and it is also relevant during and after postsecondary education. Hart Research Associates (2013) documented that the job market expects higher education institutions to place more emphasis on training student competencies that lead to five key learning outcomes "including: critical thinking complex problem-solving, written and oral communication, and applied knowledge in real-world settings" (p. 1). Reasons for this demand include the changing nature of jobs due to advances in technology, which require employees capable of thinking critically and possessing transferrable skills to be used throughout their careers (Sternberg, 2013). To be able to respond to this demand, institutions of higher education should address these issues in their curricula and apply relevant instructional strategies in graduate and undergraduate courses to cultivate the required skills. The challenge appears to be more significant in graduate programs where students are preparing for recruitment by professional organizations to perform complex cognitive tasks.

Since the dawn of the last century, starting with scholars such as Dewey (1910), learners' passive acceptance of new information has been considered an educational problem. Instead, training reflective thinking in writing and critical scrutiny of new information have since been recommended as a main purpose of education. From this perspective, critical thinking occurs when learners investigate the issues and look for new evidence to support or counter the claim (Dewey, 1910). Scholars' emphasis on learners' reflective development led to discussion of learners' cognitive processing of new information and classification of learners' cognitive activities in Bloom's taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). In their original approach to the learning cognition process, Bloom and colleagues classified the objectives of learning into six hierarchical categories: knowledge, comprehension, application, analysis, evaluation, and synthesis (Bloom et al., 1956). Later, Krathwohl (2002), revisited this categorization and revised the taxonomy objectives according to the typology of required knowledge (factual, conceptual, procedural, and metacognitive). Krathwohl relabeled the last objective as "creating" and included the fundamental skills for higher order thinking in the last three categories of the taxonomy: analyze, evaluate, and create (Kennedy, Fisher, & Ennis, 1991; Lai, 2011).

Expanding the discussion of learners' cognitive processes, Elder and Paul (1996a), propose the CT stage theory according to which learners start as unreflective thinkers whose thinking gets challenged, which turns them into beginning thinkers who keep practicing thinking and advance their thinking skills until they master the thinking process. Learners progress through these six stages by using a rigorous self-assessment while encountering their own incorrect beliefs and develop as a thinker (Elder & Paul, 1996b).

The underpinnings of these discussions on learners' reflection and thinking processes are the foundational elements of CT as identified by other authors (see Lai, 2011). However, some consider using Bloom's taxonomy as a tool for operationalizing CT attributes due to their relationship (Miri, David, & Uri, 2007) even though interchangeable use of higher order skills and CT is considered an incomplete and simplified approach by other scholars (Ennis, 1985; Paul, 1990).

CT is defined differently within the domains of cognitive psychology, philosophy, and education (Lai, 2011). The common thread among the three fields is the use of higher order thinking skills (Critical Thinking Community (CTC), 2015; Ennis, 1995; Willingham, 2007). Cognitive psychology focuses on recognizing the intricacies behind an issue, looking for evidence, basing one's beliefs on facts and evidence, and being open to ideas different from one's own beliefs (Willingham, 2007). Those in philosophy use the cognitive psychological definition while including elements or reflective thinking and reasoning in what one does (CTC, 2015; Ennis, 1995).

In the education domain, the Association of American Colleges and Universities (AACU) defined CT as "a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion" (AACU, 2010). This definition was then operationalized through development of a CT rubric included in the VALUE (Valid Assessment of Learning in Undergraduate Education) rubrics. Both of these products, the CT definition and its rubric, were the results of a collaborative effort of a group of faculty experts from universities across the United States who, at the request of AACU, reviewed existing CT materials, consulted other faculty, and examined existing assessment rubrics for CT (AACU, 2010). AACU developed five phases of learners' critical thinking with corresponding indicators for achieving the VALUE "milestones." Following is a paraphrased list of AACU's five phases of CT and their corresponding milestones as expected of learners in each phase (AACU, 2010):

1. **Explanation of issues.** Learners describe comprehensively the issues to be considered critically by delivering all relevant information necessary for full understanding.
2. **Evidence:** Learners systematically analyze assumptions and carefully examine the relevance of context.
3. **Influence of context and assumptions:** Through questioning the experts' viewpoints, learners evaluate and use information from a variety of sources to conduct an analysis or synthesis.
4. **Student's position:** Learners consider the complexities of issues when describing their perspective, acknowledge their own limitations, and include others' perspectives into their hypothesis.
5. **Conclusions and related outcomes:** Learners state the logical conclusions, consequences, and implications to reflect their informed use of prioritized evidence.

Given the complexity of defining and operationalizing critical thinking, integrating instructional strategies in a course or a curriculum aimed at promoting the relevant cognitive processes presents a pedagogical challenge. In instructional systems, the challenge represents itself as selecting one overall approach to designing a course with relevant learning content and instructional strategies focused on advancing critical thinking. Ennis (1989) offers four options as overall approaches to developing a course with CT in mind. In what he calls a general approach to instruction, Ennis recommends designing a course specifically devoted to teaching of and training in CT skills. In his *immersion* and *infusion* approaches, the CT skills are integrated in course content, implicitly or explicitly respective to the approaches. Ennis' mixed approach combines the general approach with elements of either immersion or infusion. In a meta-analysis of application of these approaches conducted by Abrami et al., (2008), they found the mixed approach to be most effective in teaching CT skills and the immersion approach as the least successful.

This paper presents an application of Ennis' immersion and infusion approaches combined to a graduate course on evaluation of training programs. The course is offered every other semester as a required course for Master's level students preparing to work in the business and industry as practitioners of instructional design, development, and evaluation. Doctoral students sign up for the course as an elective for research and application experience. Both groups may use the course to fulfill the requirement of earning a certificate in Human Performance Technology. The number of students enrolling varies between 9 to 15, depending on the students' schedules and priorities. The course content and instructional strategies offer the theoretical foundation of evaluation with great emphasis on the practical application of investigation methods in an authentic environment. Thus, it provides a platform for learners' transition from learning abstract evaluation topics to practical use of evaluation methods. Due to these features, we found the course to be a good fit for a CT-based design of instruction.

Using immersion and infusion as means of applying CT, the instructor used two complex but relevant frameworks—systems thinking and human performance technology—to scaffold students' processing of CT skills. We integrated various ideas and tools from these perspectives into our design and asked students to explicitly demonstrate their use of these tools in their assignments and presentations aimed at promoting CT. In the following section, we present a brief description of the two scaffolding frameworks before discussing the details of their application.

Macro Design Strategies for Immersion and for Scaffolding Learners' CT

The conventional way of teaching an introductory course such as ours usually focuses on teaching "what" an evaluation is and "how" to do it. It leaves out the learners' challenging task of addressing the "why" elements of the process that require learners' causal reasoning, exploration, and the search for evidence in support of their judgment and decision making: all parts of CT. Realizing the challenge of provoking and facilitating these cognitive processes, we chose to apply two relevant macro design strategies to "enable" learners to go beyond the declarative and procedural knowledge toward a purposeful creation process. To accomplish this, in the first few weeks of the course students were introduced to Systems Thinking (Ackoff, 1999; Ghrajedaghi, 1999) and HPT (Stolovitch & Keeps, 1999), both of which provided a complex cognitive framework that, when applied, demanded learners' high level thinking. These perspectives were fundamentally relevant to the course objectives and were aimed at contextualizing other instructional strategies we used. Both strategies, because of their application complexities and intricacies, demanded extensive amount of mental effort required for developing critical thinking skills. Specifically, the application of systems thinking enabled learners' development of analytical skills in order to understand the training program's systemic properties, to comprehensively identify and describe the training components, and to analyze the relevant training information required for appreciation of the program's functions and features.

Application of HPT principals, on the other hand, complemented the systems thinking scaffold in enabling students in their evaluation activities, requiring higher level CT skills such as synthesizing and evaluating their analytical accomplishments. From this perspective, a training program is identified as an organization with three major functions: 1) improving trainees' knowledge, 2) improving their job performance, and 3) contributing to the sponsoring organization's performance as a whole. Focusing on these functions, learners' analysis included examining the program's components contributing to the success of these functions and deciding whether there is a need for modification of those components based on the resulting evidences.

Infusion Strategies

To complement using the immersion scaffolds aimed at soliciting CT, we "infused" a series of sequenced CT-oriented instructional strategies and learners' activities that gradually and incrementally led to production of the course's capstone project. The class activities and assignments were sequenced so that students used the immersion scaffolds to describe the training program in systems terms and progress through the spectrum of critical thinking by identifying, analyzing, applying, and synthesizing information to be used in creating a proposal. The authenticated instructional activities dealt with a real world training program and corresponded to theoretical and practical features recommended by the literature.

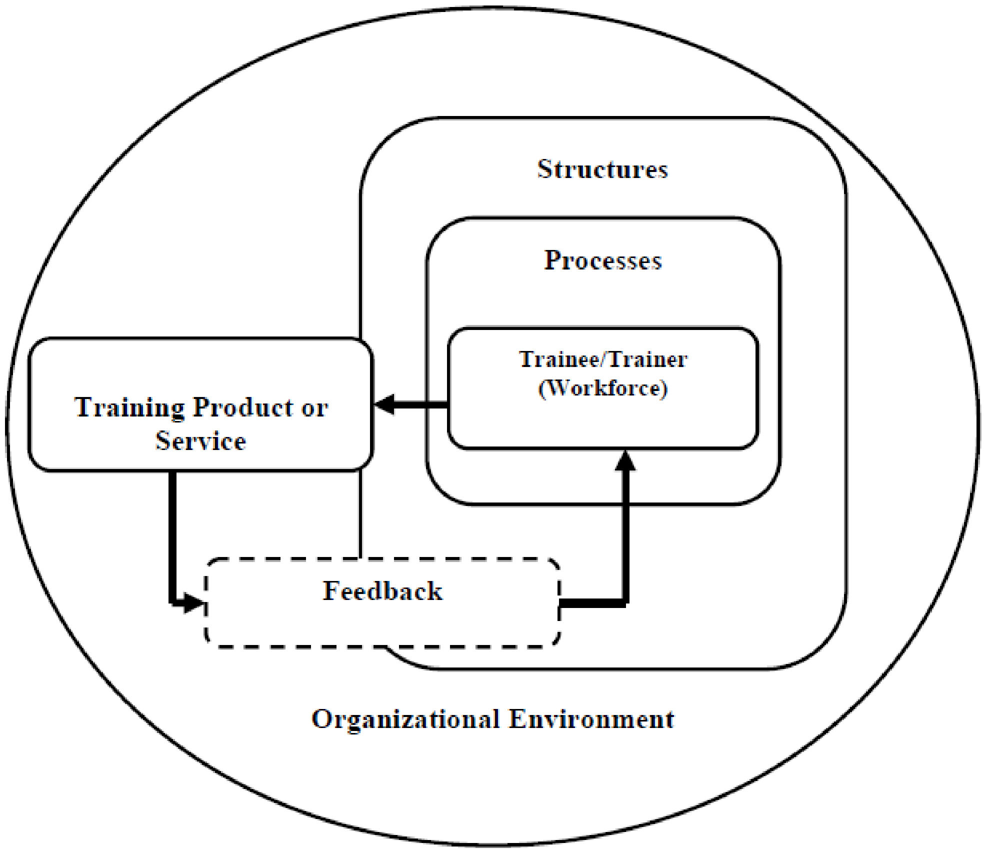
For the purpose of this paper, we have structured our discussion of the immersion and infusion application strategies to highlight the relevant instructional activities relevant to the AACU's listed milestones for each phase of CT.

Contributions of Immersion and Infusion Strategies

Phase 1. Explanation of issues. The CT milestone of this phase expects the learners display their abilities in explaining the issues under study. The training program that our students selected at the outset of the course provided a platform for conducting these activities that CTC calls an "…intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information …generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (CTC, 2015, p. 1). The application activities were designed for learners to explore and explain the functions and features of a real world training programs, such as instructional content, training strategies, mode of delivery, and training environment. The activities were preparatory to the foundation of students' "purposeful, self-regulatory judgment" (Facione, 1990) to be used in their decisions in designing the evaluation.

This milestone was achieved when students documented their application of systems thinking perspectives and contextualized the training program in a HPT context (see Figure 1). The students' cognitive efforts for this application and justification of it were demonstrated in an essay presented in class and submitted to the instructor. In this essay, they described how they compared their assigned training program to a performance organization as depicted in Figure 1. In this organizational system, they identified trainers as the workforce that produces a particular product: in this case, more knowledgeable trainees with improved skills. Students explained how the production occurs within a certain organizational structure following particular processes that are specifically designed for the training purpose. Students also explained how the program management and staff, as parts of the program environment, and also the sponsoring organization observe the transfer of training to the job environment

Figure 1
Training as a system. A systemic view of a training program, identifying key components.



and provide the feedback about the product. This essay is basically a description of Figure 1 as it is applied to the student's selected program.

Phase 2. Evidencing one's point of view. Having explained the features of their authentic training case, the learners identified and selected information for their "evidential, conceptual, methodological … or contextual considerations" (Facione, 1990, p. 3). To accomplish this, the students used the observation and documentation tools integrated into the course for conceptual "deconstruction" of the training system and documentation of the components' functions. They received instruction on using an adaptation of the "Holistic Process of Inquiry," a systemic analysis technique developed by Gharajedaghi (1999). Labeled as the "iterative analysis of training systems," students used this tool to examine the training system as depicted in Figure 2. They followed this "iterative analysis" procedure to evidence their understanding of the selected training programs and map the interaction of its components. Moreover, this instructional strategy also documented the functions of the training according to the HPT principles which consider the training's main functions to be 1) improving trainees' knowledge and skills; 2) improving trainees' job performance; and finally 3) improving organizational performance (Pershing, 2006).

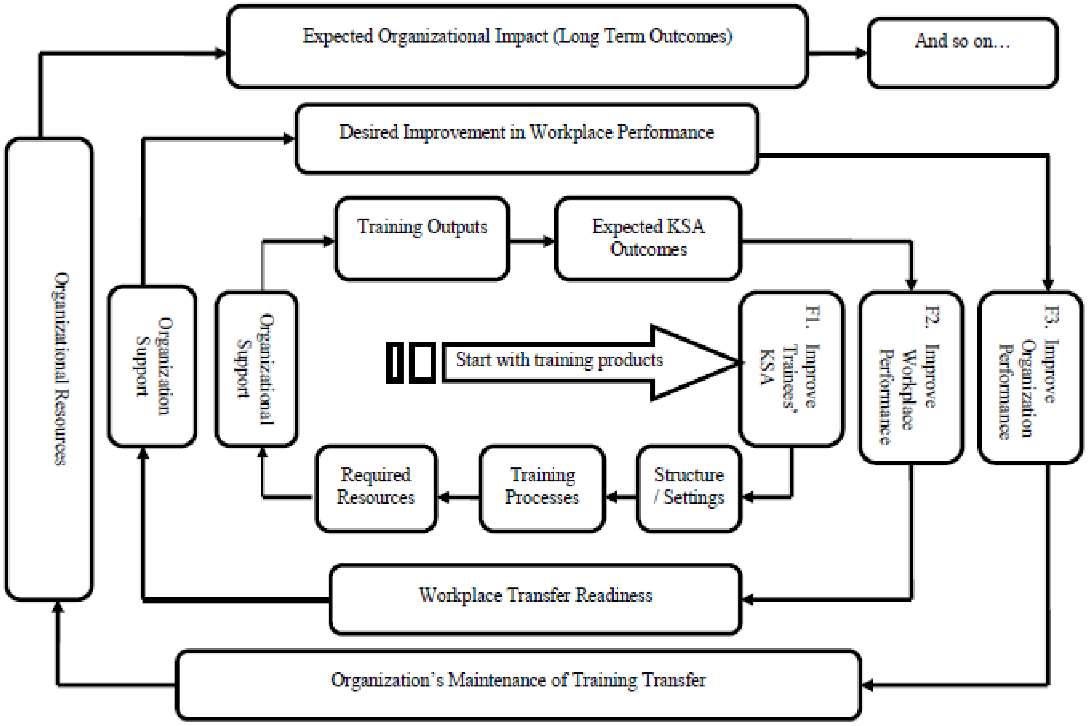
We figured that by the end of this analytical process students will have gained a deep understanding of their selected programs and its operation. Students' conducted observation, collected information, and raised challenging questions in their attempt to refine and integrate their findings according to their holistic perspectives.

The achievement of the Phase 2 milestone was demonstrated in a class paper they submitted to the instructor. In this paper, students' evidenced their point of view in describing their iterative analysis (see Figure 2) and documented how they reconstructed the system according to their views. They described how they examined the information about the training program, reflected of the program's functions and features, and rationalized how they agreed or disagreed with the existing operation of the system.

Phase 3. Influence of context and assumptions. Using the iterative analysis in the previous phase allowed the learners to "decompose" the training

Figure 2

Iterative analysis of training system. A tool which guides the analysis of a training program according to its functions and helps identify the connections between certain program components.



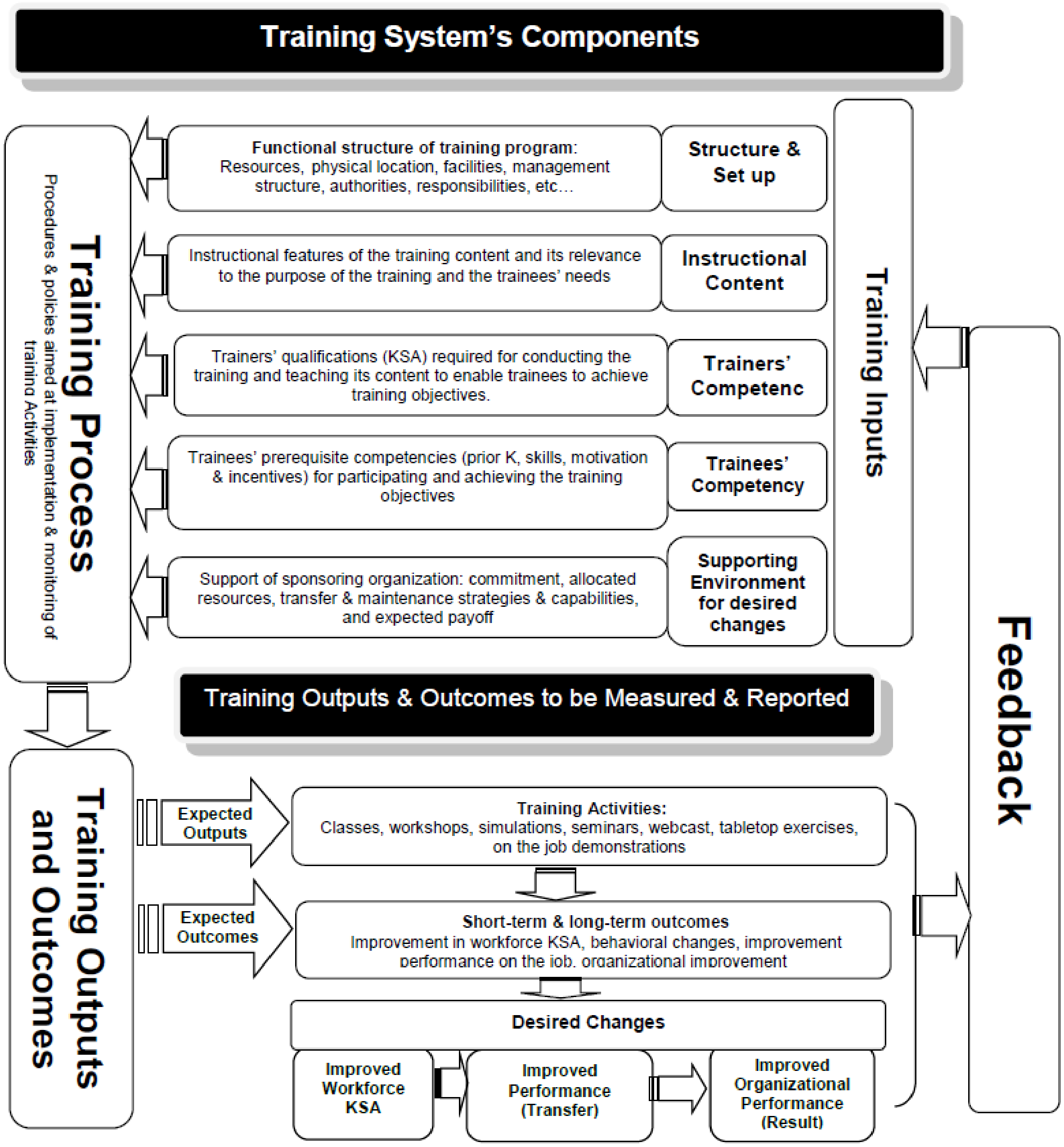
system and identify how the components are affected by their environments. They also identified and examined the assumptions based on which the training components are designed and operate. In this phase the learners integrated the results of their analysis as observation documentations into what the evaluation literature calls a "logic model."

Developing a logic model or a "logic map" has been recommended for helping evaluators define "…measurable objectives, a logic or rationale for reaching the program's goals, and a sequence of activities that present the program's logic or rationale" (Russ-Eft & Preskill, 2001, p. 90). Holden and Zimmerman (2009) describe it as a detailed description of the program activities, inputs, outputs, objectives, and resources. In our case, the difference is that the students develop this model from a systemic perspective, connecting the training inputs to the training process and concluding with the outputs and outcomes of the program as a result.

Creating this logic model specific to each program achieves the Phase 3 milestones in the sense that it requires the students' identification of the program's operation in the organizational context that influences every part of the program. Learners' creation of an evaluation logic model (see Figure 3) not only evidenced their reflective thinking on the operation of the system, but also demonstrated how they influenced the context of the program and questioned the assumptions based on which the program is operating. The result was integration of their own ideas into the development of the model which was reported to their peers in class in form of a presentation. The logic model is presented as the learners' evidence that in fact the target training program is a system with all the systemic features such as input, process, output, and outcome.

Phase 4. Students taking a position. To accomplish this milestone, learners were instructed to consider the complexities of the evaluation object and the concerns of the stakeholders in developing their evaluation questions. The questions reflected the learners' hypotheses on how well the training system was functioning by focusing on the system's inputs (e.g., instructional content, trainers' qualifications, trainees' competencies), its training process and outputs (e.g., number of sessions, types of classes, implementation of its instructional plans and delivery method), and finally the short term and long-term outcomes of the program. In their formulation and presentation of the evaluation questions, students stated

Figure 3
HPT-based Systemic Logic Model for Evaluation of Training Program. This tool breaks down the training program based on its inputs, processes, outputs, and outcomes. Students use this template to develop program specific models.



their positions and the rationale for asking the questions. Students also articulated how they synthesized their observations to support their questions.

Following a class lecture on formative and summative evaluation, students contemplated and formulated relevant evaluation questions (EQs) using the "divergent" and "convergent" approach (Worthen, Sanders, & Fitzpatrick, 1997). Corresponding to the contribution of the training components, the EQs focused on the formative attributes of the program (e.g. settings, content, trainers, and resources) or its short-term and long-term outputs and outcomes.

To indicate their achievement of the Phase 4 milestone, students integrated their selected questions into an Evaluation Management Plan (EMP; See Figure 4). In this plan, they included qualitative and

Figure 4

Evaluation Management Plan (EMP). A tool used to guide the development of students' evaluation proposal, which relates the questions directly to the data methods and sources used.

Program Areas of focus	Relevant Training Components	EQs (Issues to be examined and addressed)	Type of Information to Collect Qual./Quant./ Mixed	Information Source	Collection Method
Formative (Process)	Training Setup	1			
		2			
		...			
	Training Process/ Procedures	1			
		2			
		...			
	Training Content	1			
		2			
		...			
	Trainers' qualification	1			
		2			
		...			
	Trainees' Readiness	1			
		2			
		...			
	Organization Support Resources/ funding	1			
		2			
		...			
Summative (Outcome)	Short Term: Individual Learning (KSA)	1			
		2			
		...			
	Long Term: Performance Impact (on the job /Organizational	1			
		2			
		...			

quantitative data collection technique depending on the type of EQs and identified the sources of information, data collection method, and data analysis plan required for addressing those questions. In describing EMP, rationalizing raising these questions, and developing the methodology for addressing them, students basically hypothesize their research. Students justified their position on their proposed methodology when they presented their research method to the class and rationalized why they have taken their specific approach. In a critique session, instructor and student peers discussed and challenged the students' position on the methodology and provided feedback accordingly. Through this exercise, students realized that, due to the realities of the target program and their use of mixed method research, their research approach and use of research methods and tools were unique to their particular cases. Thus their results were not generalizable to other cases, and certainly they recognized the limitations of conducting an authentic investigation.

Phase 5. Conclusions and related outcomes. The aforementioned activities resulted in the creation of the components of an evaluation proposal, and these were synthesized into the final course product. Through class presentations of these components (program description, program analysis, and evaluation methodology) students received peer feedback, as well as learning about peers' work on the same ideas. These experiences, in addition to the instructor's feedback on a more detailed print version of the assignments, provided an opportunity for student to reflect on and evaluate their work. Following their revisions of the products according to the given comments and feedback, they individually attended a final review session with the instructor to prepare an evaluation proposal as their final class project.

To create this proposal as an indicator of achieving Phase 5 milestones, students followed a proposal outline to seamlessly integrate their previously produced products into one document. They started with their description and analysis of their selected programs, the only fact-based portions of the proposal. They incorporated their proposed program-specific logic model, EQs, and EMP followed by proposed research methodology for addressing the EQs. Students also included a communication plan in which they described the type of reports they would use and the stakeholders they would target to share the evaluation results. Together all of these components formed a logical and evidence-based conclusion to student activities and resulted in an evaluation document for their specific programs.

Summary and Discussion

In support of these pedagogical activities aimed at immersing students into a CT or higher order thinking processes, we would like to summarize our discussion by reiterating how Scriven and Paul (1987) reference CT as "…the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (CTC, 2015, p. 1). We contend that the course's instructional content and strategies, designed according to the CT skills, promote these concepts and prepare graduate students for performing a complex task like program evaluation in their professional careers.

The instructional strategies and activities used in this course elicited students' purposeful effort to achieve what Dewey (1910) presents as reflective thinking, or to investigate the issues and look for new evidence to support or counter the claim. The students' accomplishments throughout the course, we believe, induced them to go through the cognitive processes for knowledge gain, comprehension, application, analysis, evaluation, and synthesis as listed in Bloom's taxonomy. The capstone of these achievements was the production of an evaluation proposal which in particular included the higher level thinking activities. We suggest that any duplication of our effort in other courses should include consideration of the need for strong instructional scaffolds that force students into reflective critical thinking while providing an incremental sequence of activities and assignments for demonstration of those efforts.

Learners' achievements, as presented under the phases of the AACU (2010) VALUE rubric for critical thinking, demonstrate their practical journey through the stages that Elder and Paul (1996a) proposed. Even though our graduate learners should not be considered unreflective or beginners in terms of thinking, as Elder and Paul put it, they certainly faced cognitive challenges in the application of our strategies and their production of class projects. As the sequence of the assignments kept building up the cognitive demands, students kept practicing thinking and advanced their thinking skills until they mastered the process as reflected in their accomplishments of the milestones and course projects.

However, we strongly recommend that the integration of strategies aimed at promoting CT must originate from a more complex scaffold that is relevant to the content and conducive to producing the results. In our case the course required an analysis of the training program which we chose to contextualize in systems thinking, and then we designed few procedures accordingly. This eliminated the possibility of learners providing a simple description of the program and a linear observation of its functions. So did the application of HPT principles, which contextualized the training program as a performance improvement intervention. Both of these strategies and applications were completely relevant to the course, and students' prior knowledge gained from foundational courses contributed to their understanding and facilitated their progress through the cognitive stages.

Given this discussion, we speculate that replication of our efforts in graduate courses may not apply to all graduate courses. However, we make these recommendations:

- Identify a course that demands learners' complex cognitive effort in solving a problem and/or producing a tangible product.
- Make sure that the abstract instructional contents have a practical application in the field, and find a platform for their application.
- Identify relevant scaffolds that induce learners into thinking critically in producing a complex course project.
- Design incremental class projects that collectively lead to the production of the final course project, the capstone.
- Sequence the designed class activities from easy to difficult to enable students to acquire knowledge for going through the process
- Integrate the activities described under the AACU milestones into the sequence of activities while designing the infusion approach.
- Infuse activities such as class presentations, short papers, critiquing sessions, and feedback sessions so that learners get challenged by their peers and defend their position on the issues they discuss.
- Follow a theoretical framework such as the ones suggested by Bloom's taxonomy and Elder and Paul's (1996b) CT stage theory to sequence the instructional materials and course activities.

References

Abrami, P. C., Bernard, R. M., Borokhovski, E., Wade, A., Surkes, M. A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78*(4), 1102–1134.

Ackoff, R. (1999). *Ackoff's best: His classic writing on management*. New York, NY: John Wiley & Sons.

Association of American Colleges and Schools. (2010). Critical thinking VALUE Rubric.

Washington, DC: Author. Retrieved from http://www.aacu.org/value/rubrics/pdf/CriticalThinking.pdf

Bloom, B. S. (Ed.), Engelhart, M.D., Furst, E.J., Hill, W.H., & Krathwohl, D.R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook 1: Cognitive domain.* New York, NY: David McKay

Critical Thinking Community. (2015). *Defining critical thinking*. Retrieved from http://www.criticalthinking.org/pages/defining-critical-thinking/766

Dewey, J. (1910). *How we think*. Mineola, NY: Dover.

Elder, L., & Paul, R. (1996a). Critical thinking: A stage theory of critical thinking: Part I. *Journal of Developmental Education*, *20*(1), 34.

Elder, L., & Paul, R. (1996b). Critical thinking: A stage theory of critical thinking: Part II. *Journal of Developmental Education*, *20*(2), 34.

Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational Leadership, 43*(2), 44–48.

Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher, 18*(3), 4-10.

Ennis, R. H. (1995). *Critical thinking.* Upper Saddle River, NJ: Prentice-Hall.

Facione, P. A. (1990*). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*. Millbrae, CA: The California Academic Press.

Ghrajedaghi, J. (1999). *Systems thinking: Managing chaos and complexity.* Woburn, MA: Butterworth-Heinemann.

Hart Research Associates. (2013). It takes more than a major: Employer priorities for college learning and student success. *Association of American Colleges and Universities, 99*(2). Retrieved from http://www.aacu.org/leap/documents/2013_EmployerSurvey.pdf

Holden, D. J., & Zimmerman, M. (2009). *A practical guide to program evaluation planning.* Thousand Oaks, CA: SAGE Publications.

Kennedy, M., Fisher, M. B., & Ennis, R. H. (1991). Critical thinking: Literature review and needed research. In L. Idol & B.F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform* (pp. 11-40). Hillsdale, NJ: Lawrence Erlbaum & Associates.

Krathwohl, D. R. (2002). A revision of Bloom's Taxonomy. *Theory into Practice, 41*(4), 212–218.

Lai, E. R. (2011). *Critical thinking: A literature review*. Retrieved from http://images.pearsonassessments.com/images/tmrs/CriticalThinkingReviewFINAL.pdf

Miri, B., David, B. C., & Uri, Z. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. *Research in Science Education*, *37*(4), 353-369.

Paul, R. W. (1990). Bloom's taxonomy and critical thinking instruction: Recall is not knowledge. In R.W. Paul & A. J. A. Binker (Eds.) *Critical thinking: What every person needs to survive in a rapidly changing world* (pp. 519–526). Rohnert Park, CA: Center for Critical Thinking.

Pershing, J. A. (2006). *Handbook of human performance technology.* San Francisco, CA: Pfeiffer.

Russ-Eft, D., & Preskill, H. (2001). *Evaluation in organizations.* Cambridge, UK: Perseus Publishing.

Scriven, M., & Paul, R (1987). *Critical thinking as defined by the National Council for Excellence in Critical Thinking*. Retrieved from http://www.criticalthinking.org/pages/defining-critical-thinking/766

Sternberg, R. J. (2013, June 17). Giving employers what they don't really want. *The Chronicle of Higher Education*.

Stolovitch, H. D., & Keeps, E. J. (1999). *Handbook of human performance technology*. San Francisco, CA: Jossey-Bass.

Willingham, D. T. (2007). Critical thinking: Why is it so hard to teach? *American Educator*, *Summer,* 8–19.

Worthen, B. R., Sanders, J. R., & Fitzpatrick, J. L. (1997). *Program evaluation: Alternative approaches and practical guidelines.* White Plains, NY: Longman.

AUBTEEN DARABI, Ph.D. is an Associate Professor of Instructional Systems and Learning Technology at Florida State University (FSU) where he teaches graduate courses in instructional systems, performance improvement, and program evaluation. Dr. Darabi is also a senior research faculty at the Learning Systems Institute at FSU where he manages research and development grants and contracts in developing educational and training systems.

THOMAS LOGAN ARRINGTON, is a doctoral candidate of Instructional System and Learning Technology and a Graduate Research Assistant at the Learning Systems Institute.