Perceptions of Gains Through Experiential Learning in Homeland Security and Emergency Management Education

TIFFANY T. DANKO, Northeastern University
t.danko@northeastern.edu

ABSTRACT

Experiential learning is widely used in Homeland Security and Emergency Management (HSEM) higher education. This research determines whether experiential learning methods in HSEM higher education contribute to student-perceived learning gains in critical thinking skills for complex problems. This descriptive quantitative study piloted the use of the Student Assessment of Learning Gains survey in a graduate HSEM program incorporating extensive experiential opportunities. Key findings concluded that students perceived great gains in their understanding, skills, attitude, and integration of learning/critical thinking as well as a statistically significant strong correlation between student perceptions of gains in critical thinking and application of knowledge to real-world complex problems and experiential learning. These findings indicate a potential approach for developing research-based practices for instructional development and curriculum evaluations in this field.

Key Words: Homeland Security, experiential learning, emergency management, higher education, critical thinking

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INTRODUCTION

Today's Homeland Security and Emergency Management (HSEM) higher education programs prepare homeland security professionals to manage responses in all types of hazardous incidents, from terrorist events to major disasters such as hurricanes and wildfires. In order to meet the needs of these professionals, HSEM higher education programs must identify and implement instructional practices that facilitate real-world evaluation and analysis capabilities. While there is not an extensive body of research on HSEM higher education, studies by authors such as Stewart and Vocino (2013), Collins and Peerbolte, (2011), and McCreight (2009, 2014) have deemed collaboration, problem-solving, critical thinking, and complex analysis as foundational to the field.

Identification of optimal instructional practices for conveying these essential skills has the potential to advance the field while serving students' professional needs, filling the gap of research and programmatic guidance. A proven strategy in other fields, experiential learning methods such as case-based learning, simulations, and practical field activities have been commonly adopted by U.S. HSEM programs to achieve these goals. This research applied the Student Assessment of Learning Gains (SALG) instrument in a single-program case study to determine whether students perceived that experiential learning methods contributed to gains in these essential critical thinking skills.

LITERATURE REVIEW

Every day, homeland security professionals must manage ambiguity and uncertainty, with the examples of history posing the consequences of failure in the HSEM field. The Government Accountability Office report on Hurricane Katrina, for example termed it a "failure of initiative," in which many levels of government failed in the essentials of critical thinking, rapid action, and flexibility, with disastrous results (Walker, 2006). In today's security environment, HSEM professionals must be prepared to manage incident responses to the all-hazards complex problems of the future. Developing HSEM programs at universities around the country to serve the needs of these professionals has been a challenging evolution for academic institutions, without a foundation of historical best practices or national standards for curriculum and instructional delivery (Stewart & Vocino, 2013).

There is little research on the effectiveness of different approaches to HSEM education. One commonly used instructional approach is experiential learning, such as case-based learning or simulations. Experiential learning, a transformational process by which knowledge is created through experience (Kolb, 1984), is based on the work of theorists such as Dewey, Lewin, Piaget, Rogers, and Kolb. Kolb's experiential learning theory includes the idea of learning as proceeding through the cycle of "experiencing, reflecting, thinking, and acting," incorporating new concepts and experiences into existing ones (Kolb & Kolb, 2005, p. 194). Based on several decades of research, experiential learning theory is accepted as a framework for development and analysis of curriculum and educational experiences, including adult education (Kapucu & Knox, 2011; Kolb & Kolb, 2005).

Case-based learning, for example, is an established experiential learning method in fields such as law, medicine, and business. A main feature of this type of instruction is that it facilitates student learning through realistic case studies that include a narrative with discussion and exploration of a real-world dilemma (Sanders-Smith et al., 2016). Cognitively, evidence indicates case-based learning enables students to reach the top levels of learning associated with Bloom's taxonomy, as described by Anderson & Krathwol, 2001); analysis, evaluation, and creation, and serves to engage critical thinking skills (Kulak & Newton, 2014, 2015; Mesny, 2013). With an emphasis on authentic learning exercises through real-world problems, experiential learning is also generally assessed as ideal for complex fields with ill-structured problems such as HSEM (Koury et al., 2009; Zavrel, 2015). Through context and reflection, experiential learning methods enable students to consider information within a larger framework of contingencies and effects, apply decision-making skills and engaging critical thinking (Prince & Felder, 2006; Yadav et al., 2014), all goals of HSEM programs.

DECISION-MAKING, CRITICAL THINKING, AND INSTRUCTION IN HSEM EDUCATION

Many of the evaluations for HSEM fundamentals have included decision-making, critical thinking, and analysis as essential to HSEM professionals and higher education programs (Cwiak, 2011; Kiltz, 2011; Knox & Harris, 2016). Writing about HSEM higher education, McCreight (2014) pointed out that in order to develop the skills professionals require to manage complex and ambiguous problems with ill-defined possible solutions, the inclusion of critical thinking and analysis is essential. Other studies of HSEM professionals have revealed the need for critical thinking and analytical skills in HSEM education programs (Cutrer, 2012; Polsyn et al., 2010; Ramirez & Rioux, 2012). Further evaluating HSEM programs for their ability to convey critical thinking and decision-making skills, Comfort and Wukich (2013) noted the need for educators to develop strategies that create settings for students to build the skills that warrant informed decision-making processes under uncertain environments.

Emergency situations and homeland security problems require complex decision-making processes, where roles may be unclear, situations are time-sensitive, and the devastating potential consequences require effective and rapid preparation for and resolution of issues in a collaborative environment. For example, more than 100 agencies were involved in the rescues following the flooding of Houston and Port Arthur/Beaumont, Texas during Hurricane Harvey (Federal Emergency Management Agency, 2017), while 163 officers from multiple agencies responded to the shooting at the Pulse Nightclub in Orlando in 2016 (Hayes, 2017), requiring extensive agency collaboration and quick decision-making while facing life-threatening situations. Research (Clement, 2011; Darlington, 2008; McCreight, 2009, 2014) has noted the need for HSEM education to include experiential practices that parallel the complex real-world contingencies managed by HSEM professionals. Studies such as those of Kapucu and Knox (2011) have indicated that a majority of national HSEM programs included experiential opportunities in the curriculum to meet this need.

EFFECTIVENESS FOR COMPREHENSION AND DOMAIN KNOWLEDGE

A fundamental premise for higher education programs such as HSEM is comprehension and domain knowledge. Research conducted to compare student comprehension and thinking skills in courses using experiential methods against traditional lecture courses has shown increased student performance. For example, in a comparative study sponsored by the National Institutes of Health and Howard University, researchers determined that students in the case-study group exhibited significantly higher gains in learning than the non-case group, as well as increased use of critical thinking, complex problem-solving, and application of class concepts (Rybarczyk et al., 2007). Studies in multiple academic fields (Cullen, 2013; Ertmer & Koehler, 2014; Feist et al., 2013; Goldsmith, 2011; Razali & Zainal, 2013) have indicated a greater ability to address real-world issues and develop experience in problem assessment and practical decision-making through the use of experiential learning.

In HSEM, Jackson (2011) conducted a two-year study of graduate students in a terrorism/counter-terrorism course using tabletop simulations. Findings included increased knowledge sharing and greater exploration of the concepts and issues involved, and student feedback strongly indicated that the exercise provided a way to integrate and apply classroom concepts. A similar study by Johnson (2012) determined that the majority of 235 students in an emergency management course felt that a simulation exercise was a meaningful way to apply course knowledge and the decision-making process. Research also indicates the benefits of service-learning projects for student understanding and application of knowledge as well as community development through collaborative partnerships (Bryer, 2011; Campbell & Tatro, 1998; Cunningham, 1997; Kapucu & Petrescu, 2006). Kapucu and Knox (2011) found in their survey of 70 HSEM higher education programs that 97% of those surveyed felt that service-learning projects enabled students to connect theory and real-world practice.

CONTRIBUTION TO CRITICAL THINKING SKILLS

Critical thinking skill development, such as simulations and case-based approaches in many education programs, is a primary goal of using experiential learning. A number of studies have concluded that higher-order thinking skills, such as conceptual understanding, were the most impacted by methodologies like case-based learning and simulations (Lundeberg & Yadav, 2006a, 2006b; Ranchhod, et al., 2014; Shannon, 2015; Thistlethwaite et al. 2012; Tolchin et al., 2015). One example of critical thinking skills in experiential learning is Yadav and Beckerman's (2009) evaluation of student critical thinking in an undergraduate science course, comparing case-based teaching modules with traditional lectures. The authors determined found a statistically significant improvement in student learning and critical thinking capabilities in sections of the same courses where case-based learning was employed. Moreover, students indicated greater engagement and application of course concepts in the case studies than in traditional lecture.

In HSEM, Knox and Harris (2016) noted that well-designed experiential learning, such as the joint exercises conducted by the University of Central Florida's and a local office of emergency management, facilitates student gains in emergency management skills, including decision-making processes. Another study of multiple online graduate courses at the University of Maryland University College HSEM program included student survey responses that a simulation exercise increased student conceptual understanding. Furthermore, it provided practice in real-world critical evaluation and decision-making skills (Renda-Tanali & Abdul-Hamid, 2011).

EXPERIENTIAL LEARNING AND STUDENT ENGAGEMENT AND SATISFACTION WITH INSTRUCTION

Previous research indicated that experiential learning methods are an effective approach for student engagement and application of learning to real-world problems (Ahlfeldt, Mehta, & Sellnow, 2005; Allchin, 2013; Comfort & Wukich, 2013; Kolb & Kolb, 2005; Yadav et al., 2014) and that student engagement is as strong in experiential courses online as it is in traditional face-to-face instruction, such as the case-based courses described by Misset et al. (2010). Studies have shown that the collaborative communities online and face-to-face developed with experiential learning processes provide students with the tools and means for successful engagement in the development of knowledge building (Baeten et al., 2013; Kopp et al., 2014; Pena-Shaff & Altman, 2009; Sanders-Smith et al., 2016; Yücel & Usluel, 2016). Studying this, Cozine's (2015) research into HSEM simulations determined that real-world simulation applications enhanced comprehension of course information while also contributing to student engagement.

While domain knowledge and critical thinking skills are essential to education, student satisfaction with instructional methods is a consideration for course design. Wang (2003) and others (Blewett & Kisamore, 2009; Renda-Tanali & Abdul-Hamid, 2011; Rollag, 2010; Shannon, 2015) have found that student satisfaction is an effective response to many factors, such as contentment, engagement, and the learning process. Studies that evaluated student sentiments toward experiential learning opportunities have found strong student satisfaction (Cullen, 2013; He et al., 2013; Shellman & Turan, 2006; Shieh et al., 2012). Commonly, student responses indicated their satisfaction was based on a perceived improvement of logical analysis and ability to apply course concepts to real-world problem sets. Other research of higher education experiential learning programs has also indicated more positive perceptions of learning through experiential methods than traditional lecture courses (e.g. Blewett & Kisamore, 2009; Canboy et al., 2016). Studies like those of Huerta-Wong and Shoech (2010) indicate that HSEM higher education would benefit from the inclusion of experiential learning through greater student satisfaction with the learning process.

PURPOSE

The purpose of this research is to determine whether experiential learning methods contribute to student-perceived learning gains in critical thinking skills for complex problems in HSEM higher education. Further questions included student perceptions of experiential learning and its relation to the application of critical thinking skills and domain knowledge as well as student engagement and satisfaction with courses. By piloting the use of the SALG in HSEM, this research employed a unique tool to gain insights into effective instructional approaches in HSEM and expand the research-based practices of HSEM higher education.

METHODOLOGY

This research was a descriptive, quantitative single-program case study that engaged in cross-sectional survey research as well as an assessment of the experiential learning present in the studied program. The site for this study was a Master of Arts in Homeland Security and Emergency Management program at a private, major research university located in the northeastern United States. Offering both online and on-campus options with approximately 120-130 students in a given year, this graduate program has much in common with others in HSEM, including curriculum and experiential learning practices (Kiltz, 2011; McCreight, 2009, 2014; Pelfrey & Pelfrey, 2009; Ramirez & Rioux, 2012; Stewart & Vocino, 2013).

Initial data was collected on experiential learning inclusion in courses throughout the program. Course descriptions and syllabi were assessed in a document review to determine typical course experiential learning such as case studies and simulations. Additionally, the document review assessed syllabi inclusion of cognitive action verbs linked to Bloom's taxonomy to gain insight into the level of cognitive process typically demanded by the program's courses. Anderson and Krathwol's revision of Bloom's taxonomy (2001) defined nineteen specific cognitive processes to clarify the lower and higher-order critical thinking skills, with associated descriptions to inform analysis. The presence of these verbs indicating taxonomy level was assessed through syllabi review of objectives, information, and assignments as documented.

Upon approval by the Institutional Review Board, a survey was anonymously administered to students in the program using a census strategy. This study used the SALG instrument, developed as part of a program sponsored by the National Science Foundation's Science Education for New Civic Engagements and Responsibilities (SENCER) to assist instructors in measuring student-perceived classroom learning gains (SALG, n.d.). The SALG survey uses ordinal data from five-point Likert-style questions to measure perceived gains in attitude, skills, and thinking toward the survey topic and learning in four sections: understanding gains, learning gains, attitude gains, and integration of learning gains. The survey has been tested for validity and reliability through multiple offerings in other fields, and questions can be modified to directly address course-specific terms (SALG, n.d.; Seymour et al., 2000; Vishnumolakala et al., 2016; Yadav et al., 2014).

RESULTS--HSEM PROGRAM COURSES: EXPERIENTIAL LEARNING AND CRITICAL THINKING

A document review of course syllabi substantiated the experiential learning modalities included and their distribution across the spectrum of coursework. This assessed the syllabi for measurable verbs expressing Bloom's taxonomy application of knowledge, skills, and abilities as described by Anderson and Krathwol (2001). Additionally, the syllabi were evaluated to determine experiential learning opportunities emphasizing critical thinking and decision-making requirements. These included case study (Mesny, 2013; Rybarczyk et al., 2007; Thistlethwaite et al., 2012; Yadav et al., 2014) simulations and exercises/role-playing (Jackson, 2011; Johnson, 2012), field work or service learning (Kapucu & Knox, 2011; Shannon, 2015) and professional applications such as white papers or plans/programs (Knox & Harris, 2016). The researcher reviewed 25 out of the 28 total syllabi, listed in the appendix. The remaining three were electives in other programs not currently offered with syllabi that were available to the researcher.

The 25 syllabi reviewed indicated a spectrum of objectives directed toward advancing student abilities described by Bloom's taxonomy (Anderson & Krathwol, 2001) in the higher critical thinking levels of learning: analyze, evaluate, and create. The objectives and course requirements were analyzed for the action verbs and grouped for similarity and intent by the researcher. As shown in Table 1, the most frequent use of these verbs to describe requirements fell in the analyze (33 times) and evaluate (29 times) categories. The highest taxonomy level, create, occurred 24 times within the 25 syllabi reviewed. Apply and understand, at the foundational level of the taxonomy for developing critical thinking skills, were less frequently mentioned.

while assessing the most common experiential learning opportunities in the program, the syllabi were also examined for examples of experiential learning that have been associated with the higher cognitive levels of Bloom's taxonomy and critical thinking skills. These included case-based learning, assessment and development of policy and products for real-world issues, service learning, and exercises or simulations (Kulak & Newton, 2014; Mesny, 2013). All 25 of the syllabi reviewed included examples of experiential learning, indicating the prevalence of this type of learning within the program.

Table 1. Bloom's Taxonomy Level in HSEM Syllabi

Taxonomy Action Verb	Occurrence in Syllabi	Taxonomy Level
Analyze	15	analyze
Evaluate	13	evaluate
Generate/produce/develop	13	Create
Examine/Identify	12	analyze
Assess	12	evaluate
Apply	11	Apply
Understand	10	understand
Prepare/develop/design/plan	7	Create
Distinguish	6	analyze
Communicate	6	understand
Discuss/describe	3	Create
Problem-solve/determine	2	evaluate
Model	2	Apply
Critique	1	evaluate
Demonstrate	1	understand
Propose	1	Create
Prioritize	1	evaluate

Case-based learning was the most common experiential opportunity found within the program (16 out of 25). Specific language around this methodology included analyzing and using historical cases to project future incidents and provide policy recommendations, as well as evaluating critical review of policy changes. Another common feature of the program's experiential practices entailed the use of assessing, analyzing, and recommending real-world issues (13 courses). This included evaluating of practical threats and concerns while applying policies and constraints to determine appropriate actions or solutions. Some of the courses studied also included some type of field work, since they required coordinating with real-world organizations in problem-solving and evaluation, like creating geographic information system (GIS) maps for the application of homeland security issues or organizational continuity of operations plans.

Exercises and simulations, where students participate in an activity that represents the features and structures of real-world examples, include problem-solving and application of policies and procedures to achieve desired objectives (Hale Feinstein et al., 2002; Knox & Harris, 2016; Renda-Tanali & Abdul-Hamid, 2011). These learning formats were found in eight of the courses reviewed, such as an extended emergency management simulation exercise that entailed role-playing and resolution of potential real-world issues or a risk analysis exercise that included a diagnosis of events and prioritization of responses. Additionally, the program included the application of HSEM issues and policy, with students generating real-world policy documents designed to offer solutions to real-world problems, such as white papers and applied technology opportunities in GIS (5 courses) (Table 2).

Table 2. HSEM Syllabi and Experiential Learning

Experiential Learning Opportunity	Number of Courses Included
Case-based learning	16
Assessment, analysis, & recommendations	13
Field Work	9
Exercises and Simulations	8
Applied policy & technology	5

HSEM SALG SURVEY

The researcher administered the SALG survey, which used ordinal data from five-point Likert-style questions to measure gains in attitude, skills, and thinking toward the survey topic and learning, as well as some open comment opportunities. Out of the 122 students enrolled at the time of the research, 68 completed the survey, representing 56% of the students in the HSEM program. This yielded a 95% confidence level with an 8% margin of error for results, providing substantial assurance that survey responses represented a majority opinion of students within the program. Based on research such as that by Baruch (1999) and Baruch and Holtom's (2008) findings on survey response rates in academic research and studies, this is comparable to the 52%–55% average response rate their research found across a meta-analysis of over 1600 research studies. SALG survey results reflected a spectrum of perceptions by students, including some less-than-positive feedback, indicating that the responses received encompassed students in favor of the program and learning process as well as those with less positive attitudes. While there are not specific guidelines in the field for survey response rates, the confidence level and margin of error combined with research-supported response rates provide confidence that SALG survey results portray the overall perceptions of students in this case study. Responses deviating from the N=68 standard are noted as applicable.

SALG: PERCEPTIONS OF GAINS

The results of this study represented the four primary categories of information within the SALG instrument: understanding gains, learning gains, attitude gains, and integration of learning/critical thinking gains, and are shown using the median—the measure of central tendency most appropriate for the survey's ordinal measures. Table 3 shows the results of the gains portion of the SALG instrument, which ranged from no gain (1) to moderate (3) to great gain (5).

Table 3. SALG Survey Data Results: Perceived Gains

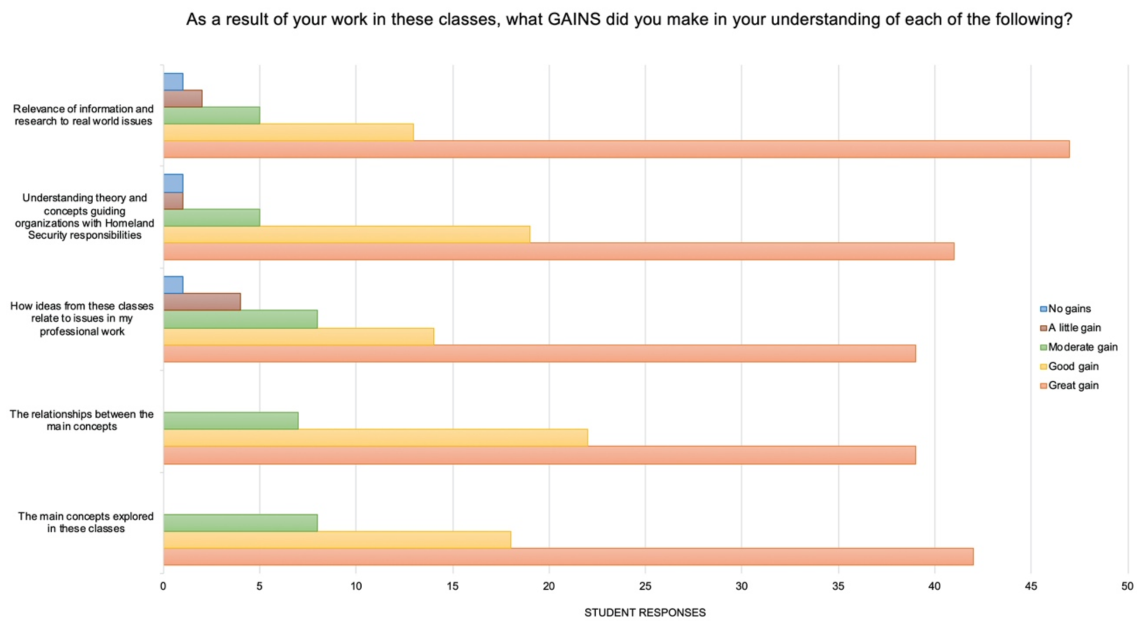
Questions	Median Response	Range	Standard Deviation
Understanding			
As a result of your work in these classes, what GAINS did you make in your understanding of each of			
The main concepts explored in these classes	5 (great gain)	2	.702
The relationships between the main concepts	5 (great gain)	2	.680
How ideas from these classes relate to issues in my professional work	5 (great gain)	4	1.007
Understanding theory and concepts guiding organizations with Homeland Security responsibilities	5 (great gain)	4	.823
Relevance of information and research to real world issues	5 (great gain)	4	.872
Skills			
As a result of your work in these classes, what GAINS did you make in the following skills:			
Finding articles relevant to a particular problem in professional journals or elsewhere	4 (good gain)	4	.900
Critically reading articles and other information about issues raised in class	5 (great gain)	4	.940
Identifying patterns in information	4 (good gain)	4	.984
Recognizing a sound argument and appropriate use of evidence	5 (great gain)	4	1.081
Developing and writing a logical argument in an appropriate style and format	5 (great gain)	4	.994
Analyzing information for use and application to real-world problems	5 (great gain)	4	.889
Attitude			
As a result of your work in these classes, what GAINS did you make in the following?			
Enthusiasm for the subject	5 (great gain)	4	.915
Confidence that you understand the material	5 (great gain)	4	.746
Confidence that you can use this subject area in your professional work	5 (great gain)	4	.960
Comfort level in working with complex ideas	5 (great gain)	4	1.056

Questions	Median Response	Range	Standard Deviation
Integration of Learning/ Critical Thinking			
As a result of your work in these classes, what GAINS did you make in integrating the following?			
Connecting key program ideas with other knowledge	4 (good gain)	4	.990
Critically applying what I learned in this program in other situations	5 (great gain)	4	1.034
Using systematic reasoning in my approach to problems	5 (great gain)	4	1.083
Using a critical approach to analyzing data and arguments in my professional life	5 (great gain)	4	1.016

Understanding. Examining the data more closely for the gains in understanding, it is clear that students perceived an overall great gain in their understanding of HSEM concepts and theory. While the range varies from two to four within the ordinal variables, the standard deviation of less than 1.000 for all measures except “How ideas from these classes relate to issues in my professional work” (σ of 1.007, N=66) indicate that the majority of students agree with this perspective as shown in Figure 1. The relation of class information to professional work may indicate a gap between instructional topics and individual student professional requirements, given the many applications of HSEM. Furthermore, the greatest number of student responses indicating great gains was in their understanding of the relevance of information and research to real world issues (67%) and may be reflective of the program’s emphasis on real-world context and information.

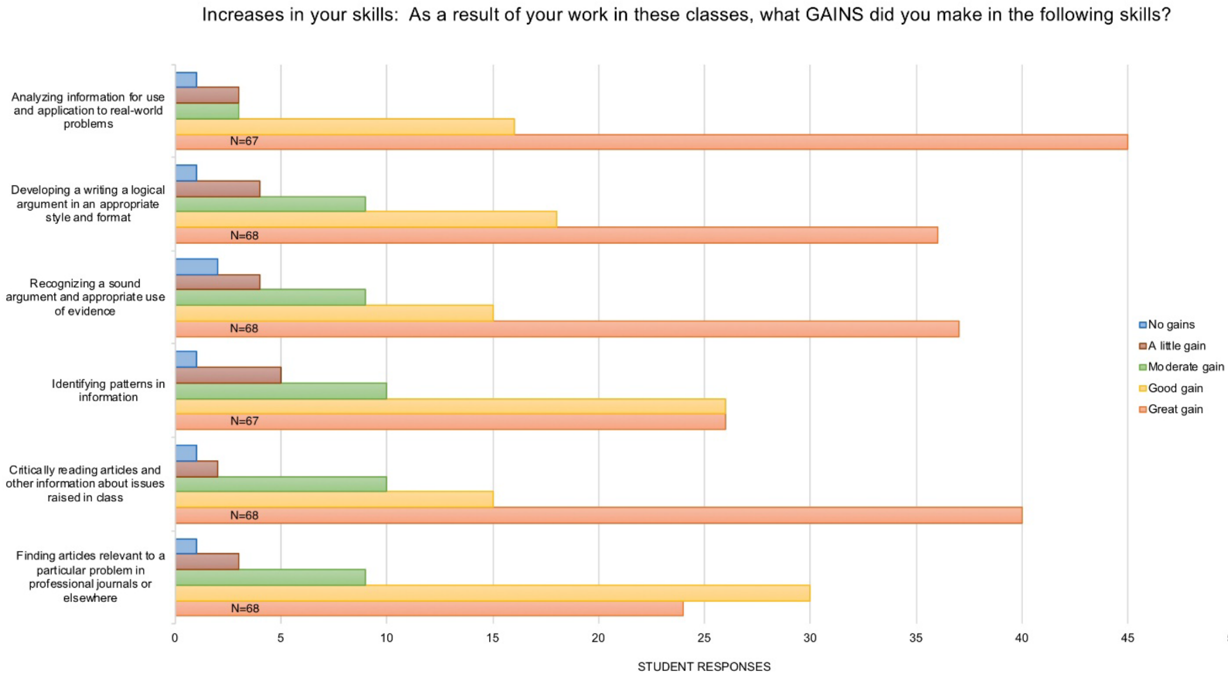
This component of the SALG also included a section for students to comment on how their understanding of the subject had changed as a result of the program’s classes. The majority of the responses included comments such as “significantly improved during the course of study” and “I’ve learned so much from class content and have been able to apply class concepts to real world examples.” Other comments related being able to understand the theories to application in practice and real-world examples, such as “Classes that include practical exercises seem to reinforce the concepts better for all students.” All but two of the 46 responses were favorable, reflecting the quantitative results and indicating an understanding and conceptualization of HSEM topics, theories, and application to professional requirements, such as the student who responded, “The classes are helping expand my understanding of Homeland Security and Emergency Management by tying in and teaching about all the different security and emergency agencies capabilities.”

Figure 1. Student Perceptions of Learning Gains in Understanding of HSEM Program Concepts



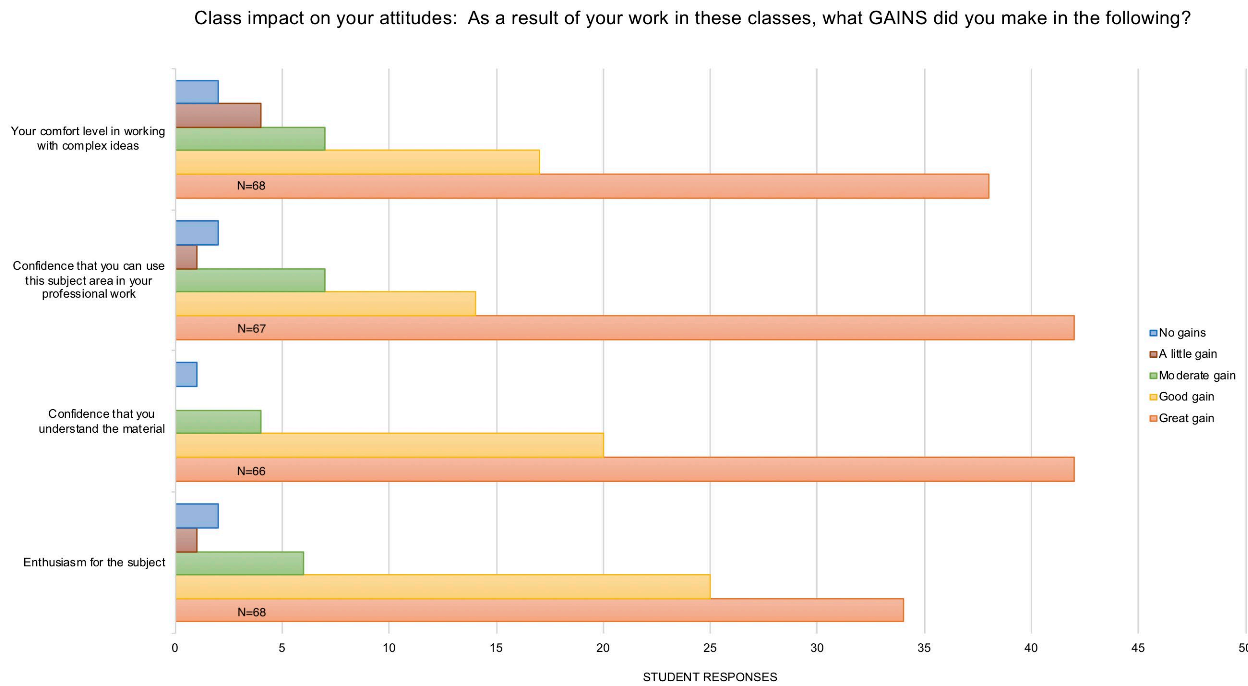
Skills. Students also perceived a great gain in their skills related to identifying and analyzing critical information and developing that analysis for real-world applications and writing expertise, with great gains in four out of six categories and good gains in the other two. While the range varies, the standard deviation of less than 1.000 for every category except "Recognizing a sound argument and appropriate use of evidence" (with a σ of 1.081, N=67) indicates the majority of students perceive significant benefit to program material in their skill development related to finding and analyzing relevant, essential information and developing associated logical arguments in writing. Similar to the student perceptions of great gains in understanding, the largest student response in the great gains category for skills was an increase in their skills level of analyzing information for use and application to real-world problems (66%), as shown in Figure 2.

Figure 2. Student Perceptions of Learning Gains in Skills



Attitude. Responses to the survey indicated students perceived a great gain in their enthusiasm for the subject and confidence in comprehension and application of the material in their professional work. Although the range again varied, the σ of less than 1.000 for each element, except for student perceptions of their comfort level in working with complex ideas (σ=1.056), indicated an overall significant gain in student confidence and enthusiasm with HSEM material and application. For each category of gains in attitude and confidence, students responding in the good or great gain category ranged from 80% perceiving a gain in their comfort level in working with complex ideas to 93% (N=66) indicating greater confidence in understanding the material as indicated in Figure 3.

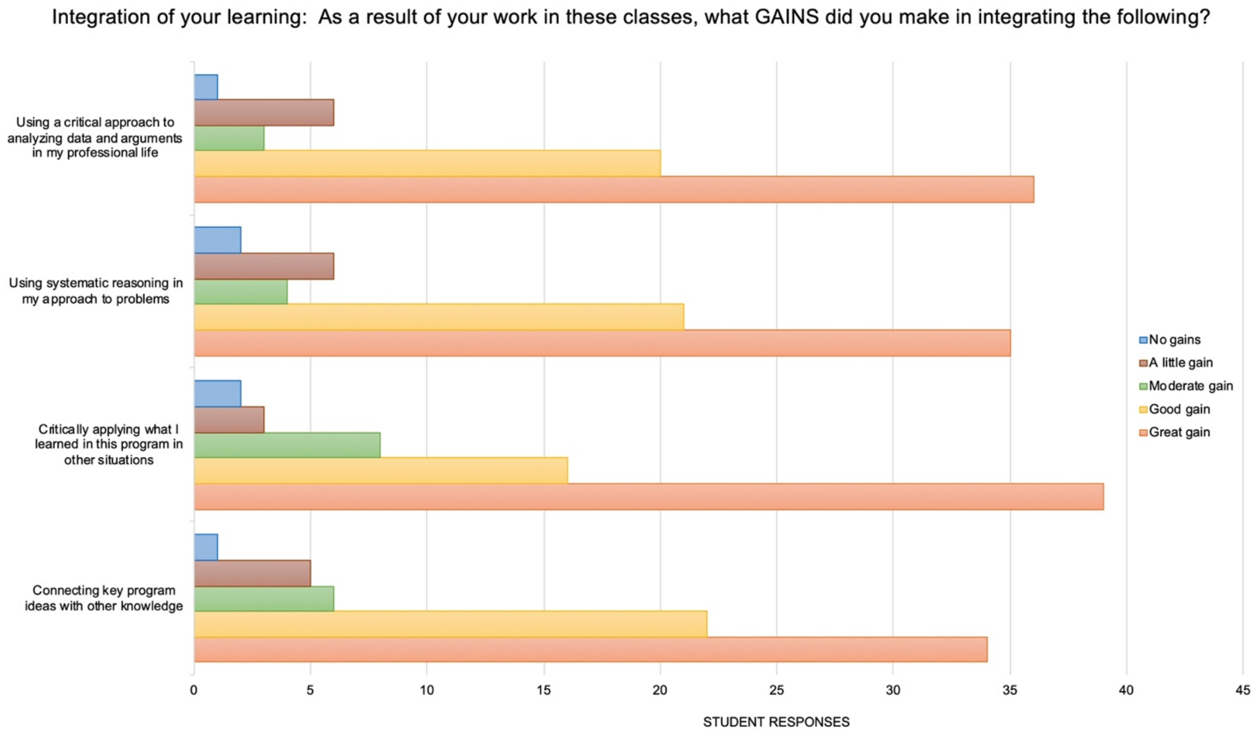
Figure 3. Student perceptions of learning gains in attitude



This component of the SALG also included an option for students to comment on how their attitude toward the subject had changed as result of classes. Similar to the student responses regarding understanding, the majority of the responses included comments favorable toward perceived gains in attitude toward the subject and its application, while also indicating variation with student expertise and individual classes. Many student answers were favorable, such as, "These classes have given me confidence and has built on my goal of life-long learning," and "Confidence in mastery of the subject." Others indicated perceived gains in areas such as critical thinking, such as "I am a far more critical thinker. I need evidence in order to be convinced about an idea." Another theme emerging from student comments was a perceived ability to apply the information learned in their professional lives, such as "I understand how to apply policy and how it fits into my job." A few students reflected a more critical view of attitudinal gains, reflecting quantitative results and differences between classes and instructors, student expectations, or applicability to individual professional needs.

Integration of learning and critical thinking. The perception of gains in integration of learning and critical thinking for students in the program indicated a wider variance for this category than understanding, skills, and attitude, as shown in Figure 4. Although the majority indicated great gain for concepts such as connecting key information to other areas of knowledge and critically applying information to professional requirements, the σ of just greater than 1.000 for three out of four categories indicate the effort in executing this difficult concept. However, σ for the three categories greater than 1.000 are 1.034, 1.083, and 1.016, which is not a significant large outlier from the great gain standard. The largest number of students responding indicating great gains in this category was in the ability to critically apply information learned to other situations (57%), with a total of 80% of students responding in the good or great gain categories.

Figure 4. Student Perceptions of Learning Gains in Integration of Learning and Critical Approach



FACTOR INTERNAL CONSISTENCY RELIABILITY AND CORRELATIONS

The SALG was originally developed to evaluate student perceptions of gains in science education, so analyses of internal consistency reliability for this application were performed for each of the four gains factors using Cronbach's alpha. Results were evaluated to determine whether Cronbach's alpha for each factor met the threshold of .800 for a developed instrument (Mujis, 2011). These results, shown in Table 4, reveal an overall Cronbach's alpha of .967, which exceeds the threshold for internal consistency reliability. For the individual gains factors, the internal consistency reliability also exceeded the threshold, indicating a strong internal consistency for the SALG instrument in this HSEM education application.

Table 4. Reliability Analyses

Item	Cronbach's Alpha
Four Gains Measures- SALG	.967
Understanding	.902
Skills	.934
Attitude	.875
Integration of Learning/Critical Thinking	.961

Subscale correlations were also performed for the SALG factors of understanding, skills, attitude, and integration of learning/critical thinking (Table 5). Spearman's rho was calculated to examine the potential correlation between gains in understanding and gains in skills and critical thinking, which are the primary goals of experiential learning and the studied program. This revealed a strong positive correlation between all the factors measuring student perceptions of gains in the SALG as administered. For all factors, correlation was significant at the .010 level, with the strongest correlation between understanding and integration of critical learning/ critical thinking (0.811) and attitude and understanding (0.756).

Table 5. Factor Correlations for SALG

Factor	Understanding	Skills	Attitude	Integration of Learning/ Critical Thinking
Understanding	1	0.710	0.756	.811
Skills	-	1	0.640	.696
Attitude	-	-	1	.745
Integration of Learning/ Critical Thinking	-	-	-	1

EXPERIENTIAL LEARNING CONTRIBUTIONS

Examining instructional approaches, class activities, and assignments for student perceptions of experiential learning activities revealed more about student experiences. The SALG measures student perceptions of contributions to learning, including experiential learning, such as the instructional approach, class activities, assignments, and resources. Table 6 contains student responses to the SALG questions about learning activities and resources, where the options ranged from no help (1) to moderate (3) to great help (5).

Table 6. SALG Survey Data Results: Learning Activities and Resources

Questions	Median Response	Range	Standard Deviation
Learning and Instructional Approach			
How much did the following aspects of these classes HELP your learning?			
Doing experiential activities such as case studies, simulations, real-world analysis of problems or development of plans, white papers, etc.	5 (great help)	3	.880
Explanation or examples of how the program topics, activities, reading, and assignments fit together	4 (much help)	4	.846
Learning and Class Activities			
How much did each of the following aspects of these classes HELP your learning			

Questions	Median Response	Range	Standard Deviation
Participating in discussions or group work	3 (moderate help)	4	1.139
Attending class lectures or completing online readings/class information	4 (much help)	4	1.035
Doing experiential activities such as case studies, simulations, real-world analysis of problems or development of plans, white papers, etc.	5 (great help)	3	.812
Learning and Assignments			
How much did each of the following aspects of these classes HELP your learning?			
Research writing assignments	5 (great help)	4	.801
Doing experiential activities such as case studies, simulations, real-world analysis of problems or development of plans, white papers, etc.	5 (great help)	2	.722
Reflective writing, such as Blackboard discussions or short writing assignments connecting theory or policy to examples or experiences	4 (much help)	4	1.117
The feedback on my work	4 (much help)	4	1.203
Learning and Class Resources			
How much did each of the following aspects of these classes HELP your learning?			
The primary textbook	3 (moderate help)	4	.997
Other reading materials or resources	4 (much help)	4	1.011
Online notes or presentations posted by the instructor	4 (much help)	4	1.011
Learning and Information			
How much did each of the following aspects of these classes and program HELP your learning?			
Explanation of how the class activities, reading, and assignments related to each other	4 (much help)	4	.987
Explanation given by instructor of how to learn or study the materials	4 (much help)	4	1.031
Explanation of how the material related to real-world problems	5 (great help)	4	.877
Learning and Support			
How much did each of the following aspects of these classes HELP with your learning?			
Interacting with the instructor in person or online/via email	5 (great help)	4	1.123
Working with peers	4 (much help)	4	1.152

As shown in Figures 5, 6, and 7, students favorably viewed experiential learning activities as contributing to their learning, and to a greater extent than other activities. Of the students responding to learning and instructional approach, 65% felt that as an aspect of classes, experiential activities provided great help to their learning in class, while a similar proportion (65%) also felt that experiential activities in class were great help in contributing to their learning. As an assignment related to learning, 62% (N=66) felt that experiential learning activities were a great help to their learning process, with 34% perceiving that feedback on their work (N=66) and reflective writing assignments (N=66) connecting theory to policy to examples or experiences were a great help to their learning.

Figure 5. Student Perceptions of Overall Class Aspects Contributing to Learning

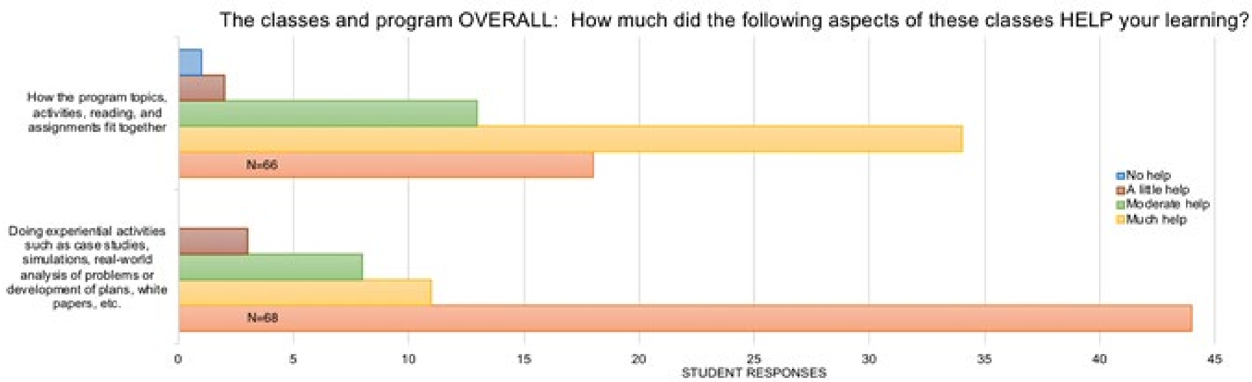


Figure 6. Student Perceptions of Class Activities Contributing to Learning

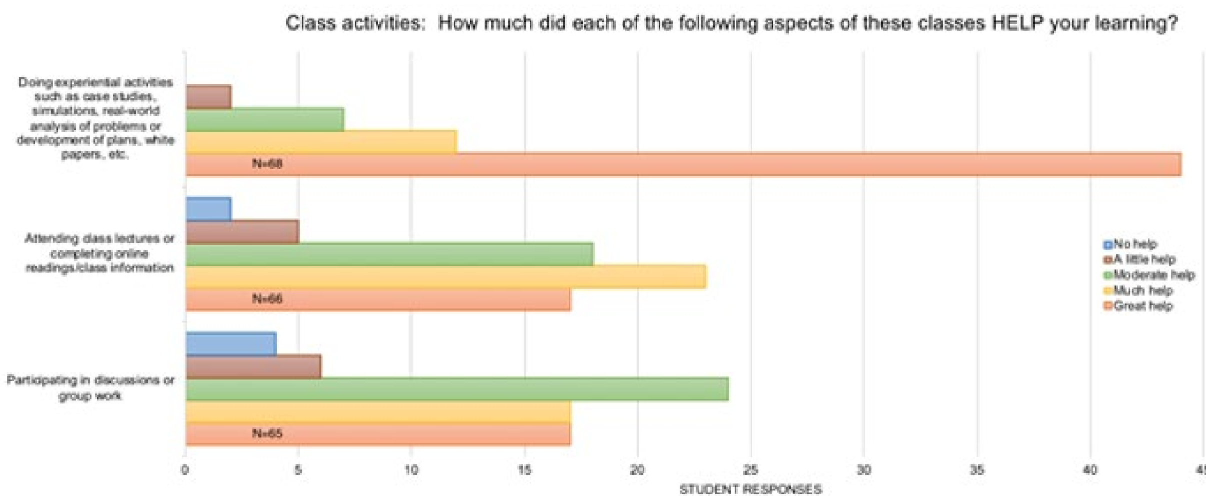
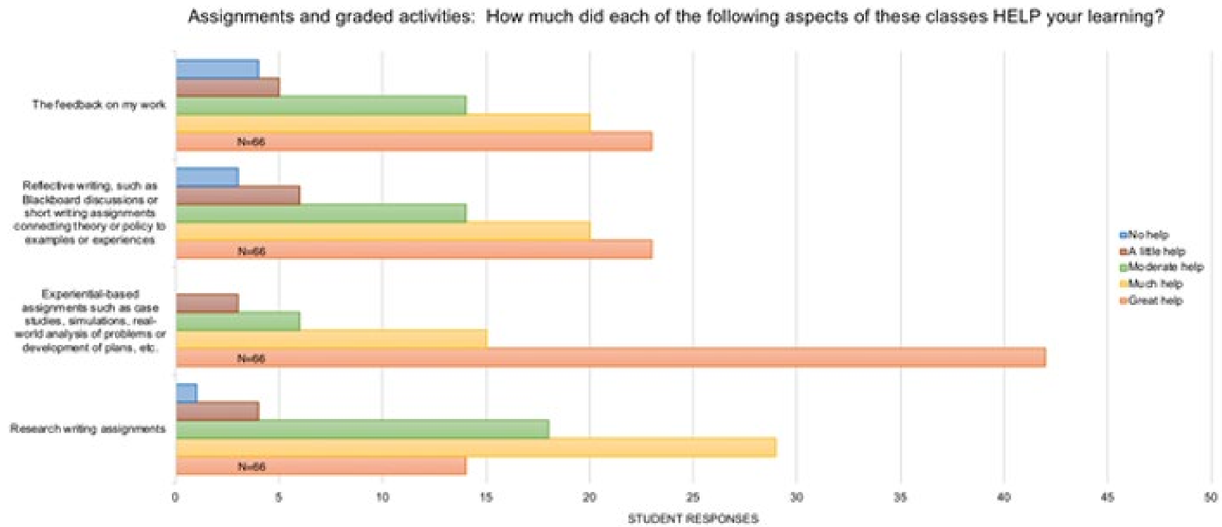


Figure 7. Student Perceptions of How Assignments and Graded Activities Helped Their Learning



The SALG's final elements include questions for students about how much class resource, information, and support as a learner helped their learning process. Figure 8 shows what class resources perceived were the most helpful in the learning process, with online notes or presentations posted by the instructor deemed the greatest help by students. As shown in Figure 9, students appreciated the explanation of how course information related to real-world problems (87%).

Figure 8. Student Perceptions of the Level of Help Class Resources Provided to Learning

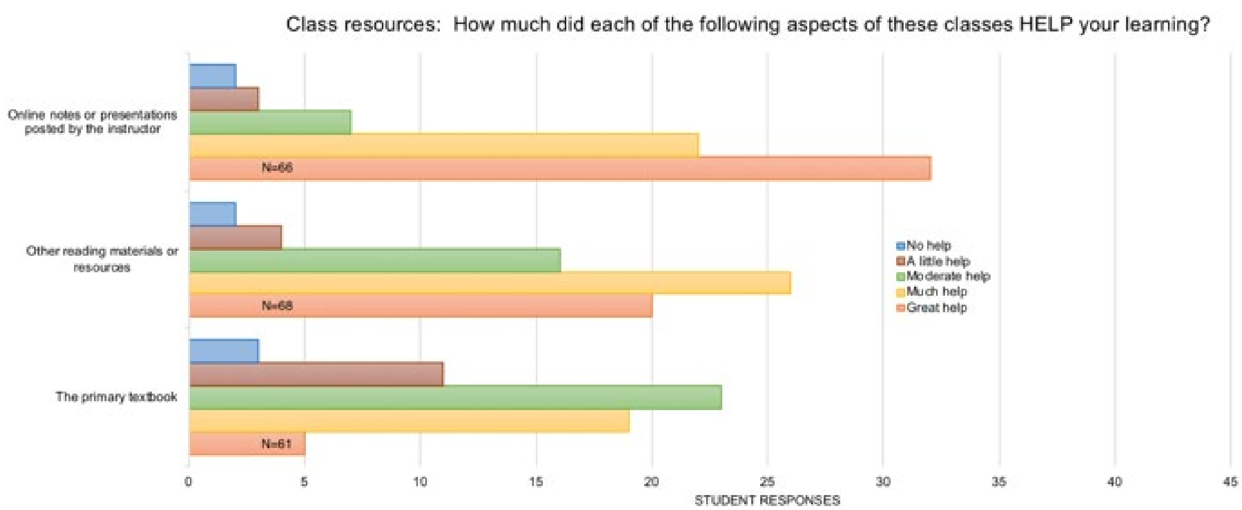
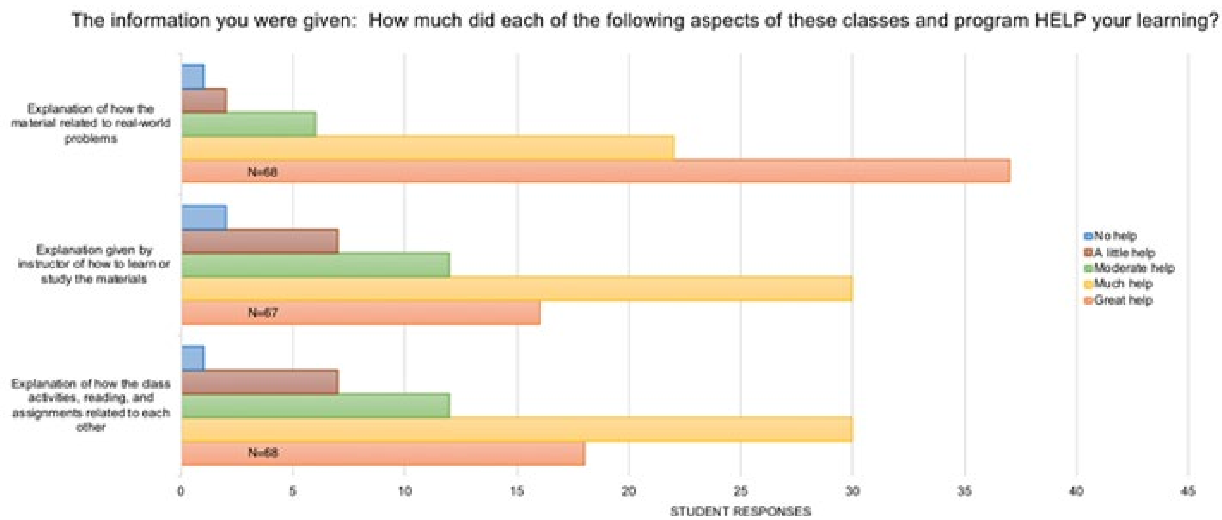
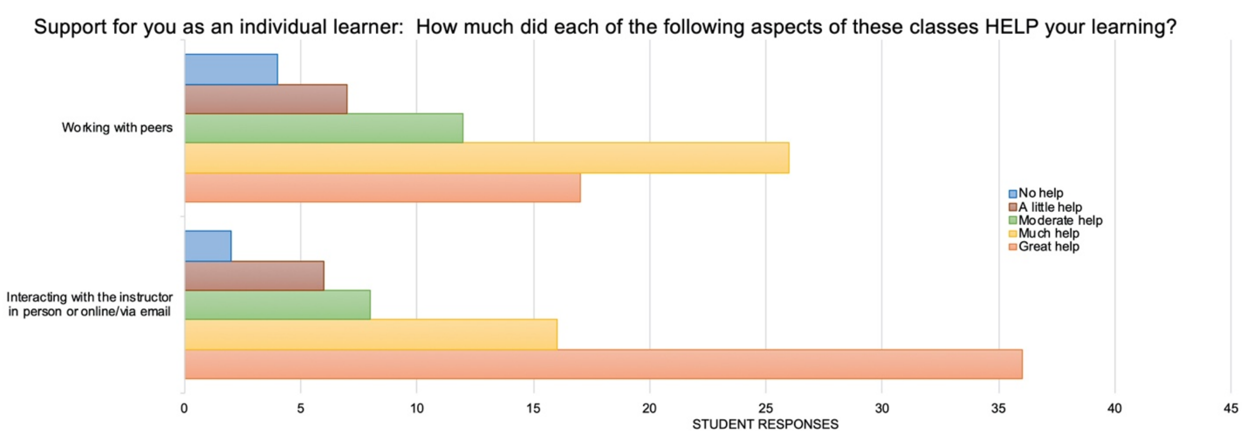


Figure 9. Student Perceptions of the Level of Help Class Information Provided to Learning



When asked about their perceptions of their support as individual learners, students appreciated interaction with the instructor as well as working with peers. Students valued interaction with the instructor higher than their peers, with 76% responding that it contributed much or great help to the learning process, and 63% (N=66) noting that working with peers as great or much help in learning. Figure 10 contains student responses to the support as individual learners' questions for this administration of the SALG.

Figure 10. Student Perceptions of the Support Provided by Aspects of Class for Individual Learning



EXPERIENTIAL LEARNING AND PERCEIVED LEARNING GAINS

The connection between experiential learning to perceived learning gains in critical thinking and complex problem-solving applications was assessed for correlations between specific questions on the SALG. The chi squared test could not be used to assess possible relationships between specific questions regarding experiential learning and student perceptions of the experience and outcomes, as more than 20% of the cells on the cross-tabulation table had expected values less than 5. The overall small size of the sample, while representing a large percentage of the program, resulted in values dictating the exclusion of this statistical measure (Mujis, 2011).

Spearman's rho, however, was an appropriate measure of relationship between student responses for experiential learning and perceptions of learning experiences and outcomes. Considering the elements of the SALG, seven questions were selected as directly applicable to the question of the impact of experiential learning on student perceptions of gains in skills as part of critical thinking and application of skills to complex real-world problem solving. As shown in Table 7, Spearman's rho calculations of student perceptions of gains in critical thinking and application of knowledge to real-world complex problems and experiential learning options were significantly correlated.

Table 7. Experiential Learning and Student Perceived Gains in Critical Thinking Skills

Experiential Learning	Critical Thinking Skills	Correlation Coefficient	Significance (two-tailed)
Class activities: How much did each of the following aspects of these classes HELP your learning; Doing experiential activities such as case studies, simulations, real-world analysis of problems or development of plans, white papers, etc.	As a result of your work in these classes, what GAINS did you make in your understanding of each of - Relevance of information and research to real world issues.	.507	.000
	Increases in your skills: As a result of your work in these classes, what GAINS did you make in the following skills? - Analyzing information for use and application to real-world problems	.567	.000
	Integration of your learning: As a result of your work in these classes, what GAINS did you make in integrating the following? - Using a critical approach to analyzing data and arguments in my professional life	.609	.000
	Class impact on your attitudes: As a result of your work in these classes, what GAINS did you make in the following? - Your comfort level in working with complex ideas	.593	0.000

Experiential Learning	Critical Thinking Skills	Correlation Coefficient	Significance (two-tailed)
Assignments and graded activities: How much did each of the following aspects of these classes HELP your learning? - Experiential-based assignments such as case studies, simulations, real-world analysis of problems or development of plans, etc.	As a result of your work in these classes, what GAINS did you make in your understanding of each of - Relevance of information and research to real world issues.	.524	.000
	Increases in your skills: As a result of your work in these classes, what GAINS did you make in the following skills? - Analyzing information for use and application to real-world problems	.502	.000
	Integration of your learning: As a result of your work in these classes, what GAINS did you make in integrating the following? - Using a critical approach to analyzing data and arguments in my professional life	.431	.000
	Class impact on your attitudes: As a result of your work in these classes, what GAINS did you make in the following? - Your comfort level in working with complex ideas	.592	.000
Learning and Instructional Approach: How much did the following aspects of these classes HELP your learning? Doing experiential activities such as case studies, simulations, real-world analysis of problems or development of plans, white papers, etc.	As a result of your work in these classes, what GAINS did you make in your understanding of each of - Relevance of information and research to real world issues.	.672	.000
	Increases in your skills: As a result of your work in these classes, what GAINS did you make in the following skills? - Analyzing information for use and application to real-world problems	.636	.000
	Integration of your learning: As a result of your work in these classes, what GAINS did you make in integrating the following? - Using a critical approach to analyzing data and arguments in my professional life	.644	.000
	Class impact on your attitudes: As a result of your work in these classes, what GAINS did you	.726	.000

Experiential Learning	Critical Thinking Skills	Correlation Coefficient	Significance (two-tailed)
	make in the following? - Your comfort level in working with complex ideas		

When asked to consider experiential learning activities such as case studies and simulations as class activities, students perceived statistically significant strong learning gains in their understanding of the relevance of information and research to real-world issues. Survey results also indicated students similarly perceived statistically significant strong learning gains in their skills in analyzing information for application to real-world problems. Furthermore, data indicate a strong, statistically significant relationship between experiential class activities and student perceptions of gains in integration of learning as using a critical approach to using data in their professional lives as well as their comfort level in working with complex ideas.

Examining student perceptions of gains in relation to experiential learning as part of their assignments and graded activities, student responses indicated a similar strong, statistically significant correlation with both understanding and analyzing information for real-world problems as well as comfort level in working with complex ideas. Experiential learning as assignments was moderately significantly correlated to student perceived gains in integrating information and critical thinking, analyzing data and arguments in their professional work. Similarly confirming the correlation between experiential learning and student-perceived learning gains in critical thinking skills in HSEM higher education, there was also a statistically strong correlation between experiential learning as an instructional approach and student gains in this area. In response to questions asking about experiential activities as a part of learning and instructional approaches, students indicated a strong, statistically significant correlation with perceived gains in their understanding, analyzing, and applying information to real-world complex problems. Likewise, there was a statistically significant strong correlation in this area with student-perceived gains in using a critical approach to analyze complex problems and their comfort with the process.

DISCUSSION AND IMPLICATIONS FOR PRACTICE

This quantitative descriptive single case study examined a graduate HSEM program located in the northeastern part of the United States at a private, major research University through a census survey of students and document review of syllabi. The SALG survey instrument measured student-perceived learning gains and critical thinking skills through ordinal five-point Likert-style questions as well as three opportunities for students to comment on sections of the survey. The census sampling strategy led to a 56% (N=68) survey completion rate, with a 95% confidence level and an 8% margin of error for results; findings that can be generalized to the case of the HSEM program.

Findings

The HSEM program included multiple types of experiential learning as an instructional method as well as curricula-integrated higher-order critical thinking skills and is representative of the objectives described in literature goals for HSEM higher education programs. The document review revealed case-based learning as the most common experiential learning method utilized as well as other methodology such as exercises and simulations. Similar to Kapucu and Knox's (2011) findings that a majority of national HSEM programs included experiential learning opportunities within their curricula, this HSEM program strongly favors experiential learning as an instructional strategy. The document review of the HSEM program syllabi also revealed an emphasis on the higher-order critical thinking level of learning as described in Bloom's taxonomy, as modified by Anderson and Krathwol (2001). Taxonomy action verbs such as analyze, evaluate, and create as well as generate, produce, and develop were the most common, reflecting the focus of program courses on the three highest levels of critical thinking. This was in alignment with existing research of HSEM higher education programs as well as HSEM professionals who noted the centrality of critical thinking skills to the educational experience (Collins & Peerbolte, 2011; Kiltz, 2011; Pelfrey & Kelley, 2013; Polson et al., 2010; Ramirez & Rioux, 2012).

Results of the SALG indicated that students perceived significant learning gains in understanding and skills application of HSEM concepts, supported by experiential learning as an instructional method. Research supports student understanding of essential concepts and skills for the field as a fundamental objective of HSEM programs (Cutrer, 2012; Doss et al., 2016; Kiltz, 2011; Pelfrey & Kelley, 2013; Pelfrey & Pelfrey, 2009; Plant et al., 2011; Polson et al., 2010; Ramsay et al., 2010; Ramirez & Rioux, 2012), and the survey results indicated that students perceived great gains in their understanding of HSEM skills and issues as well as the ability to apply this knowledge. Students also perceived great gains in their ability to analyze information for use in real-world problems while seeking out required information and developing logical arguments, essential parts of the decision-making process. This study found a correlation between experiential learning in the program with student-perceived learning and gains in domain knowledge application. The quantitative results of this correlation were reflected in student comments, which strongly endorsed the program's experiential learning practices as increasing their understanding and application to real-world issues. These findings support broader literature and research from the limited HSEM studies that examine applications of experiential learning (Feist et al., 2013; Jackson, 2011; Johnson, 2012; Kapucu & Knox, 2011; Renda-Tanali & Abdul-Hamid, 2011; Rybarczyk et al., 2007; Shannon, 2015; Yadav et al., 2014).

SALG results indicate that students perceived significant gains in critical thinking and decision-making skills, supported by experiential learning as an instructional method. This included student-perceived great gains for integration of learning and critical thinking concepts such as connecting critical information to other areas of knowledge while applying skills and information to problem-solving and other professional requirements. These gains were strongly correlated to student perceptions of experiential learning opportunities as a great help to the learning process, more so than other elements such as discussions or class lectures and information. Student comments indicated that experiential learning opportunities provided great help in the learning process, supporting their application of HSEM principles to real-world applications. Existing HSEM studies connecting higher-order critical thinking and decision-making skills to specific instances of experiential learning examination of individual class-based simulations or instances of field-based work (Acquaviva et al., 2012; Knox & Harris, 2016; Renda-Tanali & Abdul-Hamid, 2011), but were not broadly defined to entire HSEM programs. The findings of the SALG survey reinforce the literature of these single-application studies while connecting with the larger literature (Chmil et al., 2015; Kulak & Newton, 2014, 2015; Lundeberg & Yadav, 2006a, 2006b; Mesny, 2013; Prince & Felder, 2006; Yadav et al., 2014) that students perceive a correlation between experiential learning and gains in critical thinking skills and decision-making.

SALG responses also included student perceptions of significant gains in a positive outlook for HSEM topics, including enthusiasm toward the field and confidence in using and applying HSEM subjects and complex ideas, supported by experiential learning as an instructional method. Results of this study indicated that students in the program experienced significant gains in their confidence in understanding and application of HSEM knowledge and skills and enthusiasm for the subject, with a strong correlation between student responses for great gains in the integration of learning and critical thinking and attitudes and enthusiasm for the subject. Experiential learning opportunities were a favorable part of this attitudinal gain, strongly correlating student comfort levels with complex ideas and experiential learning as an instructional approach, class activity, and assignment. As a consideration for HSEM higher education programs, student engagement and satisfaction with the learning process is a necessary concern in order to build a robust, successful program and meet student needs (Ahlfeldt et al., 2005; Cozine, 2015; Kapucu, 2011; Pelfrey & Pelfrey, 2009). Research findings indicate that this program aligns with these goals, with overall positive student attitudinal gains and engagement with the learning process as well as correlation with experiential learning activities within the studied program.

Implications for Practice

This study reaffirms previous localized studies of student responses to experiential learning in HSEM higher education while informing HSEM educational leaders on a potentially valuable instructional method, building research-based practices for the field. Findings from this research support the use of the SALG instrument as a valid, applicable instrument for measuring student perceptions of their learning and engagement in HSEM higher education. It provides insight into the student perceptions of gains within this experientially oriented HSEM program, and is, to the knowledge of the researcher, the first use of this instrument in this field. Results of this research indicate that experiential learning methods were associated with significant student-perceived gains in understanding and skills application of HSEM concepts, critical thinking and decision-making skills, and attitudes such as enthusiasm for the subject and confidence in using and applying HSEM subjects and complex ideas. Potential future research to expand upon these findings include a larger-scale study of multiple programs for greater insights to the national HSEM learner population and qualitative research to explore the reasoning behind these student perceptions toward experiential learning. Each of these would expand research findings of the HSEM learner experience and priorities, enhancing program development and review.

As Donahue et al. (2010) recommended when writing about HSEM higher education, students must be able to comprehend complex problems in HSEM while evaluating, analyzing, and applying applicable requirements across a variety of contingencies and organizations. Considering this study along with previous research when preparing and evaluating curricula, educators have greater support for including experiential learning methods like simulations and case studies for their potential to provide a valuable learning experience for students and meet professional and program goals. One recommendation is the extensive inclusion of experiential opportunities in HSEM programs while assessing its applicability as an authentic learning experience. Programs should develop strategies for designing and implementing experiential learning-centered courses, articulating student learning outcomes focused on higher-order critical thinking skills and domain knowledge while assessing the potential for community engagement within the identified learning experiences. Furthermore, curriculum assessment and evaluation tools such as the SALG will be an important factor in responsiveness to both students and HSEM professional market needs. With this study and others, HSEM educators can work to build the community of practice in support of the field while meeting the needs of today’s HSEM professionals and the expectations of the many agencies and stakeholders charged with the homeland security enterprise.

APPENDIX: HSEM PROGRAM SYLLABI REVIEWED

Core Curriculum Courses

HLS 6000	Introduction to Homeland Security
HLS 6010	The unconventional threat to HLS
HLS 6020	Technology for HLS
HLS 6030	Intelligence for HLS
HLS 6040	Critical infrastructure: vulnerability analysis and protection
HLS 6050	Multidisciplinary approaches to HLS
CMN 6050	Crisis communication
HLS 6983	Topics in HLS

Electives, Concentration, and Optional courses

HLS 6035	Advanced Intelligence Applications for Homeland Security
HLS 6060	Strategic Planning and Budgeting
HLS 6070	Emergency Management and Geographic Information Systems
HLS 6080	Continuity of Operations and Planning
HLS 6090	Organization and Structural Continuity Planning
HLS 6100	Maritime Port Security 1
HLS 6110	Maritime Port Security 2
HLS 6120	Aviation Security 1
HLS 6130	Aviation Security 2
HLS 6140	Port Security Capstone
HLS 6150	Essentials of Emergency Management
CJS 6430	Risk Management
GIS 6394	Crisis Mapping for Humanitarian Action
CJS 6105	Domestic and International Terrorism
CJS 6125	Issues in National Security
CJS 6430	Risk Management
CMN 6060	Negotiation, Mediation, and Facilitation

REFERENCES

Acquaviva, K. D., Posey, L., Dawson, E. M., & Johnson, J. E. (2012). Using algorithmic practice maps to teach emergency preparedness skills to nurses. *The Journal of Continuing Education in Nursing*, *43*(1), 19–26. https://doi.org/10.3928/00220124-20111228-05

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.

Ahlfeldt, S., Mehta, S., & Sellnow, T. (2005). Measurement and analysis of student engagement in university classes where varying levels of PBL methods of instruction are in use. *Higher Education Research & Development*, *24*(1), 5–20. https://doi.org/10.1080/0729436052000318541

Allchin, D. (2013). Problem- and case-based learning in science: An introduction to distinctions, values, and outcomes. *CBE Life Sciences Education*, *12*(3), 364–372. https://doi.org/10.1187/cbe.12-11-0190

Baeten, M., Dochy, F., & Struyven, K. (2013). Enhancing students' approaches to learning: The added value of gradually implementing case-based learning. *European Journal of Psychology of Education*, *28*(2), 315-336. https://doi.org/10.1007/s10212-012-0116-7

Baruch, Y. (1999). Response rate in academic studies-A comparative analysis. *Human Relations*, *52*(4), 421–438. https://doi.org/10.1177/001872679905200401

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, *61*(8), 1139-160. https://doi.org/10.1177/0018726708094863

Blewett, E. L., & Kisamore, J. L. (2009). Evaluation of an interactive, case-based review session in teaching medical microbiology. *BMC Medical Education*, *9*(1), 56. https://doi.org/10.1186/1472-6920-9-56

Campbell, H. E., & Tatro, B. J. (1998). Teaching program evaluation to public administration students in a single course: An experiential solution. *Journal of Public Affairs Education, 4*(2), 101–122.

Canboy, B., Montalvo, A., Buganza, M. C., & Emmerling, R. J. (2016). Module 9 : a new course to help students develop interdisciplinary projects using the framework of experiential learning theory. *Innovations in Education and Teaching International*, *53*(4), 445–457. https://doi.org/10.1080/14703297.2014.975150

Chmil, J. V., Turk, M., Adamson, K., & Larew, C. (2015). Effects of an experiential learning simulation design on clinical nursing judgment development. *Nurse Educator*, *40*(5), 228–232 5p. https://doi.org/10.1097/NNE.0000000000000159

Clement, K. E. (2011). The essentials of emergency management and homeland security graduate education programs: Design, development, and future. *Journal of Homeland Security and Emergency Management*, *8*(2), 1–10. https://doi.org/10.2202/1547-7355.1902

Collins, M. L., & Peerbolte, S. L. (2011). An exploratory research design further demonstrating the need for the integration of critical thinking skill curricula in homeland security and emergency management higher education academic programs. *Journal of Homeland Security and Emergency Management*, *8*(2). https://doi.org/10.2202/1547-7355.1796

Comfort, L. K., & Wukich, C. (2013). Developing decision-making skills for uncertain conditions : The challenge of educating effective emergency managers. *Journal of Public Affairs Education*, *19*(1), 53–71.

Cozine, K. (2015). Thinking interestingly: The use of game play to enhance learning and facilitate critical thinking within a homeland security curriculum. *British Journal of Educational Studies*, *63*(3), 367–385. https://doi.org/10.1080/00071005.2015.1069256

Cullen, A. (2013). Using the case method to introduce information skill development in the MBA curriculum. *Journal of Business and Finance Librarianship*, *18*(3), 208–232. https://doi.org/10.1080/08963568.2013.795740

Cunningham, B. (1997). Experiential learning in public administration education. *Journal of Public Affairs Education, 3*(2), 219–227.

Cutrer, D. A. (2012). *Developing a homeland security curriculum: A case study in outcomes-based education using the delphi method.* ProQuest Dissertations & Theses Global. (Order No. 3533658)

Cwiak, C. (2011). Framing the ruture: What should emergency management graduates know? *Journal of Homeland Security and Emergency Management*, *8*(2), 1–14. https://doi.org/10.2202/1547-7355.1910

Darlington, J. D. (2008). *The profession of emergency management: educational opportunities and gaps*. Federal Emergency Management Agency. https://training.fema.gov/hiedu/downloads/prof_em.pdf

Donahue, D. A. J., Cunnion, S. O., Balaban, C. D., & Sochats, K. (2010). Meeting educational challenges in homeland security and emergency management. *Journal of Homeland Security and Emergency Management*, *7*(1), 1–15. https://doi.org/10.2202/1547-7355.1718

Doss, D., Henley, R., McElreath, D., Lackey, H., Jones, D., Gokaraju, B., & Sumrall, W. (2016). Homeland security education: Managerial versus nonmanagerial market perspectives of an academic program. *Journal of Education for Business*, *91*(4), 203–210. https://doi.org/10.1080/08832323.2016.1154001

Ertmer, P. A., & Koehler, A. A. (2014). Online case-based discussions: examining coverage of the afforded problem space. *Educational Technology Research and Development*, *62*(5), 617–636. https://doi.org/10.1007/s11423-014-9350-9

Federal Emergency Management Agency. (2017). *Historic disaster response to Hurricane Harvey in Texas*. Federal Emergency Management Agency. https://www.fema.gov/news-release/2017/09/22/historic-disaster-response-hurricane-harvey-texas

Feist, M., Ciccarelli, M., McFerron, B. a, & Molleston, J. P. (2013). Methods and effects of a case-based pediatric gastroenterology online curriculum. *Journal of Pediatric Gastroenterology and Nutrition*, *56*(2), 161–5. https://doi.org/10.1097/MPG.0b013e31825677d7

Finn, K., FitzPatrick, K., & Yan, Z. (2017). Integrating lecture and laboratory in health sciences courses improves student satisfaction and performance. *Journal of College Science Teaching*, *47*(1), 66–75. https://doi.org/10.2505/4/jcst17_047_01_66

Goldsmith, D. W. (2011). A case-based curriculum for introductory geology. *Journal of Geoscience Education*, *59*(July 2010), 119. https://doi.org/10.5408/1.3604824

Hale Feinstein, A., Mann, S., & Corsun, D. L. (2002). Charting the experiential territory. *Journal of Management Development*, *21*(10), 732–744. https://doi.org/10.1108/02621710210448011

Hayes, C. (2017, August 24). *Pulse nightclub shooting: FDLE releases review of agency's response, recommends changes*. Orlando Sentintel. http://www.orlandosentinel.com/news/pulse-orlando-nightclub-shooting/os-pulse-orlando-fdle-after-action-report-20170809-story.html

He, W., Yuan, X., & Yang, L. (2013). Supporting case-based learning in information security with web-based technology. *Journal of Information Systems Education*, *24*(1), 31–40. http://search.proquest.com/docview/1438693333?accountid=27965

Huerta-Wong, J. E., & Schoech, R. (2010). Experiential learning and learning environments: The case of active listening skills. *Journal of Social Work Education, 46*, 85–101.

Jackson, B. A. (2011). A table-top game to teach technological and tactical planning in a graduate terrorism and counterterrorism course. *Journal of Homeland Security and Emergency Management*, *8*(2). https://doi.org/10.2202/1547-7355.1863

Johnson, T. (2012). Emergency management students' perceptions of the use of WebEOC® to support authentic learning. *Educational Media International*, *49*(3), 171–182. https://doi.org/10.1080/09523987.2012.738010

Kapucu, N. (2011). Developing competency-based emergency management degree programs in public affairs and administration. *Journal of Public Affairs Education (JPAE)*, *17*(4), 501–521. https://doi.org/10.2307/23036124

Kapucu, N., & Knox, C. C. (2011). Utilization of service learning in emergency management programs in the United States. *Journal of Public Affairs Education*, *19*(1), 31–51. https://doi.org/10.1080/15236803.2013.12001719

Kapucu, N., & Petrescu, C. (2006). Capacity building through service learning. *Academic Exchange Quarterly, 10*(1), 132–138.

Kiltz, L. (2011). The challenges of developing a homeland security discipline to meet future threats to the homeland. *Journal of Homeland Security & Emergency Management*, *8*(2), 1–20. https://doi.org/10.2202/1547-7355.1899

Knox, C. C., & Harris, A. S. (2016). Evolution of an experiential learning partnership in emergency management higher education. *Journal of Emergency Management*, *14*(3), 201–211. https://doi.org/10.5055/jem.2016.0286

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces : enhancing experiential learning in higher education. *Academy of Management Learning & Education*, *4*(2), 193–212. https://doi.org/10.5465/amle.2005.17268566

Kopp, B., Hasenbein, M., & Mandl, H. (2014). Case-based learning in virtual groups—Collaborative problem solving activities and learning outcomes in a virtual professional training course. *Interactive Learning Environments*, *22*(3), 351–372. https://doi.org/10.1080/10494820.2012.680964

Koury, K., Hollingsead, C., Fitzgerald, G., Miller, K., Mitchem, K., Tsai, H.-H., … Zha, S. (2009). Case-based instruction in different delivery contexts: The impact of time in cases. *Journal of Interactive Learning Research*, *20*(4), 445–467. http://www.editlib.org.ezp-prod1.hul.harvard.edu/p/29337/article_29337.pdf

Kulak, V., & Newton, G. (2014). A guide to using case-based learning in biochemistry education. *Biochemistry and Molecular Biology Education*, *42*(6), 457–473. https://doi.org/10.1002/bmb.20823

Kulak, V., & Newton, G. (2015). An investigation of the pedagogical impact of using case-based learning in a undergraduate biochemistry course. *International Journal of Higher Education*, *4*(4), 13–24. https://doi.org/10.5430/ijhe.v4n4p13

Lundeberg, M. A., & Yadav, A. (2006a). Assessment of case study teaching: Where do we go from here? Part 1. *Journal of College Science Teaching*, *35*(5), 10–13. http://www.jstor.org/stable/42991825

Lundeberg, M.A., & Yadav, A. (2006b). Assessment of case study teaching: Where do we go from here? Part 2. *Journal of College Science Teaching, 35*(6), 8-13. http://www.jstor.org/stable/42991850

Marienau, C. (1999). 074171369904900301.pdf. *Adult Education Quarterly*, *49*(3), 135–14. https://doi.org/10.1177/074171369904900301

McCreight, R. (2009). Educational challenges in homeland security and emergency management. *Journal of Homeland Security and Emergency Management*, *6*(1), 1–15. https://doi.org/10.2202/1547-7355.1576

McCreight, R. (2014). A pathway forward in homeland security education: An option worth considering and the challenge ahead. *Journal of Homeland Security and Emergency Management*, *11*(1), 25–38. https://doi.org/10.1515/jhsem-2013-0099

Mesny, A. (2013). Taking stock of the century-long utilization of the case method in management education. *Canadian Journal of Administrative Sciences/Revue Canadienne Des Sciences de L'administration*, *30*(1), 56–66.

Muijs, D. (2011). *Doing quantitative research in education with SPSS* (2nd ed.). SAGE Publication.

Pelfrey, W., & Kelley, W. (2013). Homeland security education: A way forward. *Homeland Security Affairs*, *9*, 1–12.

Pelfrey, W. V. S., & Pelfrey, W. V. J. (2009). Curriculum evaluation and revision in a nascent field: the utility of the retrospective pretest--posttest model in a homeland security program of study. *Evaluation Review*, *33*(1), 54–82. https://doi.org/10.1177/0193841X08327578

Pena-Shaff, J., & Altman, W. (2009). Case-based instruction Using asynchronous online discussions: A synthesis. *Journal on Excellence in College Teaching*, *20*(3), 97–121. http://www.editlib.org/p/74543/

Plant, J. F., Arminio, T., & Thompson, P. (2011). A matrix approach to homeland security professional education. *Journal of Homeland Security and Emergency Management*, *8*(2), 1–15. https://doi.org/10.2202/1547-7355.1883

Polson, C., Persyn, J. M., & Cupp, O. S. (2010). Partnership in progress: A model for development of a homeland security graduate degree program. *Homeland Security Affairs*, *6*(2), 1–25. http://www.hsaj.org/?essays:fullarticle=6.2.3

Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: definitions, comparisons, and research bases. *Journal of Engineering Education*, *95*(2), 123–138. https://doi.org/10.1002/j.2168-9830.2006.tb00884.x

Ramirez, C. D., & Rioux, G. A. (2012). Advancing curricula development for Homeland Security education through a survey of DHS personnel. *Journal of Homeland Security Education*, *1*(1), 6–25.

Ramsay, J. D., Cutrer, D., & Raffel, R. (2010). Development of an outcomes-based undergraduate curriculum in homeland security. *Homeland Security Affairs*, *6*(2), 20. http://www.hsaj.org/?fullarticle=6.2.4

Ranchhod, A., Gurău, C., Loukis, E., and Trivedi, R. (2014) Evaluating the educational effectiveness of simulation games: a value generation model, *Information Sciences, 264*, 75–90. doi:10.1016/j.ins.2013.09.008

Razali, R., & Zainal, D. A. P. (2013). Success factors for using case method in teaching and learning software engineering. *International Education Studies*, *6*(6), 191–201. https://doi.org/10.5539/ies.v6n6p191

Renda-Tanali, I., & Abdul-Hamid, H. (2011). An assessment of the benefits of online scenario simulation tools in homeland security and emergency management education. *Journal of Homeland Security & Emergency Management*, *8*(2), 1–15. https://doi.org/10.2202/1547-7355.1917

Rollag, K. (2010). Teaching business cases online through discussion boards: Strategies and best practices. *Journal of Management Education*, *34*(4), 499–526. https://doi.org/10.1177/1052562910368940

Rybarczyk, B. J., Baines, A. T., McVey, M., Thompson, J. T., & Wilkins, H. (2007). A case-based approach to increase student learning outcomes and comprehension of cellular respiration concepts. *The International Union Biochemistry and Molecular Biology*, *35*(3), 181–186. https://doi.org/10.1002/bambed.40

SALG (n.d.). *Student Assessment of Their Learning Gains*. https://salgsite.net

Sanders-Smith, S. C., Smith-Bonahue, T. M., & Soutullo, O. R. (2016). Practicing teachers' responses to case method of instruction in an online graduate course. *Teaching and Teacher Education*, *54*, 1–11. https://doi.org/10.1016/j.tate.2015.11.015

Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a better mousetrap: On-line student assessment of their learning gains. In *National Meetings of the American Chemical Society Symposium*.

Shannon, C. C. (2015). Using a simulated mass casualty incident to teach response readiness: A case study. *Journal of Nursing Education*, *54*(4), 215–219. https://doi.org/10.3928/01484834-20150318-05

Shellman, S.M., and Turan, K. (2006). Do Simulations Enhance Student Learning? An Empirical Evaluation of an IR Simulation. *Journal of Political Science Education, 2*(1): 19–32 (2006).

Shieh, R. S., Lyu, J., & Cheng, Y. Y. (2012). Implementation of the Harvard case method through a plan-do-check-act framework in a university course. *Innovations in Education and Teaching International*, *49*(2), 149–160. https://doi.org/10.1080/14703297.2012.677657

Stewart, K. B., & Vocino, J. (2013). Homeland security in higher education : The state of affairs. *Journal of Public Affairs Education*, *19*(1), 13–29. https://doi.org/10.1080/15236803.2013.12001718

Thistlethwaite, J. E., Davies, D., Ekeocha, S., Kidd, J. M., MacDougall, C., Matthews, P., … Clay, D. (2012). The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23. *Medical Teacher*, *34*(6), e421–e444. https://doi.org/10.3109/0142159X.2012.680939

Tolchin, B., Willey, J. Z., & Prager, K. (2015). Education Research: A case-based bioethics curriculum for neurology residents. *Neurology*, *84*(13), e91–e93. https://doi.org/10.1212/WNL.0000000000001412

Vishnumolakala, V. R., Southam, D. C., Treagust, D. F., & Mocerino, M. (2016). Latent constructs of the students' assessment of their learning gains instrument following instruction in stereochemistry. *Chem. Educ. Res. Pract.*, *17*(2), 309–319. https://doi.org/10.1039/C5RP00214A

Vogt, G., Atwong, C., & Fuller, J. (2005). Student Assessment of Learning Gains: An online instrument. *Business Communication Quarterly*, *68*(1), 36–43. https://doi.org/10.1177/1080569904273332

Walker, D. M. (2006). *Statement of David M. Walker, Comptroller General of the United States. Hurricane Katrina: GAO's preliminary observations regarding preparedness, response, and recovery* (GAO-06-442T). Government Accountability Office. http://www.gao.gov/assets/120/112976.pdf

Wang, Y. S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information and Management*, *41*(1), 75–86. https://doi.org/10.1016/S0378-7206(03)00028-4

Yadav, A., & Beckerman, J. L. (2009). Implementing case studies in a plant pathology course: Impact on student learning and engagement. *Journal of Natural Resources and Life Sciences Education*, *38*, 50–55. http://ezproxy.tntech.edu/login?url=http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790efada128173728210415448d508a37fe8735c9396dc8b8bfefd9f99e55241077d&fmt=C

Yadav, A., Vinh, M., Shaver, G. M., Meckl, P., & Firebaugh, S. (2014). Case-based instruction: Improving students' conceptual understanding through cases in a mechanical engineering course. *Journal of Research in Science Teaching*, *51*(5), 659–677. https://doi.org/10.1002/tea.21149

Yücel, Ü. A. I., & Usluel, Y. K. (2016). Knowledge building and the quantity, content and quality of the interaction and participation of students in an online collaborative learning environment. *Computers and Education*, *97*, 31–48. https://doi.org/10.1016/j.compedu.2016.02.015

Zavrel, E. A. (2015). Improving graduate STEM education through increased use of the case study method. *Creative Education*, *6*, 1266–1269. https://doi.org/10.4236/ce.2015.612125.