Identifying Core Themes for an Integrated HSEM Curriculum

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ABSTRACT

The Department of Homeland Security, created in the wake of the 9/11 terrorist events, represents the largest reorganization of a governmental agency in 50 years. With this reorganization, as well as a new emphasis on the security needs of the nation and its citizens, a governmental homeland security policy was developed. Events since 9/11 have demonstrated the need for a dual emphasis within the homeland security and emergency management (HSEM) enterprise; that is, there is a need for educational capabilities that encompass both fields. As applied disciplines, scholarship within HSEM has always had links to evolving practices within the professional field. The increasingly complex demands faced in emergency management and homeland security require that higher education institutions better integrate ideas from the two fields to more effectively educate emerging professionals. This study demonstrates practitioner consensus regarding the importance of an integrated HSEM curriculum that can meet the needs of the workforce. The use of best–worst scaling (BWS) and total unduplicated reach and frequency serve as a novel research tool for the query of practitioners and their assessment for the need to integrate HSEM educational themes. BWS serves as new quantitative approach in which to demonstrate the need for HSEM integration and simultaneously serve as a research methodology for future analysis by HSEM educators and researchers.

INTRODUCTION

The Department of Homeland Security (DHS) was created as part of the government's largest reorganization in both function and size since the establishment of the Department of Defense 50 years prior (Homeland Security National Preparedness Task Force, 2006). Twenty-two federal agencies and departments were consolidated (Painter, 2013), including the Federal Emergency Management Agency (FEMA), which had long overseen the government's management of natural disasters, together with mitigation, preparedness, response, and recovery efforts. The reorganization left DHS as the nation's primary coordinator of threat response, preparedness, and a broad spectrum of other associated activities (Borja, 2008).

The fields of homeland security and emergency management (HSEM) have sometimes clashed over competing priorities, differing cultures, and areas of emphasis, i.e., security versus natural hazards (Waugh, 2003). Yet in the post-9/11 era, the professional bodies overseeing these two fields have largely been integrated, prompting the question of whether academic programs within these fields should likewise merge.

Some scholars have argued that those within higher education academia should also merge the subjects of HSEM, bridging historical, curricular, and cultural differences (Drabek, 2007; Hogue & Bea, 2006; McCreight, 2009). Such integration would better prepare responses to the increasingly complex societal impacts of natural disasters. As Drabek (2007) points out, integration could assist in developing an expanded vision for preparedness, from the community to federal government level, whether the disaster was a catastrophic hurricane or a terrorist incident.

Numerous obstacles have slowed academic integration of the two fields. In particular, scholars have disagreed over which topics are relevant enough to incorporate into the discipline's core material (Bellavita & Gordon, 2006). Programs began to form following 9/11, but they were unable to arrive at a consensus definition of homeland security. Bellavita's (2008) efforts to identify what comprised homeland security produced several definitions, some which narrowly focused on terrorism-related security, whereas others considered the broader aspects of an "all-hazards" approach. The ranging scope of these definitions has implications for the roles of both DHS and FEMA.

Kiltz's (2012) review of the challenges facing the HSEM enterprise underscored the need for interdisciplinary cooperation to respond to the complex challenges facing the nation. As she outlines, areas of interest to include climate change and associated challenges such as drought will serve to create a complex dynamic that requires the focus of a more integrated enterprise. Moreover, the nation's aging workforce highlights the importance of educating the next generation of practitioners (Ramsay, Cutrer, & Raffel, 2010). As the current HSEM workforce continues to age and retire, there will be an increased need for suitable individuals to fill their ranks, with a suitable education to best prepare them for an evolving enterprise.

PROBLEM STATEMENT

The purpose of this exploratory study was to examine what HSEM themes practitioners think should comprise the core of an HSEM baccalaureate degree.

As Drabek (2007) noted, over the past 30 years there has been tremendous growth in higher education programs focused on emergency management. Additionally, in the wake of the 9/11 attacks, curricula focused on homeland security competencies were also created. Drabek likewise noted that by 2006, more than 100 higher education programs had developed with a focus on emergency management with another 60 programs established to address homeland defense/security. With the national increase in numbers for both types of programs, some have advocated for these programs to become better integrated, as previously noted.

Given the exploratory nature of this study, the literature does not yet contain much information to assist in developing a refined hypothesis concerning the combined nature of an HSEM baccalaureate program. A substantial body of literature from both academia and post-9/11 era research has identified important aspects of emergency management education (Cwiak 2008, 2009; Jaffin et al., 2011; Oyola-Yemaiel & Wilson, 2005; Quarantelli, 1992; Thomas & Mileti, 2003) and have addressed the broader aspects of integrating homeland security education into emergency management curricula.

The need for a more inclusive homeland security education emerged in the wake of 9/11, when DHS responses to Hurricane Katrina and other events of national significance were noted to be lacking (Bellavita & Gordon, 2006; National Research Council, 2005; Ramsay et al., 2010; Rollins & Rowan, 2007; Smith, 2005). Several studies have provided detailed summaries of the existing research on homeland-security-specific education (Bellavita & Gordon, 2006; Pelfrey & Kelley, 2013; Ramsay et al., 2010), but these have not discussed how integrating curricula with emergency management might address the needs of an ever-evolving HSEM enterprise.

Although the two educational disciplines have evolved individually, they have lacked the interdisciplinary synergy needed for an integrated, standardized, core baccalaureate curriculum that meets workforce needs. This study presents a focused, quantitative analysis of a unique set of survey data drawn from a rigorous examination of practitioner-based insights, provided by professionals who serve within the HSEM enterprise. The analysis uses new approaches called best–worst scaling (BWS) and total unduplicated reach and frequency (TURF) to develop a ranked set of educational themes that could serve as a basis for HSEM program curricula. Many previous studies have used the Delphi method, Likert-type scales, or inventory lists to identify or determine HSEM-specific subject-matter needs. Although these approaches can provide useful insights, using BWS and TURF analyses helps develop a methodologically sound ranking of HSEM baccalaureate education themes most relevant to the workforce needs of practitioners. Importantly, this assessment identifies portfolios of curricula that professionals most frequently indicate are the most important factors in their job. The results begin to form the basis for the core educational needs of HSEM baccalaureate programs.

METHODOLOGY

This study's survey was designed to identify subject matter that could form the core of an integrated, higher education HSEM curriculum. Eighty-seven survey items were developed using educational themes from two previous inventories on homeland security (Bellavita & Gordon, 2006) and emergency management (Darlington, 1999). The broad nature of the list, utilizing a total of 87 themes, ensured that an ideal combination of educational themes was presented to practitioners. Care was taken to include all themes from both studies so that educational themes were not inadvertently screened out. This ensured, to the greatest extent reasonable, that the survey would include a broad spectrum of relevant and previously examined educational themes for respondents to choose from in reporting those most ideal for comprising the core course material of an HSEM baccalaureate degree.

Darlington (1999) recognized that emergency management was an evolving profession with an increasing number of academic programs nationally. Her study, utilizing a cursory content analysis and review of programs teaching emergency management nationally, identified 36 "study areas" that were either taught in an academic setting in higher education or provided as formal training by state offices of emergency services. However, because the study predated 9/11, it understandably focused less on homeland security and more on natural and technological hazards.

Bellavita and Gordon (2006) further explored homeland security-centered educational "themes." They identified themes through a cursory review of approaches to the content taken by universities, publishers, and agencies. Their content review revealed a set of approximately 51 subjects that could be taught within a course, under the rubric of homeland security. This subject list was developed post 9/11 and therefore included additional topics not addressed in Darlington's (1999) study.

The cumulative list of themes presented to practitioners included the 51 "educational themes" of Bellavita and Gordon (2006) and the 36 "study areas" of Darlington (1999). The practitioners in the current study were asked to select, from this cumulative list, the themes that would be most important to incorporate into core content for a combined HSEM baccalaureate program. Table 1 shows the cumulative list of 87 themes provided to survey respondents (practitioners).

Table 1. Bellavita and Gordon's (2006) and Darlington's (1999) Cumulative List of Themes

No.	Theme
	From Bellavita and Gordon (2006)
1	Threats to the Homeland
2	Risk Management and Analysis
3	Critical Infrastructure Protection
4	Laws Related to Homeland Security
5	Homeland Security Policies & Strategies
6	Responses to Terrorism
7	Terrorism
8	Intelligence
9	Overview of Homeland Security Mission Areas
10	Organization of Homeland Security
11	Sociology of Homeland Security
12	Systems Integration and Administration of Homeland Security
13	Border Security
14	Cyber Security
15	History of Homeland Security and Terrorism
16	Strategic Planning & Budgeting
17	Civilian & Military Relationships
18	Comparative & International Homeland Security
19	Federal Role in Homeland Security
20	Future of Homeland Security
21	Preparedness
22	Private Sector Role in Homeland Security
23	Public Health & Medical Issues
24	Role of State and Local Governments
25	Homeland Security Technology
26	Weapons of Mass Destruction
27	Critical Thinking
28	Federalism
29	Strategic Communications
30	Transportation Security
31	Basics of Homeland Security
32	Civil Liberties
33	Decision-Making
34	Ethical Issues
35	Interagency Coordination
36	Leadership
37	Media
38	Politics of Homeland Security
39	Prevention of Terrorism
40	Psychology of Homeland Security
41	Recovery After an Attack
42	Risk Communications
43	Utilities and Industrial Facilities Security
44	Emergency Management

No.	Theme
45	Engineering
46	Exercises and Training
47	Geospatial Dimensions of Homeland Security
48	Human Resource Management
49	Modeling & Simulation
50	Role of Communities in Homeland Security
51	Role of Individuals in Homeland Security
	From Darlington (1999)
52	General Emergency Management
53	Profession of Emergency Management
54	State and Local Emergency Management
55	Emergency Management Skills
56	Disaster Planning and Preparedness
57	Disaster Warning Systems and Citizen Response to Warnings
58	Citizen and Community Disaster Preparedness
59	Disaster Response and Operations
60	Hazard Prevention and Mitigation
61	Disaster Relief and Recovery
62	Information Technology and Emergency Management
63	Biological, Toxic Agents and Epidemic Hazards
64	Business and Industry Crisis and Accident Management
65	Earthquake, Tsunami and Geologic Hazards
66	Floods, Flash Floods and Dam Failure
67	Forest Fire, Wildfire and Conflagration
68	Hazardous Materials
69	Hurricanes, Cyclones, Typhoons and Coastal Erosion
70	Landslide, Mudslide, and Rockslide
71	National Security and Terrorism Hazards
72	Nuclear Power Plant Hazards
73	Thunderstorm, Lightning, and Tornado
74	Transportation Accidents
75	Volcano
76	Winter and Snow Storms, Blizzards, Avalanches
77	Public Administration and Emergency Management
78	Sociology of Disasters
79	Political Aspects of Disasters
80	Economic Aspects of Disasters
81	Research Methods and Analysis
82	Fire Community and Emergency Management
83	Public Health and Emergency Management
84	Ethics and Emergency Management
85	Media, Disasters and Emergency Management
86	Legal Issues in Emergency Management
87	Psychological Dimensions of Disaster

Best–Worst Scaling

Best–worst scaling (BWS) is a discrete-choice procedure that is designed to improve accuracy in the measurement of individual preferences by allowing survey respondents to identify both the best and worst items from a defined block of attributes (Orme, 2009). The approach was initially used to measure the importance of consumer product and brand preferences and has become popular across a variety of disciplines because it provides a reliable, choice-based method to produce measured utility values. BWS has gained broad acceptance as a research methodology in the social science, medical, and business fields. Market researchers often refer to BWS as maximum-difference scaling, or MaxDiff, whereas academics tend to use the term BWS (Louviere, Flynn, & Marley, 2015).

Interest in BWS has continued to expand in health economics (McIntosh & Louviere, 2002) and professional marketing research settings, where practitioners have used the approach to better determine consumer preferences (Cohen & Markowitz, 2002; Cohen & Neira, 2003). The efficacy of the approach was examined using a discrete-choice experiment (Potoglou et al., 2011) in England's Outcomes of Social Care study. In their examination, Potoglou et al. (2011) noted that BWS produced results similar to a traditional discrete-choice construct while placing a lower cognitive burden on survey respondents. Researchers have also applied BWS to other fields, such as health care and food science. For instance, BWS has been used in food and wine research to identify preferences for product attributes (Casini, Corsi, & Goodman, 2009; Cohen, 2009; Goodman, 2009; Goodman, Lockshin, & Cohen, 2008) and to measure sensory attributes in food science (Louviere, Flynn, & Marley, 2015). Cohen (2003) suggested that practitioners conducting associated research adopt BWS scaling over traditional rating scales to sidestep issues related to scale bias. Compared to traditional methods and paired comparisons, BWS is scale free, forcing respondents to provide the relative importance of an object or item; this approach ensures greater discrimination among items or groups of items. In this instance, BWS provides a methodologically sound approach that can be used to identify those educational themes that HSEM professionals indicated are most useful to their positions.

Practical application for best–worst scaling analysis. A case for the use of BWS was provided by Cohen's (2003) study, which documented a multinational company that had to determine a range of needs for consumers who would purchase their products. A list of benefits was provided to survey recipients that included ease of maintenance and repair, reliability, purchase price, warranty, product footprint, and upgradeability, among others. As with the present study, reliability was found to be the most important benefit with the lowest footprint.

Huybers (2014) utilized BWS in a quantitative analysis of students' evaluations of teaching (SET). BWS offered an advantage over Likert-type scales because the former provided a quantitative output that yielded metrics on a common scale for more meaningful output for in teaching evaluations. Another examination (Loureiro & Arcos, 2012) used BWS as a method to identify key management strategies regarding forest management programs. Several authors (Cohen, 2003; Kiritchenko & Mohammad, 2017; Louviere, Lings, Islam, Gudergan, & Flynn, 2013) have noted the increased reliability of the BWS results over the limitations of traditional rating scales and their importance to this analysis and use of a novel research tool in this examination.

Theoretical basis for best–worst scaling. Finn and Louviere (1992) identified three reasons that BWS is preferred over more traditional rating scales (e.g., paired comparisons). First, rating scales are not effective in forcing respondents to differentiate between the values of multiple items, whereas BWS enables discriminating measures for items of similar importance. Second, it is difficult to accurately interpret rating scale points in regard to understanding relative choice. Third, the validity of rating scales in relation to reliability and the public are either unknown or unknowable (Flynn & Marley, 2014). Finn and Louviere (1992) argued that BWS overcomes limitations inherent in paired comparisons (Thurstone, 1927) by valuing items within a random utility framework (McFadden, 1973).

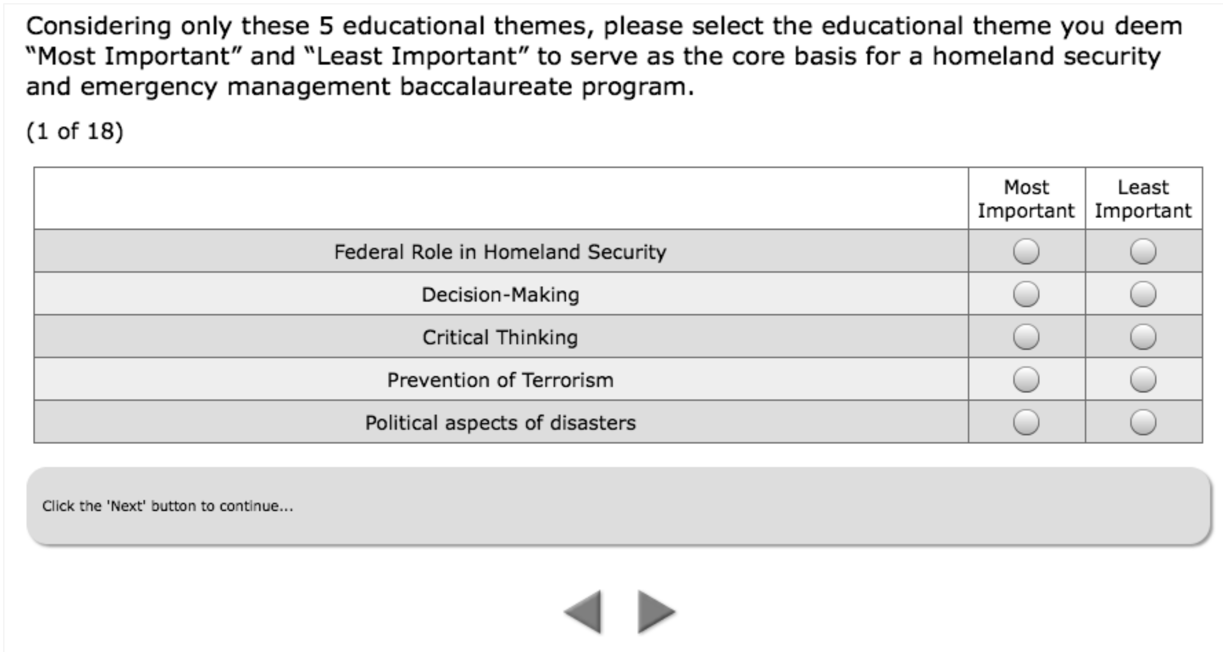
Thurstone's (1927) law of comparative judgment argued that a psychological continuum influences the paired comparisons of both physical stimulus intensities as well as qualitative comparative judgments. Thurstone argued that a discriminal process exists when a comparative judgment is made that can and will differ from another occasion when a judgment is made on a similar observation (i.e., the "just noticeable difference"). Consequently, individuals base comparative judgments on discriminal processes between a pair of objects or stimuli and select the object/stimuli for which they have a greater subjective preference (Vasquez-Espinosa & Conners, 1982).

McFadden (1973) expanded Thurstone's paired comparisons to account for an increased number of comparisons. McFadden's random utility theory provides the ability to analyze choice frequencies and to obtain a metric by which one object might be selected over that of another.

When applying McFadden's (1973) work on multinomial logit to BWS, the probability of choosing alternative A from a set of alternatives is proportional to the ratio of the utility of alternative A to the sum of the utilities of all the alternatives available for choice. Specifically, the probability of choosing A is the ratio of the exponentiated utility of alternative A to the sum of the exponentiated utilities of alternatives A, B, C . . . k, as shown in Equation 1:

$$P\ (A) = \frac{\exp(U_A)}{\sum_{i=A}^{i=k} \exp\ (U_i\ )} \tag{1}$$

Design of a best–worst scaling experiment. Best–worst scaling requires survey respondents to compare and then select both the best and the worst attributes within a defined block of items. The blocks of attributes presented to respondents are chosen from a larger set of attributes and are presented to the respondent in subsets of three, four, or five items (Orme, 2009). Each subset is displayed a sufficient number of times to ensure that each item is compared against other items from the overall collection. Respondents are asked to select both the best (most important) and worst (least important) option from a subset of items. Figure 1 presents one example of a best–worst choice set as it relates to the HSEM educational curricula that are ranked by respondents.



Considering only these 5 educational themes, please select the educational theme you deem "Most Important" and "Least Important" to serve as the core basis for a homeland security and emergency management baccalaureate program.

(1 of 18)

	Most Important	Least Important
Federal Role in Homeland Security		
Decision-Making		
Critical Thinking		
Prevention of Terrorism		
Political aspects of disasters		

Click the 'Next' button to continue...

Figure 1. Example of a Best–Worst Question for a Case 1 Type of Survey

The optimal design of the choice sets used in a BWS exercise requires frequency balance, orthogonality, connectivity, and positional balance (Orme, 2013). Frequency balance ensures that an item appears an equal number of times within an experiment. Orthogonality ensures that an item is paired with every other item an equal number of times. Connectivity makes it possible to associate interconnected relationships for an item to other items even if they were not paired. Finally, positional balance is achieved when each item appears an equal number of times within the rows of the experiment, which prevents locational bias.

Respondents should see each item at least three times during the course of the experiment if respondent-level utility is to be estimated (Orme, 2013). This is not practical in this instance, as a total of 87 curriculum items (K) would require $\frac{K\,(K-1)}{2} = 3{,}741$ paired comparisons. However, when utilizing BWS, stable estimates do not require all comparisons to be made (Orme, 2013). To avoid the potential for respondent fatigue, the number of sets was reduced using the "sparse" design developed by Wirth and Wolfrath (2012). Unlike a traditional BWS design, where a respondent might be asked to rank a particular item found in three different subsets, within a sparse framework respondents see an item only once. This simplification is possible because of the borrowing strength of Hierarchical Bayesian (HB) analysis, which allows for utility estimation across a limited number of responses (Wirth & Wolfrath, 2012). In the current setting, where $K = 87$ and $k = 5$, survey respondents were asked to provide best–worst responses for 18 separate subsets of five educational themes.

To ensure design efficiency, the specific composition of educational subsets was differentiated across 1,000 variations of the survey. The survey was administered online so that respondents could easily access and complete the survey at the time of their choosing.

Analysis of best–worst scaling data. Best–worst scaling data can be used to analyze individual-level score estimation as well as aggregate-level counting. Counts are the simplest form of resulting BWS aggregate-level data. A simple analysis provides a count for each item (theme) and the number of times it was selected as either a best or worst choice overall. The more often an item is selected as best demonstrates a stronger preference for that item within the survey population. The more often an item is chosen as worst indicates a weaker preference for that item within the survey population.

Beyond simple counts, survey results can be examined as proportional values. The times an item is selected as a best (B) can be divided by the times it was shown overall (S) to provide the best count proportion (Y), where $\frac{B}{S} = Y$. Conversely, the same can be done to provide for the proportion with which an item is selected as worse. A higher proportion of times an item is selected best indicates that respondents view the item more favorably, whereas a lower proportional value indicates a lesser degree of favorability.

Individual scores were estimated with an HB analysis utilizing McFadden's (1973) multinomial logit model. The HB estimation scores were provided in several forms, including raw, rescaled, and probability scores. The raw scores were a utility score drawn from multinomial logit. The scores were zero centered for each respondent. Based on respondent's best–worst choices, items were assigned either a positive or negative weight. An item with a higher utility (positive) score was more likely to be chosen as best compared with an item with a lower utility (negative) score. Weights were assigned on an interval scale to indicate the level of preference (scaled) from one item to another.

Rescaled scores were individual-level item scores with positive values that summed 100. The raw scores provided by the HB estimation were converted and scaled for significance. Positive score values indicated the likelihood of items being chosen within the questionnaire and, like the raw scores, were scaled. Unlike the raw scores, this approach provided for ratio scaling (an item with a score of 10 is considered twice as important as an item with a score of 5). The first step of the rescaling procedure was to zero-center the weights of the scores. The transformed item scores were scaled using a constant multiplier that sums 100. This process ensured a consistent scaling of weights in the context of each score as well as in the assumed error level from the sets presented. Given five items within each set, the probability of choice reflected the likelihood that an item would be selected as best over the four alternative items within the set.

Another method used to analyze BWS results was TURF, an algorithm that allows for the identification of the portfolio items that reach the widest set of respondents in this analysis (Howell, 2016). Squire and Orme (2012) used a market survey on grocery shoppers' ice cream flavor preferences to show how TURF can identify an optimal portfolio of items to reach a broad number of survey respondents. The findings showed that selling only the most popular seven of 42 flavors would actually miss potential; instead, stocking some niche flavors maximizes the number of shoppers who will find a flavor they like. That is, the grocer applies a threshold method to reach as many potential shoppers as possible.

The MaxDiff analyzer provides several ways to determine reach within TURF. One is first choice, in which respondents can be counted as reached if the subset of items they are presented with contains their top item (raw score). If a respondent reports several top items, then the other top items will be noted as reached with a partial reach value of 1/*n*, with *n* serving as the number of top items.

A second way in which the MaxDiff analyzer determines reach is with a threshold. That is, if the probability of choice within the examined set exceeds the supplied threshold provided for an item (from the respondent's probability of choice), then the respondent is considered reached (likelihood that he or she would have selected that item). Should two sets have equal reach, the set with the greater frequency is preferred.

The final portion of the stepwise TURF analysis procedure uses swaps to fine-tune the examination of a portfolio's reach. Swaps allow an item not selected as best to be examined within each portfolio to determine if the portfolio is more attractive as a result of this item's introduction. Should a swap have the ability to lead to a new portfolio that is more attractive than the previous portfolio, it is kept. If it does not make the portfolio more attractive, it is not kept, and the iterative process is run until all of the swaps within the algorithm have been made. The swaps can be made until no new ideal portfolios are found, and this is much quicker than the standard exhaustive procedure (Squire & Orme, 2012).

Several empirical studies have analyzed the educational needs of emergency management and homeland security practitioners who are in the workforce in operational positions. Although the efforts of emergency management educators predate those within the domain of homeland security, greater discourse has developed regarding the advantages of an integrated HSEM education. Despite historical and cultural differences between the two fields, an integrated program that accounts for the interdisciplinary demands of a workforce operating in an increasingly complex and challenging environment is needed.

Survey and Data Collection

The target population was North American practitioners within the HSEM enterprise. Two primary means of outreach were utilized to source practitioners as participants in the survey: formal professional social networks (occupation specific) and the International Association of Emergency Manager contact list. In both cases, individuals were contacted individually by email through the use of a pre-scripted contact that requested their participation. Survey respondents who opted to participate were provided with a hyperlink to an internal website managed within the HSEM program at the University of Alaska, Fairbanks. Through that link, participants registered for the study by submitting their name, email address, and location. After completing the registration process, participants were automatically redirected to a new URL that contained a link that allowed them to participate in the survey. No direct link was provided to the survey site; all participants were required to register before being granted access to the survey tool where the data were captured and later analyzed.

Because participants were using different types of computer equipment in different environments to complete the survey, we conducted a brief check for significant variations in the data by the participants' web browser type, version, operating system, and IP address. No anomalies were found for either the pretest or actual survey data.

FINDINGS

The purpose of this study was to investigate the educational themes that HSEM education practitioners determined important to serve as the core for an integrated HSEM baccalaureate program.

A total of 1,149 practitioners registered, of which 1,006 ($n = 1,006$) completed the survey. Participants with incomplete surveys ($n = 143$; 12.5% of survey registrants) might have been prevented from accessing the survey due to technical issues or organizational firewalls. Because participants were found via posts to social networks, a response rate cannot be determined. Additionally, 2,486 direct emails were sent; however, in addition to soliciting participation, the emails requested the recipients to further distribute the survey to other practitioners. These recruitment approaches expanded the reach to potential participants but also precluded knowing the response rate.

Best–Worst Scaling Results

Aggregate-level discrimination. Simple counts (Table 2) are the least complicated output from a BWS experiment involving aggregate-level data. The simple-counts scaling data reflect the frequency with which an item was shown and the number of times it was selected as a best (or worst) choice. Higher frequencies of an item being selected as a best choice indicated a higher degree of preference for including that theme within an HSEM core curricula, whereas higher frequencies as a worst choice indicated a lower preference for inclusion. The least–worst counts provided in Table 3 further reinforced the strength and consensus of the themes selected.

Table 2. Simple Counts of Top 25 Items Selected as Best, by Rank Order

Rank	Item	Label (educational theme)	Times selected as best	Best count proportion	Times selected worst	Worst count proportion
1	5	Disaster planning and preparedness	621	.596	10	.010
2	8	Disaster response and operations	519	.501	26	.025
3	80	Emergency management	519	.499	26	.025
4	4	Emergency management skills	488	.467	48	.046
5	82	Exercises and training	481	.463	32	.031
6	3	State and local emergency management	480	.460	23	.022
7	60	Role of state and local governments	463	.446	39	.038
8	63	Critical thinking	463	.446	76	.073
9	71	Interagency coordination	454	.435	31	.030
10	38	Risk management and analysis	448	.431	49	.047
11	57	Preparedness	444	.429	31	.030
12	7	Citizen and community disaster preparedness	437	.421	55	.053
13	26	Public administration and emergency management	420	.403	65	.062
14	72	Leadership	420	.403	73	.070
15	69	Decision-making	413	.396	62	.059
16	9	Hazard prevention and mitigation	408	.392	28	.027
17	1	General emergency management	391	.377	94	.091
18	10	Disaster relief and recovery	344	.330	27	.026
19	2	Profession of emergency management	334	.321	177	.170
20	47	Sociology of homeland security	322	.310	203	.195
21	34	Media, disasters and emergency management	313	.301	68	.065
22	39	Critical infrastructure protection	311	.299	51	.049
23	52	Strategic planning & budgeting	310	.298	105	.101
24	6	Disaster warning systems and citizen response to warnings	292	.271	127	.118
25	32	Public health and emergency management	274	.263	40	.038

Table 3. Rank Ordered by Least Worsts

Rank	Item	Label (educational theme)	Times selected as best	Best count proportion	Times selected worst	Worst count proportion
1	5	Disaster planning and preparedness	621	.596	10	.01
2	3	State and local emergency management	480	.46	23	.022
3	8	Disaster response and operations	519	.501	26	.025
4	80	Emergency management	519	.499	26	.025
5	10	Disaster relief and recovery	344	.33	27	.026
6	9	Hazard prevention and mitigation	408	.392	28	.027
7	57	Preparedness	444	.429	31	.03
8	71	Interagency coordination	454	.435	31	.03
9	82	Exercises and training	481	.463	32	.031
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15	7	Citizen and community disaster preparedness	437	.421	55	.053
16	69	Decision-making	413	.396	62	.059
17	26	Public administration and emergency management	420	.403	65	.062
18	34	Media, disasters and emergency management	313	.301	68	.065
19	72	Leadership	420	.403	73	.07
20	63	Critical thinking	463	.446	76	.073
21	65	Strategic communications	262	.252	76	.073
22	78	Risk communications	231	.222	85	.082
23	11	Information technology and emergency management	269	.26	87	.084
24	86	Role of communities in homeland security	274	.263	93	.089
25	1	General emergency management	391	.377	94	.091

Individual-level discrimination. HB analysis utilizing a multinomial logit model was used to estimate respondent utilities for educational themes. Raw scores are provided in this paragraph, and probability formats are presented in Tables 4 and 5. These scores can take positive or negative values and are zero centered. The magnitude of the raw score, or part-worth, indicates that the item selected would be more likely to be chosen best (i.e., over others with a lower score). The lower a score, the less likely it was to be selected. Although the estimated scores were measured on an interval scale, they did not support an interpretation as ratios. For example, an item with a score of 2.0 is not necessarily twice as important (or preferred) as an item with a score of 1.0. The probability-of-choice scores (Table 5) reflect the likelihood (0-100%) that a respondent chose an item as best from a set of five survey items.

Table 4. Raw Scores (Top 25 by Rank Order)

Rank	Item	Label (educational theme)	Average	95% *CI* Lower	95% *CI* Upper
1	5	Disaster planning and preparedness	4.02	3.94	4.11
2	8	Disaster response and operations	3.33	3.24	3.42
3	80	Emergency management	3.23	3.14	3.33
4	3	State and local emergency management	3.08	3.01	3.16
5	82	Exercises and training	2.98	2.89	3.07
6	71	Interagency coordination	2.92	2.85	2.99
7	60	Role of state and local governments	2.90	2.81	2.98
8	63	Critical thinking	2.89	2.74	3.03
9	4	Emergency management skills	2.88	2.77	2.99
10	57	Preparedness	2.74	2.66	2.82
11	38	Risk management and analysis	2.61	2.51	2.71
12	9	Hazard prevention and mitigation	2.52	2.45	2.60
13	7	Citizen and community disaster preparedness	2.51	2.41	2.61
14	26	Public administration and emergency management	2.46	2.33	2.58
15	69	Decision-making	2.38	2.26	2.50
16	72	Leadership	2.30	2.18	2.42
17	1	General emergency management	2.24	2.11	2.37
18	10	Disaster relief and recovery	2.06	1.99	2.14
19	34	Media, disasters and emergency management	1.68	1.58	1.78
20	39	Critical infrastructure protection	1.61	1.54	1.68
21	32	Public health and emergency management	1.52	1.46	1.59
22	52	Strategic planning & budgeting	1.41	1.31	1.51
23	65	Strategic communications	1.37	1.28	1.46
24	11	Information technology and emergency management	1.24	1.16	1.33
25	86	Role of communities in homeland security	1.16	1.07	1.25

Table 5. Probability of Choice (Top 25 by Rank Order)

Rank	Item	Label (educational theme)	Average	95% *CI* Lower	95% *CI* Upper
1	5	Disaster planning and preparedness	88.12	87.26	88.98
2	8	Disaster response and operations	80.63	79.44	81.82
3	3	State and local emergency management	79.03	77.92	80.14
4	80	Emergency management	78.68	77.36	80.01

Rank	Item	Label (educational theme)	Average	95% *CI*	
				Lower	Upper
5	71	Interagency coordination	77.75	76.67	78.82
6	82	Exercises and training	76.42	75.11	77.73
7	60	Role of state and local governments	75.43	74.08	76.77
8	57	Preparedness	73.68	72.37	74.99
9	4	Emergency management skills	73.18	71.59	74.77
10	9	Hazard prevention and mitigation	70.97	69.67	72.26
11	38	Risk management and analysis	70.15	68.59	71.71
12	63	Critical thinking	69.53	67.62	71.44
13	77	Citizen and community disaster preparedness	68.09	66.44	69.74
14	26	Public administration and emergency management	66.19	64.34	68.05
15	69	Decision-making	65.37	63.54	67.21
16	72	Leadership	63.57	61.68	65.46
17	10	Disaster relief and recovery	62.80	61.34	64.26
18	1	General emergency management	62.62	60.67	64.57
19	34	Media, disasters and emergency management	55.29	53.55	57.04
20	39	Critical Infrastructure Protection	54.35	52.92	55.78
21	32	Public health and emergency management	52.86	51.59	54.13
22	52	Strategic planning & budgeting	50.89	49.13	52.65
23	65	Strategic communications	49.89	48.29	51.49
24	11	Information technology and emergency management	47.38	45.77	48.98
25	2	Profession of emergency management	46.58	44.47	48.69

TURF 95% Probability Analysis

A TURF analysis was further used to identify portfolios of the educational themes that reached the widest group of survey participants at the greatest frequency. From the entire list of 87 educational themes, the TURF assessment was used to develop five 25-item portfolios that were selected as first choice with the greatest frequency by respondents. These first choices (Table 6, column entitled “TURF First Choice”) represented the top selections for 97.2% (978/1,006) of respondents. Out of five portfolios, a total list of 27 educational themes was identified as the respondents’ first choices, with 23 of those being 100% likely to have appeared within each portfolio. The four remaining items appeared in only two (40%) or three (60%) of the portfolios. Those four remaining themes (items) are the final items listed in the TURF First Choice column of Table 6.

Table 6. Consolidated Counts/Scores and TURF List

Item	Scores/Counts	Item	TURF First Choice	Item	TURF 95% Probability
1	General emergency management	1	General emergency management	1	General emergency management
2	Profession of emergency management	2	Profession of emergency management	2	Profession of emergency management

Item	Scores/Counts	Item	TURF First Choice	Item	TURF 95% Probability
3	State & local emergency management	3	State & local emergency management	3	State & local emergency management
4	Emergency management skills	4	Emergency management skills	4	Emergency management skills
5	Disaster planning & preparedness	5	Disaster planning & preparedness	5	Disaster planning & preparedness
6	Disaster warning systems & citizen response to warnings	7	Citizen & community disaster preparedness	7	Citizen & community disaster preparedness
7	Citizen & community disaster preparedness	8	Disaster response & operations	8	Disaster response & operations
8	Disaster response & operations	9	Hazard prevention & mitigation	9	Hazard prevention & mitigation
9	Hazard prevention & mitigation	20	National security & terrorism hazards	20	National security & terrorism hazards
10	Disaster relief & recovery	26	Public administration & emergency management	26	Public administration & emergency management
11	Information technology & emergency management	37	Threats to the homeland	34	Media, disasters & emergency management
26	Public administration & emergency management	38	Risk management & analysis	37	Threats to the homeland
32	Public health & emergency management	39	Critical infrastructure protection	38	Risk management & analysis
34	Media, disasters & emergency management	47	Sociology of homeland security	39	Critical infrastructure protection
38	Risk management & analysis	57	Preparedness	45	Overview of homeland security mission areas
39	Critical infrastructure protection	60	Role of state & local governments	47	Sociology of homeland security
47	Sociology of homeland security	63	Critical thinking	57	Preparedness
52	Strategic planning & budgeting	67	Basics of homeland security	60	Role of state & local governments
57	Preparedness	69	Decision-making	63	Critical thinking
60	Role of state & local governments	71	Interagency coordination	67	Basics of homeland security
63	Critical thinking	72	Leadership	69	Decision-making
65	Strategic communications	80	Emergency management	72	Leadership
69	Decision-making	82	Exercises & training	80	Emergency management
71	Interagency coordination	34	Media, disasters & emergency management	82	Exercises & training
72	Leadership	45	Overview of homeland security mission areas	14	Earthquake, tsunami & geologic hazards
78	Risk communications	50	Cyber security	32	Public health & emergency management

Item	Scores/Counts	Item	TURF First Choice	Item	TURF 95% Probability
80	Emergency management	52	Strategic planning & budgeting	40	Laws related to homeland security
82	Exercises & training			50	Cyber security
86	Role of communities in homeland security			86	Role of communities in homeland security
	Homeland security-centric topics = 3 Total topics = 29 (homeland security content = 10.3%)		Homeland security-centric topics = 7 Total topics = 27 (homeland security content = 25.9%)		Homeland security-centric topics = 9 Total topics = 29 (homeland security content = 31%)

For the TURF analysis (Table 6), a 95% probability setting was prescribed, providing for a respondent being considered reached if the probability of choice for an item in the set examined exceeded 95%. Howell (2016) noted that, unlike the TURF first-choice analysis, the threshold provides for a good second choice if the likelihood for selection is 95% or above. As with the first choice, the consistency in reach reinforced the popularity of many of the same educational themes seen within the prior examinations.

The consolidated TURF 95% probability list from the examined portfolios contained 29 items. Each of the individuals at the 95% probability or above was reached by the educational themes, and 24 had a 100% likelihood of being selected within each examined portfolio. The five remaining items each appeared only a single time (20%) within the five portfolios; each of these items still had to reach the 95% probability for selection by a respondent. The top-ranked items in this examination were the most popular educational themes within the study, which was similar to the other examinations. The five themes (items) not found to have been in in each set are listed last in the TURF 95% Probability column of Table 6.

Consolidated Counts/Scores and TURF Analysis

Table 6 provides a consolidated list of educational themes that allows for a comparison of parity between the three consolidated lists (scores/counts or TURF) and the educational themes selected. The educational themes selected remained consistent regardless of the analytic tool used in the experiment. It is important to remember that there were more than 25 themes due to differences in the top 25 rankings across each approach. In instances where an experiment might have had a list that introduced a topic not seen in previous examinations, that topic was added to the lists to ensure that the educational themes selected as part of each portfolio examined were included for further review.

The final examination conducted was a consolidated synthesis (Table 7) of the three previous examinations (counts/scores, TURF first choice, and TURF 95% probability). This final list demonstrated consistency with many of the themes, although there were some subtle changes in content, including an increase in homeland security–centric themes from one examination to the next. The fewest homeland security themes found in the analysis was using the counts/scores analysis, which was a strict, rank-ordered list of the most popular items. The TURF first-choice examination included seven homeland security themes of the 27 educational themes in the examination. Finally, the TURF 95% probability contained a total of nine homeland security themes of 29 total educational themes within the examination.

Table 7. Cumulative HSEM Educational Themes List

#	Educational theme (item # in study)	Educational theme
1	5	Disaster planning and preparedness[a]
2	8	Disaster response and operations[a]
3	80	Emergency management[b]
4	3	State and local emergency management[a]
5	82	Exercises and training[b]
6	60	Role of state and local governments[b]
7	63	Critical thinking[b]
8	4	Emergency management skills[a]
9	57	Preparedness[b]
10	38	Risk management and analysis[b]
11	9	Hazard prevention and mitigation[a]
12	7	Citizen and community disaster preparedness[a]
13	26	Public administration and emergency management[a]
14	69	Decision-making[b]
15	72	Leadership[b]
16	1	General emergency management[a]
17	34	Media, disasters and emergency management[a]
18	39	Critical infrastructure protection[b]
19	32	Public health and emergency management[a]
20	2	Profession of emergency management[a]
21	47	Sociology of homeland security[b]
22	67	Basics of homeland security[b]
23	86	Role of communities in homeland security[b]
24	20	National security and terrorism hazards[a]
25	40	Laws related to homeland security[b]
26	50	Cyber security[b]
27	37	Threats to the homeland[b]
28	45	Overview of homeland security mission areas[b]
29	14	Earthquake, tsunami and geologic hazards[a]

Note. Highlighted themes were common to all previous examinations.
[a] Darlington educational theme
[b] Bellavita and Gordon educational theme

The results from the previous examination provide a structured manner in which to investigate the workforce needs of an integrated homeland security and emergency baccalaureate program. The HSEM practitioner survey results from the final examination of the BWS and TURF analysis showed substantial agreement on the educational needs of HSEM programs. The simple counts, BWS, and

TURF methodologies also provided differing results about the degree to which HSEM education should be integrated.

DISCUSSION/CONCLUSIONS

Review of Key Findings

The DHS was created from an amalgamation of 22 federal agencies and departments and all of their associated responsibilities. In the post-9/11 environment in which it was created, the DHS has served as the primary coordinator for the fields of HSEM security and emergency management for nearly 20 years. As competing priorities and emergencies have challenged the DHS's evolving nature and operations, the two fields have largely integrated from an operational perspective (Kfir, 2018). The question of academic integration between the communities, however, has remained.

The final analysis of this study resulted in cumulative list of HSEM educational themes (Table 7). Practitioners selected almost the same number of themes from each of the two source inventories (Bellavita & Gordon, 2006; Darlington, 1999). Specifically, of the top 29 educational themes selected by practitioners, 21 were drawn from Darlington's inventory, whereas the remaining 8 were from Bellavita and Gordon's. The parity between the educational themes confirms the importance of having an integrated content in HSEM coursework. Additionally, the practitioners in this study reported that they valued content that consisted of both HSEM themes; this finding reinforces previous researchers' calls for integrated curricula to better meet the needs of an increasingly complex work environment (Drabek, 2007; Hogue & Bea, 2006; McCreight, 2009).

This study underscored the significance of using BWS and TURF analyses to develop an integrated list of educational themes.

Survey data from 1,006 practitioners were examined to meet the call from previous studies to evaluate the need for integrated HSEM programs (Drabek, 2007; Kiltz, 2011, 2012; McCreight, 2009). The respondents provided a robust and remarkably consistent set of themes that would best prepare college graduates to meet HSEM workforce needs. The themes included aspects from both the homeland security and the emergency management fields. The results demonstrated the importance of integrating themes from both fields into HSEM baccalaureate programs and, in general, connecting the two professional communities.

The present findings revealed a diverse set of educational themes that practitioners recommended including as core content in an integrated HSEM baccalaureate education. Not surprisingly, themes included disaster planning, emergency management, emergency preparedness, risk management, and risk analysis. Themes that have not traditionally fallen within the rubric of emergency management, such as homeland security, critical infrastructure protection, and even national security and terrorism, were also identified as important content areas. The clearly defined crossover of subject matter indicates that the traditional approach of teaching one field or the other does not meet with practitioners' expectations for emerging professionals. This finding was drawn from a large sample size and was robust across two analyses (BWS and TURF).

The use of BWS and its extension, TURF, provided an empirical basis supporting future use of these discrete-choice tools. Although BWS has not previously been used within the HSEM academic and research arenas, the analytic method is an effective way to aggregate both individual and collective choice preferences for future studies.

Implications

One strength of this study was the sample size, which was more than three times the number of respondents required for robust qualitative results (Orme, 2010). Additionally, the large sample provided a broad range of perspectives. A potential limitation of the study could reside within the use of a voluntary sampling group who were invited to participate but may have self-selected not to participate based upon a lack of interest concerning the topic. Another potential limiting factor might reside in the number of individuals who identified as Emergency Managers (federal, state or local) (n=548) out of the total study of (n=1006). While the number could potentially serve to create an anchoring bias where emergency management educational themes would be more heavily favored, the overall findings demonstrated some degree of parity in what was valued overall in relation to both HSEM themes.

The use of BWS has implications for use in future studies. In particular, forcing respondents to choose best and worst answers can sidestep recognized issues related to the use of traditional, scale-based survey instruments (Cohen, 2003). The use of BWS and TURF can likewise be utilized by other emerging fields within the HSEM construct. Whereas a discrete-choice experiment can be used to obtain statistical results on respondent preferences, BWS and variants can be used to identify not only a list of topics but also attributes that can classify subsets of those topics. An example from the current study is the topic of intelligence, which participants commonly selected for inclusion in integrated HSEM curricula. The topic of intelligence could parsed into various subtypes of intelligence, such as human intelligence, signals intelligence, or imagery intelligence, and the respondent could then be required to select one aspect as more important than another.

Recommendations

The 87 themes explored in this study were derived from previous examinations of courses and content from institutions of higher education offering emergency management (Darlington, 1999) and homeland security (Bellavita & Gordon, 2006) programs. Future studies to further develop a defined core curriculum should examine evolving or emerging topics of concerns that might influence the needs of HSEM practitioners moving forward. For example, a topic that might warrant further examination is climate change and its numerous consequences for both emergency managers and homeland security professionals.

Although the results of this study's survey provide the backdrop for what practitioners thought was needed for HSEM undergraduate programs, the list of 29 themes is too large to be included (as single subjects) within a program. Narrowing the number of themes to a clearly defined, more universal curriculum should prove to be more useful as a program basis than the current integrated list. Some themes acknowledged in previous studies, such as critical thinking, are important in their own right and can be incorporated into all course material (Kiltz, 2009). Other themes that might not be of significance as a standalone course might still be incorporated as a competency or skill within a course.

In response to the discourse on developing program standards to support an integrated HSEM education (Donahue, Cunniony, Balabanz, & Sochats, 2010; Drabek, 2007; Kiltz, 2011, 2012; McCreight, 2009), further research should work to identify standards and a body responsible for upholding them. McCreight (2009) rightly acknowledged the lack of operational background and experience for those looking to provide quality education, and Donahue et al. (2010) contended that academia should develop and deliver this knowledge. Only by developing integrated practices between the HSEM fields can practitioners and scholars alike create and sustain successful integrated HSEM programs.

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