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Developing a Homeland Security Curriculum: A Case Study in Outcomes-Based Education

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Abstract

In 2007, I began research for my doctoral dissertation on what a curriculum in an undergraduate degree in homeland security should look like. At that time, the field of homeland security was a nascent discipline, and as such it did not have a standardized academic curriculum. There were several institutions of higher learning in the United States that were offering degrees in homeland security, but no consensus existed on what the curriculum should contain. This is what prompted me to perform a case study, gathering input from a body of subject matter experts as to what these experts felt were the necessary learning objectives for an undergraduate degree in homeland security. The research project used a qualitative, case study methodology to examine and validate the results of earlier studies on homeland security curriculum development. I used a consensus-driven, iterative Delphi technique to survey a sample of homeland security experts to ascertain their ideas on what elements should comprise an undergraduate degree in homeland security and then compared the data with earlier research projects. The participants in the study identified a list of 15 core academic areas with a set of 50 associated program-specific objectives and a list of eight overarching program objectives that in their eyes could comprise a standardized model homeland security curriculum. I felt that adoption of such a model curriculum would not only aid in standardization but could be a precursor for an institution seeking program accreditation in the field of academic homeland security.

Learning Outcomes

By the end of this case, students should be able to

- Understand the need for a standardized undergraduate curriculum in homeland security
- Explain the role that outcomes-based education plays in curriculum development
- Discuss the rationale behind the use of the Delphi technique to achieve consensus on curriculum elements
- Interpret the results of the curriculum development case study
- Evaluate the effectiveness of the case study methodology in answering the problem statement and research questions

Project Overview and Context

When I began teaching undergraduate courses in homeland security (HS), I quickly realized that the field of academic HS was a nascent discipline, and as such it did not have a standardized, outcomes-based curriculum. Academic HS at that time (2006) was a brand-new field. According to Christopher Bellavita and Ellen Gordon (2006), although the discipline of HS

had a myriad of published guidelines and strategies, including 12 federal strategies, more than 50 state and territory strategies, 13 homeland security presidential directives (HSPDs), and a growing list of implementation guides, there was no standardized, accredited degree program for HS students at that time.

There had been some work done in the topic of HS curriculum development prior to my doctoral research project. In fact, my own institution, Embry–Riddle Aeronautical University (ERAU), had begun a bachelor's degree program in HS in 2007, and a team of faculty had developed one of the first outcomes-based HS curriculum in the nation (Ramsay, Cutrer, & Raffel, 2010). Wanting to validate and expand upon this initial research, I chose to employ a case study methodology to evaluate the results of this earlier study. I designed a qualitative study to identify a new set of program-level, learning-based outcomes for an undergraduate degree in HS. I used a consensus-driven, iterative Delphi technique to survey a sample of HS experts to ascertain their ideas on what elements (i.e., knowledge, skills, and abilities) should comprise an undergraduate degree in HS and then compare and contrast the data with the earlier research project of 2010. In addition, I gathered basic demographics on the panel to gauge their thoughts regarding additional elements that should be included in an HS degree. It was my hope that the proposed curriculum developed by my study would enable institutions of higher learning to offer a unified, outcomes-based curriculum that would achieve a measurable level of knowledge, skills, and abilities a student must have to perform successfully as an HS professional in the 21st century.

Research Practicalities

The problem addressed in this case study was the lack of generally accepted or peer-reviewed program-level, learning-based outcomes that defined a bachelor's degree in HS. At the time, there was no national accrediting body for HS degree programs, such as exists in other academic disciplines, despite the fact that the concept of HS had found its way into academia. According to Cheryl Polson, John Persyn, and O. Shawn Cupp (2010), "There is no nationally recognized program [for academic homeland security] in higher education at all" (p. 1). Likewise, there appeared to be little curriculum standardization among the early academic HS programs around the country.

Some research had been done on the subject. An initial study was completed at ERAU in 2007-2008, which surveyed a small panel of HS experts to help identify a list of the knowledge, skills, and abilities that HS majors should attain upon graduation. Although that initial study was valuable, I felt that the size of the sample population used ($N = 8$) was statistically too small to produce conclusive results. Therefore, my case study was designed to validate and build upon

that initial ERAU study by surveying a larger population of HS experts, made up of the 2010 membership of the University and Agency Partnership Initiative (UAPI) membership (*N* = 338).

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Research Design

For this project, I decided to incorporate a case study approach and the Delphi technique because both methodologies offered something the project needed. Rather than using samples and following a rigid protocol to examine limited number of variables, I chose the case study method because it involved an in-depth, longitudinal examination of a single issue (HS curricula) and provided a systematic way of looking at similar topics, collecting data, analyzing information, and reporting the results. According to Robert Yin (2003), "The case study is but one of several ways of doing qualitative social science research, and is the preferred strategy when the focus is on a contemporary phenomenon with real-life context" (p. 1).

I felt that the case study method was a strategy that engaged the participants and facilitated problem-solving in a nascent field of study such as HS. According to William Trochim (2001), there is no single way to conduct a case study, and a combination of surveys, interviews, and observations can be used. Hence, one acceptable method of conducting a case study would be use of the Delphi technique. I reviewed the recent literature on the topic and found that case study methodology was successfully coupled with the Delphi technique in several instances to explore and describe research questions on a wide variety of topics, including curriculum development (Kerrigan, 2005; Lee, 2006; Siccama, 2006; Stewart, 2008). This is why I chose qualitative case research in my study to examine and validate the results of a similar, earlier study done by ERAU.

After deciding upon the case study methodology to compare the earlier ERAU study with the results of my study, my next step was to generate a basic research question to guide my case study. This was, "What competencies (knowledge, skills, and abilities) should undergraduates in HS possess?" In turn, this overarching question led to the following more in-depth research questions:

- *Q1*. What core academic areas, overarching program objectives, and program-specific objectives should comprise an undergraduate degree in HS?
- *Q2*. What areas of overlap exist between my study's final set of core academic areas, overarching program objectives, and program-specific objectives and those developed by earlier studies, particularly the one from ERAU?
- *Q3*. What additional elements are of importance to the academic field regarding the development of an HS degree program?

To explore this research question, the actual methodology of my study consisted of four iterative phases or rounds:

- *Round 1*—employment of the Delphi survey technique to a larger population of subject matter experts to determine by consensus what elements should make up the core academic areas in an HS curriculum;
- *Round 2*—promulgation of a survey instrument to poll the UAPI membership on what elements should be included in the overarching program objectives of an HS degree program;
- *Round 3*—distribution of a survey instrument to determine the program-specific outcomes that should be associated with the core academic areas identified in an earlier round;
- *Round 4*—obtain via survey the panel members' demographic data and elicit their responses on a variety of culminating questions regarding HS curriculum development.

My project used a series of processes (Delphi method, qualitative surveys, and outcomes-based education models) to materially assess and modify core courses based on input from a panel of experts in the field of HS. Overall project success was achieved in four steps:

1. A set of core academic areas for a baccalaureate degree was obtained from the participants.
2. A set of overarching program objectives was developed by the panel.
3. A list of program-specific objectives was agreed upon by the participants.
4. Data were collected from the panel on a set of culminating questions regarding demographics and additional elements that make up an HS degree program.

Finally, the data obtained by my study were compared with the initial results from the ERAU study and others to ascertain the degree of validity of the earlier research projects.

Method in Action

The need for development of standardized, outcomes-based curriculum for the academic field of HS was apparent from my initial research. Academia's mission in developing future HS leaders is recognized by the U.S. Department of Homeland Security (DHS), in that the Science and Technology Directorate of the Department exhorted the academic community to "educate and inspire the next generation homeland security of workforce" (USDHS, 2009, para 1). However, I was not able to locate any significant, scholarly, peer-reviewed publications on developing an outcomes-based, standardized HS degree with program-level objectives at the undergraduate level. I chose to concentrate on two elements: (a) outcomes-based education and (b) the Delphi technique.

Outcomes-Based Education

In designing a curriculum, I was aware that one of the vital design elements was an ability to measure a student's success in actually learning the subject matter. One way to accomplish this criterion was to develop a curriculum that is outcomes-based and is assessable. The field of education has long recognized the principles and theories of outcomes-based education, which emphasize result-oriented thinking. Ronald Harden, Johnathan Crosby, and Matthew Davis (1999) defined outcomes-based education as a way of designing, developing, delivering, and documenting instruction in terms of its intended goals and outcomes. David Andrich (2002) posited that an outcomes-based education program must describe actual student learning experiences that can be assessed in light of measurable performance metrics. Therefore, I felt that outcomes-based education should lead to specification of distinct student outcomes that could be measured by educational assessment.

Choosing the Survey Population

Once I decided upon an outcomes-based curriculum, I next wondered how to best assemble a panel of experts to assist in my case study. I decided to tap into the collective wisdom of a group of HS subject matter experts belonging to the organization called UAPI, a program under the auspices of the Center for Homeland Defense and Security. This organization brings together institutions from across the United States that are dedicated to advancing HS education, works to accelerate the establishment of high-quality academic programs, and provides opportunities for collaboration that create an intellectual multiplier effect that furthers the study of HS.

Participants for my study comprised the 338 members from the 2010 membership roster of UAPI, who are considered experts in the field of academic HS/defense due to their education, judgment, skills, and experience. Emulating the consensus-driven initial results from the 2010 ERAU study, I distributed an expanded survey to the larger cohort of UAPI members, affording a higher degree of validity and reliability for my study.

The Delphi Technique

Now that I had the survey population selected, what methodology should I employ to gather the data? I decided to use the same methodology as the 2010 study, namely, an iterative, online survey based on the techniques of the Delphi method to reach consensus of the elements of an outcomes-based undergraduate degree curriculum in HS. The Delphi method, named after an ancient Greek oracle able to foretell the future, was first developed at the RAND think tank in California in the 1960s. The technique has often been used as a unique research tool that

encourages a true debate of specified topics, independent of personalities (Linstone & Turoff, 2002).

The Delphi method can be most effective in educational research when the problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis. From a cost–benefit perspective, the Delphi technique can be economical when more individuals are needed than can effectively interact in a face-to-face exchange or when time and cost make frequent group meetings infeasible. Finally, the Delphi methodology, by using anonymity, preserves the heterogeneity of the panel members and may actually increase validity by avoiding the potential of one strong personality dominating the group (Linstone & Turoff, 2002).

The main reason I chose the Delphi method is for its ability to collect consensus via expert opinions and synthesize new, alternative solutions. The potential weakness of the Delphi methodology was that the panel in my project comprised only members of UAPI, which represented a convenience sample of subject matter experts in the HS field. However, the rather homogeneous professional representation in the Delphi panel was not necessarily a drawback because the study's aim was to generate core competencies and program-level outcomes for an HS degree program. According to Michael Adler and Erio Ziglio (1996), valid policy recommendations and alternative, innovative strategies can still be achieved with small, homogeneous panels.

What the Earlier ERAU 2010 Study Found

The principal basis of my case study was examination of an earlier study conducted by faculty of ERAU in 2008. To understand the intent and methodology of my later study, it is necessary to provide a synopsis of that earlier study which was used as a model. The earlier ERAU study determined that a need existed for a set of standardized learning outcomes for an HS degree program. In conducting their study, the ERAU researchers selected eight professionals in the field of HS, including the areas of emergency management, HS law and policy, terrorism studies, critical infrastructure and risk analysis, law enforcement, and homeland defense. Together, the eight panelists selected for this earlier study had 120 years of combined experience in HS and were considered subject matter experts in their field.

To answer the research questions proposed in this study, the ERAU researchers used the Delphi technique. Specifically, the Delphi process proceeded in iterative rounds using a web-based survey to present the proposed curriculum outcomes and to capture each panelist's responses. In a series of two rounds, each with several iterations, the ERAU researchers explained the process and presented the precise obligations for the panel members along with

a timeline for completion of the round. During subsequent iterations and rounds, the ERAU researchers provided an update and summary of study progress to the participants. Consensus was achieved when 75% of the participants agreed on a particular element.

Although the results of the original ERAU study were interesting as a first look into the development of an outcomes-based curriculum in HS, I felt that the size of the survey population was too small to achieve statistical validity and that further study was warranted to fully explore the issue. Therefore, my later case study closely replicated the results of the ERAU research and attempted to validate and expand upon the earlier results utilizing the same research methodology, but performed on a much larger survey population, and including an additional set of survey questions employing a 5-point Likert-type scale.

What My 2012 Case Study Found

Two years after the initial ERAU study, I fielded an online, iterative survey to validate and build upon the results of that earlier study. I surveyed the full membership of UAPI (N = 338), all experts in the field of academic HS, to solicit their consensus on overall program outcomes and core academic areas for an academic undergraduate degree in HS. I chose to condense the earlier study's term educational objectives into what I called overarching program objectives, which I felt captured essential outcomes a student must master but which do not fall conveniently under the program-specific outcomes.

The survey instrument for my study was the Delphi technique adapted to an online format using a commercial software program called SurveyMonkey®, which is one of the world's leading providers of web-based survey solutions. The surveys were only accessible by me, as the researcher, via a unique user name and password, ensuring that user data were safe, secure, and available only to authorized persons. Besides stringent security, SurveyMonkey® software offered me the ability to analyze and display collected data in a variety of formats and perform quantitative textual analysis on open-ended responses. Key to Delphi methodology, the use of this software program enabled the survey respondents to maintain their anonymity while allowing me to collect, compile, and resubmit the data from each iteration for overall consensus.

The questions in the first round dealt with the proposed core academic areas of an HS degree as initially identified by the ERAU study. Round 2 examined the overarching program objectives. The third round focused on identifying program-specific objectives associated with the core academic areas identified in Round 1. Finally, Round 4 contained a set of questions designed to collect demographic information from the Delphi panelists and to survey their thoughts on specific elements of an academic HS program.

Theoretically, the Delphi process can be continuously iterated until 100% consensus is determined to have been achieved. I decided to use a consensus level of 75%, similar to the ERAU 2010 study I was modeling. In other words, agreement was defined as the point at which no further discussions were entered by the panelists on a specific issue, and at least 75% of the panel members selected the "keep as written" for each element under discussion. If 75% agreement could not be reached after three iterations, that particular item was deleted from the proposed curriculum.

Specifically, the Delphi process used in my research study consisted of the following four steps (rounds):

1. Iteratively develop a consensus on what should constitute a set of core academic areas, and definitions for those areas, that represent broad practice areas in HS;
2. Iteratively develop a consensus on what should constitute a broad set of overarching program objectives for a bachelor's degree in HS;
3. Develop, through consensus, the program-specific objectives that will accompany the core academic areas developed earlier and serve as guidelines for the suggested content in each course;
4. Using a survey, collect demographic data regarding the study participants and gain insight into the participants' ideas regarding specific issues in HS education.

Here is an example of the type of survey question submitted to the participants in the effort to establish a list of core academic areas:

> For Round 1, examine each of the proposed core academic areas for an HS curriculum and decide whether the topic (and its definition) should be retained as written, retained with edits, or deleted. Further iterations of Round 1 may be needed to reach consensus which is defined in this study as 75% of the participating panelists in agreement on a particular element.

> *CAA1: Intelligence: The systematic process of collection and interpretation of information in support of national, state, or local policy or strategy.*

> _ Keep as written _ Keep with edits _ Delete Comments:

Further iterations in each round were run until a 75% consensus rate was achieved for the items included in the recommended curriculum. My research on the Delphi technique suggested that I should run no more than three iterations per round. For the last round of the

study, I used a Likert-type scale survey to rate the participants' opinions on a variety of topics concerning HS curricula development. The survey questions in this section employed a common 5-point Likert-type scale, with the following choices: *strongly disagree*, *disagree*, *neither agree or disagree*, *agree*, or *strongly agree* for the 23 questions or statements posed. The following is a sample question:

> *For each question, please select one of five choices that most closely expresses your opinion regarding the issue. Please do not leave any question blank, or select more than one answer for the question.*
>
> *Q1. The process of using subject-matter experts to choose the components of an HS curricula by using an iterative, consensus-driven Delphi technique was appropriate in the research study just conducted*
>
> *_ Strongly Disagree, _ Disagree, _ Neither Agree or Disagree, _ Agree, or _ Strongly Agree*

Once all of the data were recorded, tabulated, and processed, the results of the case study produced a recommended undergraduate curriculum in HS made up of 15 core academic areas, with 50 associated program-specific objectives and eight overarching program objectives.

Practical Lessons Learned

One thing I learned from this study is that it can be quite difficult to get consensus on curriculum topics. Each participant of my panel was an academician and had strong feelings on what should, and should not, comprise an undergraduate curriculum in HS. That was where the Delphi technique came into play, allowing consensus to be reached among a pool of subject matter experts. Perhaps the biggest challenge was getting the participants to stick with the study for the several months it took to complete the project, which can result in a significant dropout rate. Another problem was maintaining objectivity of the researcher, as I had to read all of the comments and suggestions and use text analysis to correlate "like" answers and remove duplicates. Although I strove to keep an open mind, it is always difficult to remove all bias. By using the text analysis feature built into the SurveyMonkey® software I used, I was able to keep the researcher bias to a minimum. Overall, the Delphi technique was an effective research methodology for my study, once I realized the technique's limitations. It was the only way for me to survey a large number of subject matter experts located all across the United States and reach a final consensus on matters regarding HS curriculum. For anyone contemplating the use of the Delphi technique in their research project, I would recommend the methodology—

but be prepared for the process to take some time and involve qualitative analysis of survey responses.

Conclusion

According to William Pelfrey Sr. and William Pelfrey Jr., (2009), "In order for the topic of homeland security to develop into a formal discipline, a viable model of curricula that can be tested, refined, and implemented is required" (p. 60). That is exactly the problem my research study examined. Using an iterative Delphi process to reach consensus, I was able to guide a panel of subject matter experts through a series of rounds and iterations to determine what elements an outcomes-based curriculum in HS should contain. Although each of the 338 members of UAPI was invited to participate in the research survey, only a relatively small percentage responded. This is a constant problem with research surveys. In my study, there was only a 12% rate of return from the UAPI membership, but according to Chia-Chien Hsu and Brian Sanford (2007), that is in line with the average rate of response (10%-15%) for an online survey. During subsequent rounds, the number of participants in the study declined slightly, as is customary in the Delphi process, and stabilized at an average of 40 respondents per round for the duration of the project's iterations. This dropout rate corresponds with that of typical Delphi studies, which according to Heiko von der Gracht (2008) is in the range of 20% to 30%.

Overall, the most significant findings from my study were the validation of the earlier studies' methodology and results and the development of a comprehensive outcomes-based curriculum for an undergraduate degree program in HS. The proposed curriculum posited by my study could be considered a standardized model, and therefore could be adopted and then modified as necessary by any institution of higher learning.

In summary, my study of 2012 built upon the work of previous research projects and added to the body of knowledge regarding development of an HS curriculum. The results of previous studies were validated and enhanced by my research, demonstrating that the Delphi technique is an effective and appropriate tool for conducting qualitative research on an emerging topic. Although the data in this current project are not all-inclusive due to the size of the population survey and are not definitive based on the nature of the qualitative research methodology used, the research does serve to validate earlier work done on the issue of HS curriculum development. The intent of my study was not to stifle academic creativity in curriculum development but to offer an alternative idea to the currently disjointed approach to academic HS education of the United States.

HS is an emerging, somewhat nascent discipline; however, the compendium of new HS

academic programs that has sprung up since the 9/11 attacks on the United States indicates the growth of widespread acceptance of this major in undergraduate education. But that is not the end of the story. As Christina Ramirez and Gail Rioux (2012) state in their concluding summation, "As a new field, the continuing evaluation and re-evaluation of [homeland security] curricula should continue so that it remains relevant, innovative, and valued by the customers" (p. 24). Hopefully, my case study can assist in that important effort.

Exercises and Discussion Questions

1. Why is there no standardized, outcomes-based undergraduate curriculum for homeland security degree programs in the United States?
2. What is outcomes-based education, and why is it important in curriculum development?
3. What is the case study methodology used in research, and why was it chosen as the methodology for this project?
4. What is the Delphi technique, and why was it chosen as the methodology for this case study?
5. What are some of the problems and/or challenges the author of this case study encountered during the project?
6. Do you think this case study was effective? Did it answer the research questions it posed? Why or why not?
7. What changes in methodology would you make if you were tasked to conduct a similar research project?

Further Reading

Cutrer, D. A. (2012). *Developing a homeland security curriculum: A case study in outcomes-based education using the Delphi method.* Retrieved from http://commons.erau.edu/publications/301

Quinn, N. (2007). *An assessment of partnerships in flood emergency management, Red River Valley, Manitoba* (Unpublished master's thesis). University of Manitoba, Winnipeg, Canada

References

Adler, M., & **Ziglio, E.** (1996). *Gazing into the oracle: The Delphi method and its application to social policy and public health*. London, England: Jessica Kingsley.

Andrich, D. (2002). A framework relating outcomes-based education and the taxonomy of educational objectives. *Studies in Educational Evaluation*, 28, 35–39. doi:http://dx.doi.org/10.1016/S0191-491X(02)00011-1

Bellavita, C., & **Gordon, E.** (2006). Changing homeland security: Teaching the core. *Homeland Security Affairs*, 2, Article 1.

Harden, R., **Crosby, J.**, & **Davis, M.** (1999). An introduction to outcome-based education: AMEE guide no. 14. *Medical Teacher*, 21, 7–14. doi:http://dx.doi.org/10.1080/01421599979969

Hsu, C., & **Sandford, B.** (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*, 12, 1–8.

Kerrigan, W. (2005). *Exploration of future practices for urban extension county offices: Identifying patterns of success using a modified Delphi and case study*. Available from Dissertation and Theses ProQuest Information and Learning Company. (UMI No. 3180609)

Lee, Y. (2006). *An investigation and critique of competencies needed by human resource development (HRD) master's degree graduates in Korea*. Available from Dissertation and Theses ProQuest Information and Learning Company. (UMI No. 3252137)

Linstone, H., & **Turoff, M.** (2002). *The Delphi method: Techniques and applications*. New Jersey Institute of Technology. Retrieved from http://www.is.njit.edu/pubs/delphibook/index.html

Pelfrey, W. V., Sr., & **Pelfrey, W. V., Jr.** (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, 54–82. doi:http://dx.doi.org/10.1177/0193841X08327578

Polson, C., **Persyn, J.**, & **Cupp, O. S.** (2010). Partnership in progress: A model for development of a homeland security graduate degree program. *Homeland Security Affairs, VI*(2). Retrieved from http://www.hsaj.org/?article=6.2.3

Ramirez, C., & **Rioux, G.** (2012). Advancing curricula development for homeland security education through a survey of DHS personnel. *Journal of Homeland Security Education*, 1, 6–25. Retrieved from http://www.journalhse.org/v1i1-ramirezandrioux.html

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

Siccama, C. (2006). *Work activities of professionals who occupy the role of faculty support staff in online education programs*. Available from ProQuest Dissertations and Theses. (UMI No. 3217237)

Stewart, S. (2008). *A study of instructional strategies that promote learning centered synchronous dialogue online*. Available from ProQuest Dissertations and Theses. (UMI No. 3347372)

Trochim, W. (2001). *The research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog Publishing.

U.S. Department of Homeland Security. (2009). *Homeland security centers of excellence.* Retrieved from http://www.dhs.gov/homeland-security-centers-excellence

von der Gracht, H. (2008). *The future of logistics: Scenarios for 2025.* Frankfurt, Germany: Gabler-Verlag Publishing.

Yin, R. (2003). *Case study: Design and methods.* Thousand Oaks, CA: SAGE.