Question is a fool for five minutes management essay

Business, Management

he who does not ask a question remains a fool forever."- Chinese Proverb

Introduction

An important area of emphasis in procurement and management of military training over the past several decades has been the issue of cost. With an ever shrinking budget while meeting the growing demand to maintain forces at the highest level of readiness, the training development and delivery must be continuously assessed as to their cost effectiveness and efficiency. Questions about initial cost incurrent, production cost, and maintenance cost have served, either directly or indirectly, as the predominant focus of the cost effectiveness studies. It is through these kinds of questions that an increased understanding of the processes and problems of military training product costing has evolved. At the same time there has been a gradual departure from Technical Training Equipment (TTE) and a gravitation towards computer based instructional aids such as Computer Based Training (CBT) products, or Interactive Courseware (ICW), both of which fall within the classification of Interactive Multimedia Instruction (IMI), and emulators and simulators, generating considerable interest in the military education, and military financial literature. The military has embraced training tools such as IMI, CBT, ICW, and maintenance and operation emulators, and simulators to enhance military students' educational opportunities. New choices and opportunities for leaders, students, instructors, and administrators have opened as technologies provide anytime and anyplace modes of educating the masses (Fletcher, 2004). Multimedia and Internet-based technologies have provided powerful options for instructing and learning. Many military schools, remote bases, and service academies have been using various

training products as a means to supplement, or augment instructor led training, or as a total replacement of TTE, all in an effort to provide the experience needed in educating students and leaders. According to Bonk, Kim, and Zeng (2005), and Bonk, Olson, Wisher, and Orvis (2002) there is a shift towards a blended solution, using IMI to enhance and augment instructor facilitated instruction, simulators and emulators as a replacement for Technical Training Equipment, both in supported technology and general acceptance. This movement has been fueled by the desire of the military to seek out the best possible solution to resolving the complex issue of doing more with less without compromises. Unfortunately, very few have looked at the total life-cycle cost of training. Although, a study conducted by Angier, Fletcher, and Horowitz provided evidence that incorporating ICW would result in a decrease in overall cost. This study examined the cost of individual training when incorporating ICW (Angier, Fletcher, & Horowitz, 1992).

Problem Statement

Based on the above discussion, it is possible to identify a two-fold problem that will serve as a point of departure for the present investigation. As has been noted above and is clarified in the later review of literature section, one problem area is the fact that decision makers are being provided costing information which may present an advantage over another training product or alternative, yet when taken in total, that advantage may be diminished or negated. In essence, cost effectiveness may vary considerably depending on the instructional method employed and the manner in which the skill-based

assessment are conducted. It is these variances that lie at the heart of the problem areas proposed for this study. If the cost-effectiveness can be improved through the use of IMI, emulators and simulators or through the use of TTE, it is important to determine if a correlation exist between the cost-effectiveness and the retention and comprehension of technical instruction delivered by a blended instructional approach and a traditional instructor led approach in a US Navy technical training center instructing foreign military students, or is there a trade-off, such as a less efficient method for greater cost savings. Therefore, the intent of this proposed research will be to examine such relationships.

Dissertation Research Question

What is the cost-effectiveness, and skill-based comprehension assessment relationship as it relates to the blended instructional approach, using IMI and simulators and a traditional instructor led approach, using TTE, as presented to Foreign Military Students at the Center for Surface Combat Systems? Can the blended instructional approach (instructor led/facilitated, using IMI and simulators) increase the foreign military students' mean skill based performance score and decrease the time allocation in those activities well beyond that attained by the traditional instructor led, using TTE approach? Is there a significant difference in the students' mean skill based performance score and time allocation in the instructor led approach using TTE from the blended approach using IMI and simulators?

Hypotheses

Based on a review of literature as noted later in this concept paper, two major hypothesis areas will guide the analysis of data. The primary hypotheses of the cost effectiveness evaluation is that the blended approach will show a reduction in life-cycle cost as compared to the traditional instructor led approach. Therefore it is hypothesized that the cost effectiveness evaluation of the blended approach will show a significant reduction, having a Z value greater than . 05 significant level, in life-cycle cost as compared to the traditional instructor led approach. The secondary hypotheses is the students in the blended approach and the students in the instructor led approach will have comparable mean skill based performance score and completion time, within . 05 significant levelTherefore it is hypothesized that the mean skill based performance score and completion time of the blended approach will not be significantly different, having a Z value less than or equal to . 05 significant level, as compared to the traditional instructor led approach. Descriptive statistics such as mean and standard deviations would be used for mean cost factors, skill based performance score and completion time analysis, with inferential statistics such as t-test/z-test would be used to test relevant hypotheses.

Deficiencies in the Evidence

Historically, the military has been a strong proponent in the use of cutting-edge technology, but at what cost? Developed in the 1950s by the Department of Defense (DoD) cost-effectiveness analysis was the prescribed decision management tool in resolving weapon system procurement

requirement conflicts of the armed services, in an effort to mitigate cost, and avoid duplicate weapon development (Hitch & McKean 1960). Although the conduct of a cost effective analysis is a requirement in the justification and allocation of funds for any new or modified military training program, there is limited data with regard to the total training package. But is the blended approach the most cost effective means of providing instruction, with so many training products being developed, which one will, with regard to the total training context, provide the greatest return on investment? How cost effective would a total incorporation of digital training product tools and associated instructional delivery methods be? Or is the traditional approach the most cost effective means of providing instruction, with its inherit maintenance cost, periodic upkeep cost, and its resulting bottleneck of the training schedule, with regard to the total training context, provide the greatest return on investment? However, apparently no published reports of subsequent research with the total training package cost effectiveness for a Foreign Military Sales course exist. At most the individual cost effectiveness analyses are summed together to provide the total cost, presenting several issues. When conducting a cost effectiveness analysis on a new IMI product, the typical cost pattern would indicate an initial high investment cost, with a decline over the life of the product (Frank, Helms, & Voor, 2000); whereas a cost effective analysis for Technical Training Equipment, which is actual tactical equipment, presents a lower initial cost with an increasing cost over the life of the product (Frank, Helms, & Voor, 2000). This would lead one to believe the Technical Training Equipment would be the optimum choice. Yet, in both cases the additional variables such as instructor preparation time,

laboratory set-up time, maintenance time for the Technical Training Equipment, additional facility foot-print and infrastructure requirements for Technical Training Equipment, computing infrastructure for IMI, instructor training in the use of the IMI, student through-put, and student induced casualties to the Technical Training Equipment are reflective of projected assumptions. I am proposing to assess courses that have been in operation for a number of years, using known values, thus providing quantifiable costing data. Why study the cost effectiveness of development and delivery of military training? The US Navy has conducted multiple studies over the years in determining and assessing best applied and conveyed pedagogical methods, as well as the cost effectiveness per training tool, yet there is little information as to the cost effectiveness with regard over a span of time or the life-cycle of those products, from development to delivery, and efficiency of the associated instructional method. Typically, cost effectiveness is noted as having been conducted, and the alternatives presented in the products research or development stage. In addition, no one has published accounts of any cost comparisons between the traditional instructor led, using TTE approach and a blended instructor facilitated/led, using IMI and emulators and simulators approach.

Audience

Given the limited information with regard to the cost effectiveness for the total training package within the US Navy Foreign Military Sales context, I believe my research would provide greater insight into the true bottom-line of military training. The goal of this research would be to gain a better

understanding of the total cost incurred over the life time of a training program, to include cost associated with facilities, instructional staff, administrative staff, housing, training products and material development, and delivery, as well as the training efficiency in the delivery of the material. Based on the conclusions, this information could be used by the leadership of naval training to better assess operating cost.

Purpose of the Study

This is the premise, and purpose of this study. Through a cost-effective training analysis on the life cycle of a military training course, to include its development through instructional delivery I intend on building upon previous research in the field. I propose conducting a qualitative and quantitative research on the holistic cost effectiveness, and assessing the training efficiency in two different means of instructional delivery, one traditional instructor led using TTE and the other a blended approach using predominantly IMI, emulators and simulators. The concept of the proposed research is within the context of the cost associated with the development and delivery of military training in the United States Navy. The intended focus will be military training developed and conducted for Foreign Military Students at the Center for Surface Combat Systems located in Dahlgren Virginia.

Definition of Terms

Computer-based training (CBT): Instruction delivered with the aid of a computer. Cost-effectiveness: A technique for the evaluation of alternative proposals. Interactive Courseware (ICW): ICW is computer controlled

courseware that relies on trainee input to determine the pace, sequence, and content of training delivery using more than one type medium to convey the content of instruction. ICW can link a combination of media, to include but not be limited to; programmed instruction, video tapes, slides, film, television, text, graphics, digital audio, animation, and up to full motion video, to enhance the learning process. Interactive multimedia instruction (IMI): IMI is a term applied to a group of predominantly interactive, electronically-delivered training and training support products. IMI products include instructional software and software management tools used in support of instructional programs. Life Cycle or Life Cycle Model (LCM): Outlines the life cycle of an acquisition system from materiel concept investigation, through development and acquisition, until ultimate phase out and disposal. Materiel acquisition may initiate training requirements. Maintenance: The physical act of preventing, determining, and correcting equipment or software faults. It includes all actions taken to retain system/equipment/product in a useful serviceable condition or to restore it to usefulness/serviceability. Maintenance includes inspection, fault isolation, testing, and servicing. Needs analysis: Systematic in-depth analysis and verification of training discrepancies and emerging needs identified by a needs assessment. The results of the Needs Analysis are the definition of performance deficiencies and the isolation of potential solutions. This analytical process addresses the specific nature of the deficiency. Simulator: A training device that substitutes for, by emulation, the functions and environment of actual equipment or systems. Any training device, machine, or apparatus that reproduces a desired condition or set of conditions

synthetically. Specifically for training, a relatively complex item of training equipment, using electronic/mechanical means to reproduce conditions necessary for an individual, or a crew, to practice operational tasks in accordance with training objectives. It represents the operational equipment physically and functionally to varying degrees and follows the mathematical equations that describe performance. Skill: The ability to perform a psychomotor activity that contributes to theeffective performance of a job task. Technical Training Equipment (TTE): Actual tactical equipment which an instructor will use various fault insertion techniques to provide realistic calibration and repair scenarios. Training efficiency: Relationship between monetary inputs and the desired outcome, such as between the expenditure on a training product and increase in test scores, using an objectively based assessment of the students retention, and comprehension of the material presented.

Review of related literature

Introduction

The review of literature consist of a brief assessment of the search processes. An examination of the theories, methods, and processes used to frame the proposed research topic, and how this knowledge connects the business processes and cost effectiveness in the traditional instructor led approach using TTE, and the blended approach using IMI and simulators in a US military technical school.

Search Process

I am proposing that this study will build upon previous studies in military training cost-effectiveness and explore further, in an effort to capture the total cost and the relating training efficiency. I further propose to investigate the numerous aspects in analyzing the cost effectiveness in the development, product delivery, and instructional delivery, on a specific component of a US military technical school. I intend to conduct the primary literature searches using the Regional Public Library, University of Mary Washington Library, Columbia Southern University's Online Library, Army Knowledge Online Library, and Navy Knowledge Online Library to include searching ProQuest, Gale Virtual Reference Library, Dissertations and Theses Database, Opposing Viewpoints Resource Center, Emerald, Gale PowerSearch databases, additionally I intend on researching books, secondary cited articles, and websites. Data searches that I will use, would include key words such as cost-effectiveness, business models, decision making, defense industry, Naval training, Naval planning, cost analysis, predictions, cost estimates, military training, return-on-investment, management planning and control, systems analysis, and strategic planning.

Conceptual Framework

My intent is to conduct a cost effectiveness analysis on two identical courses provided through the International Programs Office Foreign Military Sales at the Center for Surface Combat Systems, comparing and analyzing two instructional delivery methods, both of which would be providing the same technical course of instruction to foreign military students: one instructor-led

knowledge lessons with skill based maintenance/operation on actual tactical equipment, also known as Technical Training Equipment (TTE), and the other a blended or hybrid instructional method comprising instructor facilitated computer-based Interactive Multimedia Instruction (IMI), with equipment emulators and simulators used during the skill based maintenance/operation portion. The study would not exam course content, methodologies of instruction, nor the extent a student receives or retains information from either method, although the grades the students receive from both the knowledge and skill based assessments, both of which are objectively assessed, would be collected as quantifiable data for training efficiency. The central focus of this research is to be from a business-economic return-on-investment perspective in the cost-effectiveness with regard to the total training package, or life cycle of the course. The resulting question that this researcher will attempt to address is: Given the two methods of instruction, and the two means of demonstrating desired skill based objectives, which is the most cost effective, to include development, delivery, and instructional time. Research studies discovered during my initial literature review provided a foundation, with methodologies and framework, which I intend on leveraging from. In a review of cost studies in education Tsang’s (1988) study provided a discussion of an economic framework, and reviewed issues and analyzed the resulting data on costs of education in developing countries. The study concluded, and further reinforced the report provided by Hitch and McKean (1960) that a cost analysis could contribute to decisions on education; a greater effort must be made to increase the amount of data collected and to use that data to aid in educational

policymaking. Orlansky and String (1979) conducted a review and evaluation of approximately 30 studies on the cost-effectiveness of computer-based instruction in military training. The results of the review indicated a standardized methodology is needed to provide a quantifiable measure of effectiveness. The need and desire of a cost effective analysis on training was further supported in a study conducted by Gavino (2002), in his thesis he exams the associated cost with the application of a new process in training Naval Officers. Gavino provides a qualitative and quantitative analysis with regard to the transformation of instructor led approach, to an interactive computer simulation with hands-on approach. Although conducted within the private sector, Bakia's (2004), research provided that through the conduct of a cost analysis the findings of which could be used to identify inefficiencies within the process or procedure. With the resulting data, a policymaker would be better informed in decision making on future endeavors. In Bakia's study, a comparison of three different approaches in the delivery of a graduate-level business curriculum was assessed for cost effectiveness. The methods that were investigated were classroom-based, video, and computer-based. The study defined cost-effectiveness within the context of cost per student to a final course grade. Results of the study indicated a relationship between class size and cost-effectiveness of a particular instructional method. That a class size of less than 150, the data indicated classroom education appeared to cost less and was more effective. Furthermore the research contended the class size would have to be greater than 200 in order to realize a discernible cost effectiveness towards any methods other than classroom. Within the scope of this research, each class

size is mandated to be no greater than 12 students, thus the study would have to expand to include multiple classes, all within the same technical study. Providing evidence that incorporating ICW would result in a decrease in overall cost was a study conducted by Angier, Fletcher, and Horowitz. This study examined the cost of individual training when incorporating Interactive Courseware (ICW), by Angier, Fletcher, and Horowitz (1992) examined the savings, as well as the potential cost in the greater use of Interactive Courseware (ICW) in support of current and traditional instructional delivery methods (Angier, Fletcher, & Horowitz, 1992). The importance of such a study is anchored in the budgetary concerns of the Department of Defense, which devotes 6. 7% of its total budget to training, to include as a student, instructor, or administrative support. The resulting findings of the research supported the study’s hypotheses in that a wider use of ICW would decrease the cost of training personnel to a given level of skill and knowledge, as well as decreasing the number of students in training at any given time (Angier, Fletcher, & Horowitz, 1992). With the given decease in the cost of training personnel and a decrease in the number of students in training at a given point, the overall cost savings were estimated to be between $130 million to $160 million (Angier, Fletcher, & Horowitz, 1992). Further information supporting instructional cost effectiveness and efficiency was provided in the research conducted by Thoreson (1988) into the cost-effectiveness of automation in an Army classroom focused on one Military Occupational Specialty code (MOS), the Equipment Records and Parts Specialist (76C10). The study presented a method for planning a cost-effective means of automation of Army classroom training. The study defined classroom cost

and productivity curve in hour-by-hour increments and the resulting data was then combined and calculated, resulting in the defining of the marginal cost per trained soldier. The study provided that in the use of instructional software, training time could be shortened thus resulting in cost savings. The study further provided how the use of classroom productivity curves could be used in the development of specific applications with the greatest impact on training and cost. A study conducted in review of the cost-effectiveness of military training, supporting the need to further investigate and attempt to capture the total training cost was a study conducted by Knapp and Orlansky. Knapp and Orlansky’s research consisted of the formulation of a cost element structure for training; providing identification, structuring, and defining a list of cost elements describing the life-cycle cost of any formal program, course, or device for individual training of DoD personnel, regardless of the conditions or assumptions imposed by the particular application or problem of interest. Data was obtained through an analysis of over 100 studies conducted on Department of Defense training programs. The purpose of the research and development of the formulation was to satisfy a widely recognized need for a consistent, comparable, and credible evaluation of the cost-effectiveness of alternative methods of training. This research contributed to previous studies of cost analysis and cost effectiveness, and further clarified the need for additional studies in the area. Within the study, it is stated the " Defense Science Board has recommended that cost-effectiveness evaluations of military training be performed to optimize the use of available training resources and to support investments in new training programs, equipment and technologies" (Knapp

& Orlansky 1983). The study confirmed that the data required to develop and assess instructional programs are insufficient. " Contributing to the weak position of training in competing for funds, and in demonstrating its value" (Knapp & Orlansky 1983). Incorporating recommendations from reviewers in similar activities and functions, a cost element structure was developed with contributing and supporting authoritative and widely used cost guides issued by and for the training and weapon systems communities of the Services and offices of the Secretary of Defense (Knapp & Orlansky 1983). It is the intent of the researcher to leverage off of the work of previous studies, and to apply the mathematical computations developed and defined by Knapp and Orlansky. Providing insight into the cost effectiveness of foreign military student instruction was a study conducted by Orlansky and String. This study provided a summary of twenty-two empirical comparison studies that were conducted on the cost-effectiveness of military training in countries that are members of the Technical Cooperation Program, (TTCP) which includes; Australia, Canada, New Zealand, United Kingdom, and the United States. Research defined a mathematical process in the quantification of cost effectiveness. The research provided that there are two factors to be taken into account when assessing cost effectiveness, the training effectiveness ratio and the training cost ratio, and when these two are factored together, the result is the cost effectiveness ratio. " Training Effectiveness Ratio (TER), is the ratio of training time saved by use of a simulation to the amount of time spent in the simulation: TER = A-As/S where A= time required to reach criterion performance using actual equipment without prior use of a simulator, As = time required to reach criterion performance using actual

equipment with prior use of a simulator, and S = time spent training in the simulator" (Orlansky & String, 1982). In the establishment of a standardized measurement of funds in the use of one product over another, the research described the formulation of the training cost ratio (TCR). " TCR = Cs/C where Cs = cost of the new training approach, and C= cost of the existing training approach" (Orlansky & String, 1982). Thus the " cost effectiveness ratio (CER) is defined as CER= TCR/TER where TCR = the Training Cost Ratio, TER = Training Effectiveness Ratio, defined in this manner the closer the CER is to zero the more cost effective the simulator based training"(Orlansky & String, 1982). The findings of the research indicated that although the simulator was found to be cost effective, those students that were trained on simulators performed significantly slower than those trained on actual equipment in the performance of their jobs. This slower performance has been examined and with recent technological advancements, has been mitigated. In studies conducted by Holden, Sottilare, Goldberg, and Brawner (2012), Kass (2006), Smith (2006), and Wray and Mnro (2012) all provide empirical evidence that the gap identified in Orlansky and String’s study has been eliminated. With regards to the research I am proposing, the maintenance skill based portion of the course are timed events, the resulting times achieved are recorded along with the grades. This data would be used to further support or contradict this research supplemental finding. Research conducted on the cost-effectiveness in the use of military maintenance simulators as compared to training on actual tactical equipment was conducted by Orlansky and String (1977). The research indicated that maintenance simulators are just as effective in training maintenance

technicians as actual equipment trainers when measured and compared by student achievement at school; " there is no difference in the job performance of students trained either way, according to supervisors' ratings, in only one study" (Orlansky & String, 1977). The research provided quantifiable data that indicated in 7 of 11 cases the study investigated, the cost of " one unit of a simulator was less than 60 percent of the cost of its counterpart actual equipment trainer to develop and fabricate" (Orlansky & String, 1977). Additionally, in 9 of the 11 cases in which the study investigated, an additional unit of the simulator fabricating cost " was less than 20 percent of the cost of its counterpart actual equipment trainer" (Orlansky & String, 1977). Orlansky and String’s research further provided that the " acquisition and use of a maintenance simulator over a 15-year period would cost 38 percent as much as an actual equipment trainer, according to the only life-cycle cost comparison that has been reported" (Orlansky & String, 1977). The study concluded maintenance simulators are cost-effective as compared to equipment used in training. Orlansky and String’s study has been recently validated through the studies conducted by Kass (2006), Smith (2006), Sotomyer, Salva, and York (2012), Spicer, and Andrew (2012) and Wray and Mnro (2012). In each study, it was provided that the maintenance simulators were cost effective, and delivered similar training efficiency. Clark (1989) suggests that in conducting a cost-effective analysis the researcher " should differentiate between delivery technology and instructional technology" (Clark 1989). The delivery of technology should be characterized by the actual equipment, machines, and media used in providing a means to, or used in support of the instruction; delivery

technologies would be classified as printed books, instructors, or computers. Whereas instructional technology would be the methods used to enhance or influence the actual process of knowledge or skill learning of students; instructional technologies consist of processes, formats, structure and sequences of instructional material, such as aligning a master course schedule for optimum flow of topics, uses of examples, blocks of instructional time, operation and maintenance practice, and exams. " Instructional technology is transported to the student by delivery technology" (Clark, 1989). Through the various studies, a means of measuring cost-effectiveness has evolved. " The basic technique has been to derive results for educational effectiveness of each alternative by using standard evaluation procedures or studies" (Rossi and Freeman 1985) while applying an overlap of cost on project. This approach, as stated by Levin (1983), is referred to as the ingredient approach. The ingredients approach is a systematic process for decision makers to develop an estimate regarding costs (Levin 1983). The Levin ingredient approach has been applied to different educational programs in determining cost-effectiveness issues, and assisting with decision-making (Hartman, 1981).

Summary

To summarize, cost-effectiveness literature regarding any type of educational technology in the private sector or the military is limited. With several studies reporting their measures of effectiveness to include test scores, or attrition rate. This information would be used to provide a historical, or a trend analysis on the development of cost-effectiveness

approach and the results from implementation of such an approach. In fact, no study published in the 21st century was found to explicitly create cost-effectiveness ratios for existing alternatives, as recommended in the literature on cost-effectiveness methodology (Levin 2001). Within some of the studies reviewed, the alternative chosen in the analysis was only hypothetical, this resulted in studies comparing inappropriately and adversely influencing the outcome. From a management perspective, reporting on cost was inconsistent and minimal, standard government reporting policies do not require the level of detail or granularity, making it difficult to determine the individual types of costs included in the various studies, impacting an opportunity to compare findings across studies.

A description of proposed study methods

Methodology

Introduction

In the previous section, an introduction to the proposed area of research was presented. This included a description of the study’s research problem, several research purposes, three hypotheses that will serve to direct the data analysis, and an identification of several terms key to the study. In addition, a review of relevant literature related to the two major study variables – cost-effectiveness and the instructional method of delivery – established a background of support for the study. Both of these variables have been studied extensively, but not together and with foreign military students. The proposed research is an effort to examine the relationship between these variables in a manner that has not been done to date.

The intent of this section is to describe the methodology that is proposed for such a research effort. Included in the section will be a description of the study setting, proposed research design, study sample, and proposed data collection methods, procedures, and analysis efforts.

Study Setting

In its broadest conceptualization, this study is intended to address the cost-effectiveness of courses used on the population of foreign military students in a United States Navy Military Technical School. However, the vast diversity of this population in terms of military status, language and other related variables would make for a monumental undertaking. Therefore, it is necessary to delimit the setting from which a sample for the study will be drawn. The setting for the proposed study, thus, consists of all individuals within two settings. One setting will be a technical course being instructed in the traditional approach, with the instructor leading the discussion, and the skilled-based assessments are conducted using Technical Training Equipment. The other setting is a blended or hybrid approach, with the instructor leading the discussion, using Interactive Multimedia Instruction to assist in the knowledge portion, and the skilled-based assessments are conducted using simulators or emulators. Choosing these settings will provide for a sample of courses within a confined geographic area thereby facilitating the collection of data, while at the same time meeting the requirements of grouping differences as noted in the literature review.

Research Design

The proposed study employs an ex post facto research design as described by Kerlinger (1973): Ex post facto research is systematic empirical inquiry in which the scientist does not have direct control of variables. Inferences about relationships among variables are made from any determined variations between the studied variables. (p. 344)

Historical Research Design - The purpose is to collect, verify, synthesize evidence to establish facts that defend or refute your hypothesis. It uses primary sources, secondary sources, and lots of qualitative data sources such as logs, diaries, official records, reports, etc. The limitation is that the sources must be both authentic and valid. Causal Comparative or Ex Post Facto Research Design - This research design attempts to explore cause and affect relationships where causes already exist and cannot be manipulated. It uses what already exists and looks backward to explain why. Therefore, the study plan will involve the gathering of information about training products used in courses of instruction, employing the traditional and the blended instructional approach. No manipulation of the variables by the researcher will be possible; instead any determined differences will be ex post facto in nature in that they will stem from differences in results in the measurement efforts according to cost associated with building infrastructure, administrative and management overhead, instructor preparation and training time, and the scores of the knowledge and skill based assessments. Historical research design data would be used to provide an historical reference and basis; employing historical research

methodology to examine the traditional development of training products and their associated cost, to include capturing and defining the processes over a period of two years. Furthermore, to provide a measure of effectiveness as defined in previous research, historical information regarding students' scores that are archived in the commands administrative database, Student Administrative Support System (STASS) would be retrieved and used in the quantitative comparison. Students' assignments, tests, and final grades would be downloaded to Excel files. Historical course information that is archived in the Authoring Instructional Media (AIM) would be used to ensure courses used in comparison are of the same objectives, and content to ensure validity in the study.

Population and Sampling Plan

The Center for Surface Combat Systems International Program Office provides technical training to foreign military student. It has been determined that on average there are 36 to 60 foreign military students actively engaged in training at any given month of the year. Typically half of those students attend a traditional course of instruction and the other half attends a blended course of instruction. All of the students must be able to speak and read English, as the courses are only taught in English. A random sample will be drawn from a list of courses obtained for both instructional methods. Using a table of random numbers, the course will be selected from each setting until a minimum of four courses, two using the traditional approach and two using the blended approach.

It is expected that obtaining a minimum of four courses as described in the previous paragraph will result in a good cross section in terms of range of cost, and assessment scores. In addition, the normal variations in cost associated with the life-cycle management of a course of instruction among at the four courses will enable statistical comparisons for the study's hypotheses that provide new information about cost-effectiveness.

Data Collection Procedures

There is a standard methodology for measuring the cost of alternatives in cost-effectiveness analysis. As per Levin's ingredient approach, all ingredients for each alternative would be categorized in a tabular format. In the broad sense, common ingredients would consist of personnel, such as instructors, and administrative personnel; equipment, such as in class computers, and smart boards; facility operation baseline cost; materials, such as notebooks, and trainee guides. From the broad scope of categories, each would then be further defined into quantity and quality, such as equipment category, number and type of computers in use. The cost data would be gathered for each of the categories through the review and assessment of releasable financial reports, while the student assessment scores would be obtained through student records, and on-site maintained databases such as STASS and AIM. Additional tabular categories will consist of the unique alternative ingredients; development of paper based curriculum and blended training tools, to consist of initial concept, to final product delivery; delivery of traditional based curriculum and the blended approach, to consist of time of lesson, duration of lesson, and duration of course. Once all ingredients have been collected, the associated total cost

for the assessed course would be determined. Because I am proposing a study on a government facility, with government employees, much if not all of the needed information is publicly available. Cost with respect to instructors, and administrative personnel would be obtained through public records; no personally identifiable information would be used in the study. Cost for the facilities would be gathered through public records. Cost for the equipment, and materials would be obtained through public records. With regard to cost for curriculum development, and development of the training tools, as these are produced by civilian vendors, only the information released to the government and deemed releasable to the general public would be collected. If this poses artificiality to the study, the artificiality would be documented and noted in the final report. For each category, the annual cost will initially be obtained. In the case of equipment, and facilities, the cost would be adjusted to reflect depreciation. To determine the annualized value, the total cost of each method ingredients would be totaled which would then be dived by the total number of students that have attended the method to derive the cost effectiveness. The resulting cost effectiveness would then be compared to the other instructional method. The historical data reflecting student grades from each instructional method would be averaged and assessed to determine the most cost effective and efficient method.

Data Analysis

Three types of analysis are proposed for this study. First, to determine the total cost effectiveness, a cost-effective training analysis will be done for each of the sample courses of instruction selected, to include all training

products employed during the course, such as instructor guides, trainee guides, instructor preparation time, instructor training, infrastructure, administrative and management cost. Second, in order to provide a description of the sample from which data will be collected, descriptive information on number of students, length of course, time to complete the skill-based assessments, will be described, as well as the means, modes, range, and standard deviations for the associated cost, and the knowledge and skill based assessment scores. Third, to determine the relationship, or linear dependence between total cost and assessment scores, I will employ the Pearson product-moment correlation coefficient to determine the measure of the strength of linear dependence between the two.

This study proposes to address the following questions using the defined research methods: Which method of product development and instructional delivery is the most cost-effective? Gathering costing data and using quantitative comparison the two instructional methods would be analyzed to provide if any difference in the cost effectiveness ratio of the two instructional methods. Null Hypothesis - There is no significant difference in the results of the cost-effective training analysis between the courses employing the traditional approach and the course employing the blended approach. Each will be tested by chi-square. Which method of product development and instructional delivery is the most efficient? Gathering assessment scores and using quantitative comparison the two instructional methods would be analyzed to provide if any difference in the final course grades of the two instructional methods. Null Hypothesis - There is no significant relationship between cost-effectiveness and assessment scores

from students that experience traditional military instruction using Technical Training Equipment and students that experience the blended curriculum using emulators and simulators. This will be tested with the Pearson correlation coefficient. All hypotheses will be tested at a minimum of the . 05 level of significance. Descriptive statistics would be used to analyze and summarize the numerical and nominal data. The ingredients of the two methods, to include students' scores and final grades would be entered into the Statistical Package for the Social Sciences (SPSS) software to perform a statistical analysis to identify underlying variables or factors that may explain correlations within a set of observed variables. This study could be used as a factor to guide decisions about product development for military training tools, to include decisions regarding content development, timing, and types of opportunities provided.

Concluding Remarks

Significance

It is expected that the study will make at least three contributions to the areas of life-cycle cost-effective training. First, the study will contribute to the expanding knowledge base of total life-cycle cost-effectiveness. Second, this study will contribute to the expanding knowledge base in the relationship between instructional delivery method and resulting assessment scores obtained. As more is known about the relationship of training product development cost, training cost of the instructor, and infrastructure cost over the life of a course of instruction, and the relationship between the delivery approach, be it traditional or blended, and the resulting assessment scores

obtained in each, it will be possible to clearly plan and manage course development and delivery.

Limitations

There are two limitations to the study. First, the study will be limited in terms of its focus, although the delivery method will be defined, it will not be central to the theme of the study. A second potential limitation of the study is participation by actual people. The central theme of the study is the cost effective training analysis over the life of a course of instruction, and doing so in a quantitative means. The data that is to be gathered must be broken down to reveal actual operating and initial investment cost, and in this requires little to no participation, only access to the data.