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ABSTRACT

This study uses the Internet and a two phase methodology to help gain insight into the current state of America's logistics programs. Phase I examines logistics program structure while phase II employs a modified, electronic version of the Delphi technique to help examine global logistics education practices. The results of the research indicate that, while key differences exist in America's logistics programs, academicians of the discipline largely agree on the relative importance of key functional areas of the discipline. However, a potential gap may exist between the skills addressed in logistics and business education programs and the skills required for successful global logistics practice.

INTRODUCTION

As we embark on a new millennium, many issues remain to be addressed regarding the path that logistics education will take. It is almost universally recognized at this time that the contemporary logistics program can no longer function as a purely operational or technical degree program and that new graduates at the start of the 20th Century must demonstrate a variety of abilities and skills to effectively compete for jobs. There is an increasingly heightened awareness of logistics as a vital function of successful business practice and educators are responding by providing far more than just a technical degree program. Logistics is no longer simply serving a support role to the traditional functional business disciplines.

Increasingly there is evidence in the academic and practitioner literature that curricula are being reviewed and revised as educational strategies become increasingly guided by a consumer driven focus. While the future of the discipline is very promising, with logistics majors and information systems majors leading the way in new job opportunities, industry is looking for graduates with the basic skills already in place that will add value and justify the attractive salaries that are being offered. In short, industry is also looking to academia to provide a knowledge base that effectively bridges the gap between theory and practice.

This paper will present the issues that are currently being addressed and present a guideline for the current status and future direction of academic pedagogy and research in the logistics discipline. To provide structure to our study we looked at the following areas: (1) Basic skills requirements, including core competencies within the field of logistics as well as those cross-disciplinary skills considered essential in a logistics major; (2) Internal resource support, including funding sources, internships, and fellowships; (3) External resource support, including chaired positions, grants, linkages to professional organizations, courses taught by industry specialists; and, (4) Structure of logistics offerings, including whether courses are offered as part of another field or major, as an individual major, or as a separate department within a college.

The Internet revolution and the global marketplace have combined to help create many new business opportunities for many U.S.- based firms. Logistics operations have recently played a very large, strategic role in global business practices, especially as information technology has increased consumer expectations of quick delivery schedules. In several cases, well-developed global information logistics systems have been used to help achieve a competitive advantage by serving as a significant cost-cutting and customer service enhancing tool (Richardson, 1996; Novack, Rinehart, and Wells, 1992).

Challenges Facing Logistics

An increasingly global, technology-based marketplace appears to have created a gap between logistics education practices and the needs of the marketplace. While numerous challenges face practitioners of any discipline, many believe the ability to address two key issues: 1) information/ Internet technology, and, 2) the globalization of business will determine industry success in the near future. Given the importance of cutting edge knowledge of technology and globalization, companies hiring entry-level logistics professionals will frequent the logistics programs most adequately dealing with these issues in the classroom.

Some have criticized business schools for being slow to respond to the quickly evolving, technological marketplace and globalization of business (Arpan, Folks, and Kwok, 1993; Porter and McKibbin, 1988). Applying new technologies to logistics education is paramount if logistics students are to succeed as logistics practitioners in the 21st century. Student involvement with new technology must include an introduction to updated hardware and a variety of current types of software. In addition to the continuing technological evolution, students practicing logistics in the 21st century will be faced with an increasingly global environment. As global companies expand throughout the world to take advantage of benefits offered around the world, entry-level logistics practitioners will be faced with performing international shipping duties, handling foreign sourcing, and dealing with multi-country trading blocks. While it is clear the short-term business environment will continue to become increasingly global in nature, some have contended that business schools have failed to sufficiently internationalize their curricula (Porter and McKibbin, 1988).

STUDY

The Internet has dramatically changed the way we conduct ourselves as business educators. While the total impact of Internet technology on society is yet to be determined, it is clear the Internet has changed many aspects of our lives. Exploring ways to facilitate academic research through improved data collection techniques could result in a streamlined research process, producing more timely research findings. Dissemination of accurate research results in a timely manner will help educators to contribute to practitioners, thus reducing the perceived "gap" between the two communities.

The primary purpose of the current research is to better understand the current state of logistics education by examining logistics programs offered by 4-year universities in the United

States. Given the obvious importance of information technology on logistics practice and the corresponding criticism of academicians for failing to bridge the discipline gap between theory and practice, the researchers elected to collect data for the study via the Internet. Exploration of the Internet as a viable way to collect data for academic research may help to streamline the research process, improving the timeliness of research results and making them more applicable to logistics practitioners.

A two phase study methodology was employed with stage one being an Internet-based survey instrument. The survey was designed to address several issues including basic program organization, relative importance of different logistics functions, size and financial support of various programs, and basic qualifications of faculty. The second phase of the research was also Internet-based. This portion of the research also attempts to utilize information technology, specifically the Internet, to assess the current state of global logistics education in U.S. institutions of higher learning. This study differs from previous research in two basic ways. First, this portion of the research specifically explores the impacts of information technology adoption and the global marketplace on logistics education practices. Second, phase II of the research uses Internet technology in conjunction with the Delphi method specifically to facilitate data collection. The authors are unaware of previous business education research which utilizes the Internet to assemble an expert panel to help employ the Delphi methodology of data collection.

Phase I Analysis

Phase I of the research began with survey development which followed traditional procedures for survey instrument construction. Questions dealt with a variety of basic issues relevant to assessing the current state of logistics programs in the U.S. Key issues examined include structure and size of the program, logistics program offerings and instructor qualifications, the identification and relative importance of key functions of logistics programs, funding sources, and student opportunities.

The advent of supply chain management has ushered in another new era of logistics and the need for new managerial skills and competencies (Gammelgaard and Larson, 1999). Today, logistics success depends upon effective internal integration and well-coordinated, multi-organization networks. Logistics educators are once again challenged to determine the relevant issues, tools, and techniques that must be introduced into the classroom. To ignore the emergence of such current issues as globalization, information technology, and supply chain management as key drivers of logistics strategy would poorly prepare students for the challenges and conditions of the current marketplace.

As a result, the phase I survey instrument used multiple items to measure several constructs considered to be key portions of supply chain management. Each construct was designed to measure a key supply chain and/or logistics function. Functions examined include: purchasing, transportation, inventory management, information technology, distribution, and strategic alliance/relationship management. Respondents were asked to rate several individual statements as to their importance to logistics education. All survey responses in this section were based on a 5-point Likert scale.

Potential study participants were determined by examining past attendees of the Council of Logistics Management's Logistics Educators' Conference. A list of 121 study participants was compiled and each was sent a postcard asking for study participation and providing an Internet web address. Respondents were asked to visit the web site and answer the on-line survey instrument. After a two week period, reminder cards were sent to individuals in the original sample who had not completed the survey. A total of 50 respondents provided usable responses, yielding a response rate of 41.3%.

Phase I Results

Program Structure. Of the 50 respondents to the initial Internet-based survey (Phase I), 20% indicated the logistics program at their school is administered through its own department while the majority of respondents, (54%) indicated their logistics program is combined with another discipline to make up a department within the college. Course offerings range from a low of 1 course per year to a maximum of 25 course offerings per year. The average number of annual course offerings is approximately 10.

Instructors. College classrooms are filled with a diverse group of instructors. Over two-thirds of logistics programs (68%) utilize full-time tenure track faculty who only teach logistics courses. Additionally, over 60% of the programs also use full-time tenure track faculty who concurrently teach courses in the logistics discipline and at least one other discipline (e.g., marketing, management). Forty-four percent of respondents indicated their programs rely in part on business professionals to teach selected courses. However, when asked if their program would be increasing or decreasing the number of business professionals in the classroom, the results were roughly split with 51% expecting an increase and 49% expecting either no change or a decrease.

Student Requirements and Placement. While most logistics programs (84%) do not require participation in an internship prior to graduation, 88% indicated they do encourage students to participate in an internship prior to graduation. In addition, 75% of respondents indicated their program contains students who participate in other types of work opportunities related to the field (e.g., summer work, part-time work while attending school). Thirty nine of the fifty respondents (78%) indicated at least 85% of the students graduating from their logistics program were successfully employed in a logistics-related job within three months of graduation.

Funding and Support. Recognizing that funding is often an issue, the researchers elicited responses on how various logistics programs supplement their primary funding source. Sponsorship of a conference and providing external services to businesses are the two most often cited sources of supplementary funding. Conducting educational seminars, conducting research for business, personal or alumni donations, business donations, and receiving government grants were also occasionally mentioned as external sources of funding a logistics program. Interestingly, not only do most programs feel the need to supplement their primary funding source, only six of fifty respondents indicated faculty members of their logistics program have the opportunity to receive an endowed faculty position. Clearly, funding of programs is a challenge that must be dealt with by those teaching in most logistics programs.

Relative Importance of Logistics Functions. Building on past research which has identified key logistics functions (Williamson, Spitzer, and Bloomberg, 1990), the current research attempts to determine the relative importance of different functions on successful logistics practice. The six key functions (constructs) included in the survey were: distribution, information management, purchasing, transportation, inventory management, and strategic alliance/relationship building. Each critical construct was measured with the use of multiple items considered to be critical to performing each function. For example, one item used to measure the purchasing construct was the ability to perform competent supplier evaluation and selection.

The reliability of the multi-item measurement instrument was assessed by examining the Cronbach's Alpha measure. Seven items were used to measure the *distribution* construct with a Cronbach's Alpha measure of .76. Six items were used to measure *information management* (alpha = .72), *transportation* (alpha= .88), and *strategic alliance / relationship building* (alpha = .87). Five items were used to measure *purchasing* (alpha =

.80) and *inventory management* (alpha = .78). Each of the six constructs were measured with multiple items with a reliability in excess of .70 which is considered to be sufficient for basic, exploratory research (Nunnally, 1978).

Subjects were asked to evaluate the importance of each item designed to measure each construct. All items were based on a five-point Likert scale, anchored by important/unimportant. Responses were uniformly high (between 4.2 and 4.8 out of five) for four of the six constructs. In short, the respondents saw four of the six constructs and most of the individual items measuring each construct to be important. This suggests that while the appropriate constructs have been properly identified, the raw importance ratings would not have sufficient variance for useful discrimination. To overcome this issue, the respondents' ratings were standardized around his/her own mean rating—see Cunningham, Cunningham, and Green 1977, and Gurwitz 1987.) Survey respondents were also asked to rate the relative importance of each of the six constructs by allocating 100 percentage points among them (e.g., purchasing 10%, transportation 20%, information management 30%, inventory management 15%, strategic alliance/relationship management 5%, and distribution 20%). Below are the combined results which illustrate that information management is regarded as being the most important of the six constructs questioned. Information management had both the largest percent allocation of the six logistics functions (constructs) and the highest mean score of the six constructs. See Table 1 for complete results.

Phase II Analysis

During phase II, the future environment for global logistics practitioners is investigated. This part of the research assembles a group of individuals with international logistics experience to help identify the key characteristics of the global logistics environment for the year 2000 and beyond. Once key characteristics are identified they are placed into a survey format for additional data collection. The survey instrument allows for a rating of key characteristics necessary for

TABLE 1
RELATIVE IMPORTANCE OF SIX KEY FUNCTIONS OF LOGISTICS

Key Logistics Construct in order of Importance	Mean Importance Rating (n=50)	Standard Deviation and Range of Ranking Percentage	Mean of Multiple Items
1) Information Management	18.59 %	sd= 6.59: 10 % to 40 %	4.76
2) Inventory Management	17.84 %	sd= 5.88: 5 % to 30%	4.63
3) Transportation	17.71 %	sd= 7.09: 5 % to 40%	4.59
4) Purchasing	17.57 %	sd= 10.46: 5% to 65%	4.57
5) Strategic alliance/ relationship building	14.12 %	sd= 5.89: 5 % to 30%	4.23
6) Distribution	12.02 %	sd= 5.32: 5% to 20%	4.05

successful future global logistics practice. Data analysis will help identify the concepts and skills that should be developed and taught by global logistics educators.

The initial step of the research was to assemble a knowledgeable panel of global logistics practitioners via the Internet. The pre-qualification process reviewed the credentials of each individual to identify subjects with appropriate background for participation in a study of global logistics practices. Minimum qualifications to be included as a panel participant included first-hand past experience in global logistics in the period from 1990 to 1998. Candidates initially judged to have an appropriate background were further screened. To be included as a panel participant the practitioner must currently be employed in a job dealing directly with international logistics issues on a regular basis. Examples of job titles represented by the panel of practitioners include international logistics manager, global operations specialist, international trade facilitator, and international logistics systems analyst.

While considerable care was taken to assure research participants were qualified to provide information pertaining to global logistics education issues, the sample could still be considered to be one of convenience. The researchers felt the use of this type of sample was justified in part because of the desire to administer the Delphi methodology via the Internet. While use of the Internet limits the population available for participation in the study, the researchers contend exploring the potential benefits of a new data collection method outweighs the limitations of using a convenience sample. Nevertheless, it should be noted that convenience samples have several limitations including potential bias by participants and poor generalizability of the results.

In order to forecast the key characteristics necessary for successful practice of global logistics in the future, the researchers used a *modified*, electronic version of the Delphi technique. The Delphi method was chosen as the model for this phase of the research because it offers decision makers a systematic approach for predicting future events that might be too nebulous for more objective forecasting approaches (Riggs, 1983; Rohrbaugh,1979). The Delphi method brings practitioners together in a group, conference, or seminar setting to share ideas and reach a consensus about the future (Sniezek,1989).

The Internet may be an effective way to employ the Delphi method because it allows panel participants who can not physically gather together to be assembled electronically while maintaining anonymity. If designed properly, one advantage of using the Internet is to maintain anonymity of each panel member throughout application of the Delphi method while still allowing for electronic feedback, debate, and comment. The message board used to assist in data collection did not divulge any information about which panel participants were involved in the panel discussions. This helps to provide equal weight to the input from each panel participant by preventing powerful members in the panel from unduly influencing or swaying the opinion of others. The Delphi method has traditionally been used in face to face settings. However, this exploratory research modified the traditional administrative format of the Delphi technique by using the Internet to bring panel participants together in a group.

Past research indicates the Delphi method usually consists of roughly thirty participants because larger groups typically create few additional ideas and limit discussion and in-depth exploration (Delbeq, Van De Ven, and Gustafson, 1975). Table 2 provides a detailed description of the characteristics of panel participants and survey respondents from phase II of the research. Thirty-three "experts" made up the initial panel of experts for application of the Delphi method. The 33 subjects meeting the established criteria were given a two week period to participate in an anonymous, interactive Internet message board. Specific times for chat room participation were

communicated to each of the participants. The first step in applying the Delphi method is to allow each panel participant to provide narrative input into a series of general questions and statements dealing with the future of global logistics practices. Responses to the initial session are then summarized, placed in a conventional survey format, and provided to a select group of practitioners who have previously agreed to serve on a subsequent panel. Subsequent panel members are asked to provide additional input by ranking each knowledge area by order of importance. Of the 33 original panel participants, 21 also agreed to fill out the survey instrument developed from input of the original panel. Another 17 international logistics academicians and practitioners also completed the survey instrument.

Phase II Results

Past studies demonstrate the effectiveness of the Delphi technique in identifying incidents where genuine agreement about changes or alterations

TABLE 2
DEMOGRAPHICS OF
STUDY PARTICIPANTS

Trait	Original Panel (n = 33)	Subsequent Survey Respondents (n = 38)
Gender:		
Male	91%	92%
Female	9%	8%
Age:		
25 to 40	21%	17%
41 to 55	46%	70%
Over 55	33%	13%
Years of Experience:		
0 to 5 years	12%	17%
6 to 10 years	18%	21%
Over 10 years	70%	62%
Type of Firm Represented:		
Multinational	70%	58%
3rd Party	9%	13%
Government	18%	29%
Other	3%	0%

might exist (Dull, 1988). The accuracy and reliability of this method as a forecasting tool has been well established in a variety of research settings (North and Pyke, 1969). The Delphi methodology has previously been used to investigate international business issues (Daniels, 1991) and explore curriculum improvement (Blair and Uhl, 1993). In this phase of the research the method is used to help forecast industry changes and educational needs facing global logistics as we progress into the twenty-first century.

While the Delphi technique is usually considered to be an unstructured research methodology, there is often a basic set of general procedures followed during data collection (Rowe, Wright, and Bolger, 1991). However, there is no standard method of analyzing the data once collected. The data analysis technique chosen depends primarily on the objectives of the study and the perspective of the researcher(s) conducting the study. During the current study, content analysis was the technique chosen to categorize responses from panel participants.

Content analysis is a systematic and objective data analysis technique designed to use set procedures to make valid inferences about the context of the data (Krippendorff, 1980; Stone, Dunphy, Smith, and Ogilvie, 1966). This data analysis method has proven to be very effective for a wide variety of purposes including the coding of open-ended survey questions and panel comments (Berelson, 1952). Specifically, content analysis was chosen for this research in part because it has proven to be helpful to data collection when specific theoretical underpinnings are lacking (Kolbe and Burnett, 1991). Given the pedagogical nature of this phase of the research and a corresponding lack of a testable theory, the researchers felt content analysis was an appropriate methodology.

At the conclusion of the two week period, the researchers and a graduate assistant gathered the data and performed a content analysis. The three coders were given basic instructions regarding content analysis. Once the initial content analysis was completed, the researchers attempted to assure the results were reliable. Reliability assessment for content analysis is performed by examining the overall stability, reproducibility, and accuracy of the classifications (Weber, 1990). To help assure reliability of the content analysis, each of the three evaluators performed an initial analysis of the responses. Two weeks later the entire evaluation process was repeated. As is common when assessing reliability of categorization, reproducibility and stability of the results were both examined. Reproducibility was a respectable 85% during the content analysis phase of the research while stability was judged to be a very adequate 93%.

Once the electronically administered Delphi Method of data collection was complete, a survey instrument based on key issues previously identified by industry experts was provided to select members of the original panel plus additional academicians and practitioners. Respondents were asked to use a 1 to 7 Likert type scale (one being highly important) to identify the importance of each key issue on the successful practice of global logistics.

TEN MOST IMPORTANT SKILL AREAS FOR GLOBAL LOGISTICS PRACTICE

Table 3 illustrates the ten most important skill areas for successful global logistics practice. Interestingly, the two skill areas perceived to be most important by practitioners (written/oral communication skills and understanding of cultural issues) are traditionally considered to be non-business areas of study. The area considered to be the third most important to successful global logistics practices (ability to get along with co-workers) was categorized in this research to be a basic personality trait. In summary, the three attributes considered to be most important by the global logistics practitioners and academicians participating in this research are areas most consider to be external to business logistics programs.

TABLE 3
TOP TEN KEY AREAS TO GLOBAL LOGISTICS PRACTICE

Areas of Study Key to Successful Global Logistics Practices	Mean (Original 33 Delphi Participants) (n=33)	Standard Deviation	Mean (Selected Delphi and Other Industry Participants) (n=38)	Standard Deviation
Written/oral communication skills	1.3[c]	1.1	1.1[c]	.9
Understand culture	1.6[c]	1.3	1.5[c]	1.2
Can get along with co-workers	1.8[d]	.8	1.5[d]	1.0
Strategic planning for logistics optimization	1.9[a]	.9	1.6[a]	1.0
Financial analysis (e.g., minimize total costs	2.2[a]	1.1	1.9[a]	.9
Sourcing & its impact on logistics	2.2[a]	1.1	2.1[a]	1.4
Being goal-oriented/internally motivated	2.3[d]	1.2	2.1[d]	.9
Negotiating and bargaining skills	2.3[b]	1.1	2.1[b]	1.1
Can analyze problems using critical thinking	2.3[c]	1.5	2.1[c]	1.3
Inventory management and its impact on logistics	2.3[a]	1.3	2.2[a]	1.3

* Items rated on a scale with 1 = highly important, 7= least important.
[a] Business: Logistics areas of study (4 areas)
[b] Business: Non-logistics areas of study (1 area)
[c] Non-Business areas of study (3 areas)
[d] Basic Traits (2 areas)

Several additional skill areas considered by practitioners to be important to global logistics practices (strategic planning, financial analysis, sourcing, and inventory management) are currently being taught as basic core concepts in most logistics programs. Fortunately, several of the concepts considered to be highly important by academics teaching logistics are also viewed to be important by practitioners. Consistent with prior research (Murphy and Poist, 1994), these results indicate logistics educators are doing a relatively good job of identifying and addressing core knowledge areas in logistics courses.

Conversely, only one of the top ten key skill areas (negotiating and bargaining skills) was categorized to be a topic typically taught in a general business curriculum. While logistics educators appear to be doing a relatively good job

of identifying and teaching many of the key skill areas required for successful global logistics practice, this study's results indicate general business educators may need to re-examine their curriculum. Academicians appear to be somewhat slow to respond to demands to offer key skill areas important for successful global logistics practice.

RESPONDING TO TECHNOLOGY, GLOBALIZATION, AND SUPPLY CHAIN MANAGEMENT

It is clear that schools need to continue to respond to the changing environment in their program offerings. Greater analytical and quantitative skills training combined with hands-on real-world problem analysis appears to be a key future trend (Closs and Stank, 1998). An example is the "tools" course developed for graduate students at the University of Tennessee in response to student demand for a course that would provide experience in management and decision support tools (Smith, Langley, and Mundy 1998). The barriers that they identify to the integration of education and practice of logistics have been the cost and ease of use of computer hardware, the availability of computer software, and limited educational resources. Cost and availability of computer resources has been previously cited as a major limitation in many academic institutions (Tyworth and Grenoble, 1991). The current survey corroborates the fact that information management is viewed as a critical component to successful logistics practice (See Table 1.). The shift from mainframe to micro-computer applications (Mentzer, Schuster, and Roberts, 1990) and the growing demand by students for computer assignments using transportation and logistics software packages (Rutner, Kent, and Gibson, 1996) appear to have altered the way educators are approaching technology in the classroom. With even the most data-intensive management applications being shifted from mainframe systems to client-server environments (Smith, Langley, and Mundy, 1998), cost and availability of computer resources should become less of a barrier to information technology application in the classroom. Additionally, the expanded assortment of application software, both general purpose applications, such as spreadsheets, as well as special purpose, logistics related applications, is likely to significantly reduced many of the barriers to integrating education and practice simply because of increased availability.

In a review of the relevant literature reflecting the challenges facing developing logistics/supply chain programs, Lancioni, Smith, and Forman (1998) identified the following barriers: disagreement among industry practitioners regarding the relative emphasis that should be placed on logistics training versus on the job training; the limits imposed by computer hardware, software, and other educational resources; and the fact that many businesses fail to recognize logistics management as a distinct field (Lancioni, Smith, and Forman, 1998). The results of the current research tend to support this previous research. Clearly there are some differences between what practitioners believe is important to successful logistics practice (primarily global practice) and what academicians are teaching in their programs (See Table 3). Furthermore, many logistics programs are administered through a department combining several disciplines (See Table 1). Perhaps this is in part because many universities do not yet accept logistics management as a distinct academic field or discipline.

Academicians appear to have responded to environmental changes by changing the focus of their logistics programs. In fact, several logistics programs have moved from product logistics to the movement of information through the logistics channels. As evidenced from information technology being ranked the single most important function of successful logistics practice, the focus has clearly changed from the movement of product to the flow of information (See Table 1). One outstanding example of how information technology has impacted logistics practice is the rapid development of the Internet

within the last five years. The electronic shopping mall spurred by the Internet has created new challenges to supply chain/ logistics education at a rate that would have been impossible to conceive just a few years ago (Ellram and Easton, 1997).

The power of the Internet is revolutionizing the field by accelerating the speed of information transmission and facilitating the flow in all directions throughout the supply chain. For example, trends in logistics are increasingly designed to add value to the process and respond to customer driven demands. In short, a move from a push to a pull perspective is becoming increasingly evident.

> The move from push to pull, by necessity, makes logistics a more important part of the organization and gives it more visibility. It also means that logistics professionals need new skills...they need familiarity with information systems, marketing, sales, and production planning (Richardson, 1996).

Purchase orders, shipping, tracing, billing, and reorder points are automated and designed for immediate response, cost cutting, and adding value. This pull-environment is compatible with the Internet. Besides radically altering the nature of consumer behavior, the explosive growth of the Internet is also replacing functions within the channels of supply traditionally intended to facilitate company-to-company communication and integration of logistics functions primarily through communication of information (e.g., electronic data interchange (EDI) systems).

MANAGERIAL IMPLICATIONS

Funding

We have recently seen logistics evolve from an operation role in support of traditional functional areas to a strategic partner in upper management operational planning. However, old habits die hard and territorial claims on limited resources in business schools have forced logistics educators into what has been an uphill struggle to establish their position within existing structures. Companies are looking for new hires with basic computer literacy, meaning the ability to use computers to access information, databases, and specific applications software tools. The level of experience varies with job description, but clearly a sufficient level of knowledge in basic logistics applications software, if not programing and systems engineering expertise, is essential.

The competition for limited resources is recognized as one of the major challenges facing logistics programs, but it can be viewed as a struggle for which proponents are well armed. First, in recognition of a recent trend in business school education in general, new standards for accreditation have become mission oriented and are resulting in business colleges allocating resources in accordance with a clearly defined mission. Logistics education, by its very nature, places more emphasis on the applied rather than the theoretical and, in fact, academic research in logistics is often discounted by faculty from other areas due to this focus on the practical (Allen and Poist, 1997). Second, career opportunities in logistics are growing at rates surpassing any other business major, except possibly information management, and this trend is expected to continue (Lancioni, Smith, and Forman, 1998). The current research confirms considerable levels of success with placement with over 85% of students placed in logistics related jobs within three months after graduation. Clearly, from a purely efficient markets perspective, the availability of well-paying jobs will generate increased demand for logistics course offerings, logistics majors within existing programs, and independent logistics programs.

Finally, business education in general is becoming more customer driven and programs around the country are turning to industry for funding and resources and are having to justify their existence in the process. Once again current research corroborates the fact that many

logistics programs around the country are supplementing their primary funding source with various types of secondary funding sources. Evidence of this can be seen in the many non-traditional formats that are being implemented, such as the explosive growth of distance learning programs, the team-teaching of courses, and the night and weekend classes that are being offered at many universities, including the larger well-established and well-funded institutions. Taken together, these forces appear to favor the logistics programs and indicate that they can legitimately lay claim to a larger and more equitable share of resources within the halls of academia.

Distance Education

People coming into the field today need to know where industry turns for knowledge and the best source for a wide range of knowledge is the professional organizations, such as the Council for Logistics Management and the Warehousing Education and Research Council (Fawcett, Vellenga, and Truitt, 1995). Logistics educators are exploring many of the newly available technologies for connecting logistics professionals and educators outside of the classroom, and finding support in professional organizations. While the cost for distance education technology may appear to be somewhat prohibitive now, the technology is evolving and questions remain on just how the needs of the consumer of these services (i.e. students and practitioners) and the university will be matched. There are those who argue that barriers of economics and hardware are formidable, and the benefits of a distance learning experience versus a live seminar are still unproven. Others extol the value of being able to bring together a network of experts through electronic networking (Richardson, 1996). By using the Internet to administer the Delphi methodology of data collection in a manner that assembles experts throughout the globe, this research has proven that assembling a network of experts through electronic networking capabilities is realistic. However, its effectiveness for educational purposes is as yet unproven.

Core Competencies and Basic Skills Requirements

A critical area that needs to be addressed is the depth and breadth of coverage expected of a logistics education. Some have suggested that industry perceives current practice as too narrowly focused (Armstrong, 1997; Richardson, 1996; Allen and Poist, 1997), a perception that is perhaps misplaced given the clearly inter-disciplinary nature of most logistics programs. Nevertheless, current research did discover certain discrepancies between what is necessary for successful global logistics practice and what is being taught in most logistics programs.

Past research (Murphy and Poist, 1994; Fawcett, 1992) indicates that the skills required of entry level, and even mid-level logisticians, are evolving rapidly as technology and the definition of logistics education changes. In the traditional program, the focus of the discipline has been on the physical distribution and tracking of material and courses were designed to treat logistics as serving a support role to existing functional areas such as marketing (logistics) or management (transportation). As such, it has sometimes been viewed as the "red-headed step child" of the mainstream academic disciplines and has been in a constant struggle to defend the few resources it has received. Once again, the current research continues to identify a need by faculty of logistics programs to enhance their primary source of funding with secondary funding sources.

Past research (Murphy and Poist, 1994) also indicates that academics and practitioners largely agree on many of the basic logistics skills required for success in the industry. The current research found this to be true when dealing with domestic logistics endeavors (Phase I). However, this is not necessarily the case in the global logistics arena (Phase II).

IMPLICATIONS FOR INTERNET DATA COLLECTION

Use of the Internet as a vehicle to collect data was highly successful in this attempt, especially in the highly experimental Phase II of the research. Given the underlying methodology (Delphi Technique), use of an interactive message board appeared to work well. Respondents participated regularly, interacted via messages to the message board, and remained anonymous throughout the entire panel discussion. No one panel participant appeared to be dominant and all messages appeared to be weighted roughly equal by other panel participants. While this was an exploratory study testing the possible advantages of using the Internet to administer the Delphi Technique, results appear promising. Future research should expand the investigation into possible uses of the Internet as a data collection mechanism. Specific research in the area of administering the Delphi Technique should expand on the current research in several ways. First, a further examination of the applicability and usefulness of information technology as an aid to the efficient collection of data is necessary. Second, a comparison of research results from Internet and non-Internet panels (Phase II) and survey (Phase I) should be compared to help assess data reliability and participation or response rates.

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