

THE HISTORICAL IMPACT OF BUSINESS AND ENGINEERING EDUCATION ON THE INDUSTRIAL DISTRIBUTION DISCIPLINE

Jim Toppen, Rod Flanigan and Janet Lear, University of Nebraska at Kearney; Gary Stewardson, Utah State University

Abstract

Industrial distribution as an educational discipline is relatively new. Its origin came during the industrial revolution when manufacturers discovered that engineers generally made poor technical sales representatives. While engineers were competent in technical content, they often had no interest, or no ability, in selling the product to the end user. The interpersonal skills of engineers were often lacking the necessary components to be successful in a sales environment. Business school graduates, however, had an entirely different challenge. Manufacturers of technical products found that business graduates lacked the ability to understand the products and explain to customers the technical aspects of these products. Industry demand called for a cross between these two educational disciplines, sort of a hybrid engineering/business education, hence, the beginning of societal and educational demand for the industrial distribution discipline. In 1956, Texas A&M University accepted the challenge of creating a degree that combined the technical skills of an engineer and the relationship skills of the business professional into what is now known as a technical sales professional. This degree was called industrial distribution and combined coursework from both engineering and business curricula. This study examined the histories of both of these degrees and how the content and the blending of said content from each of these disciplines allowed for the formation of the industrial distribution degree.

Introduction

Just as most disciplines within higher education originated from societal need, industrial distribution, as a post-secondary discipline, developed as the need for a more technically competent sales force evolved soon after World War II (WWII). As manufacturing of technical products increased and the need to get these products to end users grew, the distribution model of conducting business continued to evolve. The history of industrial distribution is not a well-researched topic. Porter and Livesay [1] point out in their book, *Merchants and Manufacturers*, that “changes in the distribution played at least as important a role in the story of our economic past as did changes in produc-

tion” [1]. The attention of most historians, however, has been primarily directed at developments in manufacturing. The origin of the distribution of manufactured products in the United States dates back to the early beginnings of the country when products were manufactured by skilled tradesmen, and then bartered, traded or sold to local end users.

After WWII, distributors provided a way for manufacturers to have a presence in most communities and markets. They would provide the end user with a place to purchase products in a sort of one-stop shop. This became very advantageous to both the manufacturer and the end user. As distributors developed and became specialized in specific products and markets, they realized the difficulty of finding and developing technical sales people. If these distributors hired graduates with the soft skills necessary for a professional salesperson from business colleges, they often lacked the ability to learn and retain the technical information required. Conversely, if these distributors hired trained engineers, it was found that although the engineers did very well in the technical area, they lacked the necessary people skills required to develop the personal relationships needed in the sales arena. This dilemma initiated the demand to develop a specialized degree that combined the people skills and the technical skills needed to become successful technical sales people. Texas A&M initiated such a degree in 1956 and they called it industrial distribution. This degree became the provider of technical sales personnel for the industrial distribution industry. Texas A&M's degree has been recognized as an educational leader in industrial distribution. Several other schools followed in developing this degree, including the University of Nebraska at Kearney, Purdue, Alabama Birmingham, East Carolina University and others.

This paper summarizes the history of both business education and engineering education so that the reader might be able to understand how the need for a specialized degree in industrial distribution evolved.

Business Education in the United States

According to Moreland [2], business involved money lenders, the legal fraternity, merchants and entrepreneurs for many centuries. From the early beginning of the United

States, the guild and apprenticeship systems, many of which were originally developed in other countries, were an integral component of the trade system. During this same time, bookkeeping instruction began to take root as it made its way from Europe to the New World.

Business Education Comes to the New World

Small business in the U.S. has evolved since the very early arrangements by the British to promote export trade with the newly established American colonies. As the settlers came to the New World, the New England colonies gave birth to home industries that grew into village and town industries. Labor and skills became more specialized. The sole proprietors and leaders of these small businesses were often journeymen skilled in a trade, such as shoemakers, gunsmiths, bakers, weavers, tailors, tanners, powder makers and others [3].

During the early days of the U.S., schools, teachers and books were scarce as education was considered private, and the skilled trades were passed along without formal education. The Massachusetts General Court passed the first act in 1647 requiring all settlements of 50 families or more to provide elementary school and towns of 100 families or more to provide secondary schools to prepare boys for college [2]. The curriculum was largely classical, however, and not considered important.

Evolution and Improvement of Business Education

Although not widely recognized or supported until the mid-eighteenth century, bookkeeping was first offered in Boston in 1709 and in New York City in 1731 [4]. Because these cities were centers of trade, bookkeeping, mathematics and other classes such as navigation and surveying were offered. In 1749 Benjamin Franklin urged schools to adopt “commercial and productive” classes [4]. As a result, the curriculum diversified, and classes such as commercial arithmetic and bookkeeping were offered [4].

Perhaps the most influential education leader of his time, Horace Mann (1796-1859) wrote “Why should algebra, which not one man in a thousand ever uses in the business of life, be studied by twice as many as bookkeeping which everyone, even the day labourer, needs?” [2]. On the other hand, Charles Eliot, president of Harvard from 1869 to 1909, reflected the academic view. He was instrumental in developing the elective system and established the first

graduate school of business administration. Business education grew as the demand for it increased.

Private colleges began to open to meet the demand for educated business workers. Bartlett’s Business College located in Philadelphia opened in 1834, and Dolber’s Commercial College located in New York City opened in 1835 [5]. Most notable, however, is Duff’s Mercantile College, which began in 1840 and was incorporated in 1974. Still in existence today, the school is currently known as the Everest Institute, Pittsburg campus.

More schools continued to open during the last half of the 19th century. Until the early 1860s, only males attended business schools. However, during the Civil War, the federal government experienced a shortage of male clerks, and suddenly women entered the business world through the Treasury Department [4]. In 1867, the U.S. Office of Education was created as a part of the Department of the Interior. In 1953, it became part of the Department of Health, Education and Welfare.

Another large contributor to the growth of business education in college was the Morrill Act, passed in 1862 [5]. This Act granted states a designated number of acres for the purpose of establishing schools of agriculture, mechanical arts and business. Higher education for business now had a permanent place in the college arena. In 1881, the Wharton School of Finance and Commerce, University of Pennsylvania, was founded and became the first successful school of business. Other four-year institutions began opening schools of business by the end of the 19th century. Joliet Junior College, established in 1902, was the first post-secondary 2-year institution with a business curriculum.

While many federal legislative acts contributed to the growth of business education, perhaps one of the most significant contributions was the Smith-Hughes Act of 1917, later known as the Vocational Act of 1917. This legislative act promoted vocational programs in agriculture, trade and industry, and home economics. In 1963, the definition of vocational education was broadened to include business. Vocational (career) education was later championed by Carl D. Perkins, which ushered in the era of Perkins legislation beginning with the passage of the Carl D. Perkins Vocational Education Act of 1984 [5].

During the mid-1800s, as business moved from an agrarian society to an industrial society, management became an issue because no common body of knowledge existed for instruction in management [6]. James Montgomery of Scotland prepared one of the first management texts ever written. Because Montgomery was so highly regarded as a man-

ager, he was brought to the U.S. in 1836. He prepared a comparative study of management in different economies. The focus was on organization, methods and the recognition of human problems as industry expanded. This beginning gave way to scientific management thought, and then to efficiency and the modern era of management theory and practice.

In the early beginnings of marketing, students were educated as economists. From Adam Smith's concept of "the economic man bent upon a constant effort to better his condition" [7] through competition and the idea of the consumer in economic theory in the 19th century, marketing evolved to sales, advertising, research and marketing management. By 1976, marketing included quantitative aspects, marketing systems, environmentalism, comparative marketing, international marketing, logistics and marketing and society [7].

Business Education Curriculum Development

While the origin of management in the curriculum is unclear, some evidence points to engineering students as the first recipients of a series of lectures at Stanford University in 1896 by John Richards on works administration [6]. One of the first management textbooks to hit the shelves of business schools came in 1911 when Frederick W. Taylor published his first textbook on scientific management, entitled "The Principles of Scientific Management".

With the addition of distributive education (i.e., marketing) in the early 20th century, the curriculum expanded. Ohio State University was one of the first schools to include marketing in the curriculum [7]. The first classes included Distribution of Products in 1905, Commercial Credit in 1909 and Salesmanship in 1916. By 1921, the curriculum included business communications, marketing, marketing problems, wholesaling, retailing, credits and collections, salesmanship, advertising, advertising practice, exporting and importing, and research in marketing. In 1937, Congress passed the George-Deen Act that provided funds for teachers to teach classes in distributive subjects such as sales, marketing and wholesaling. This step allowed marketing education to expand. The concepts of differentiation and socialization were added between 1960 and 1970.

From its roots in money lending, trade guilds, and apprenticeships, today's business education curriculum has grown to include many facets of business administration including accounting, economics, information technology, finance, management, sales, supply chain and marketing. Figure 1 is

a representation of some of these post-secondary business school disciplines offered today.

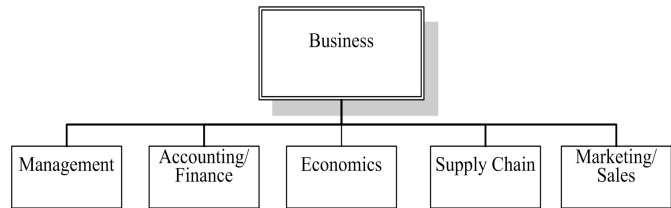


Figure 1. Typical Business School Disciplines

Business curricula did a very good job at developing the soft skills and the business operations skills needed in the distribution industry. However, the need to understand technical information and be able to assist customers with technical information was lacking. Distribution still needed people that had the ability to learn technical products. Engineering, on the other hand, did a great job of preparing people for the technical side of the business. The soft skills needed by engineering graduates to be quality sales people were lacking, due in part to the kind of training received in school.

The Beginning of Engineering Education in the United States

On a parallel course to that of business education, engineering education in the United States was beginning to evolve and take shape during the infancy of the country. This engineering education was heavily influenced by the European settlers of this country. During the early 1700s, several European countries, including France, Germany and England, had significant epistemological influence on science and engineering. Russia was also one of the earlier entrants into the field of engineering and technical education. The early European system of engineering education evolved from a complex system of guilds and apprenticeships, as well as societal demand for more theoretical solutions to basic needs. The early adopters of engineering and technical education came from many different backgrounds, and this historical setting would shape the future of the profession for many years to come [8].

During the early years of American industrialization, there was a strong relationship between the political and economic framework of the country. Financial rewards were built-in to stimulate the manufacturing foundations of the new country. Manufacturing of basic items such as clothing, tools, food and other supplies was a major engineering concern for America during the late 1700s due to the non-importation law implemented in 1774. Further, as the coun-

try gained its independence from England and continued to grow, basic infrastructure was needed. There was a significant need for engineers to design and build roads, canals and bridges [9]. Societal demand would drive increased opportunities for engineering and, perhaps more importantly, an increase in more technically engineered products.

Shop Cultured Engineering Education

During the late 1600s, amongst the English colonies in America, apprenticeships were growing. Several colonies even passed local laws regulating the apprenticeship programs. At the same time, there were efforts being made to introduce the idea of manual arts into formal education. This system of apprenticeship and manual arts instruction was the primary system of education for lower- and middle-class youth of the middle ages. As the country continued to grow and develop, this foundation of hands-on training would play a pivotal role in the development of a more scientific approach to some of the pressing needs of society.

School Cultured Engineering Education

With increased demands for technical experts in warfare, transportation, bridge building and canal design, interest in a more theoretical approach to industrial education was renewed. While several universities had been established in the U.S. during the 1700s, it was not until the year 1802, when the United States Military Academy (West Point) was created, that this country had its first official engineering program at the university level [8]. It was originally established as a school for both officer training and a national school for civil engineering. Other higher education institutions would soon be involved in engineering education; Norwich University, Gardiner Lyceum and The Rensselaer School are all considered some of the early pioneers in engineering education in the United States.

Meanwhile, the U.S. Congress passed the aforementioned Morrill Act in 1859 (and later signed into law by Abraham Lincoln in 1862). The Morrill Act would federally fund a system of agricultural and engineering colleges in each state. Also known as the Land Grant Act, it was a significant step in the progress of engineering and technology education in the United States. The purpose of these land-grant universities was to “teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life” [10].

Due in large part to the Morrill Act, there were over 85 engineering schools by 1880 [8]. This increase in engineering universities also increased the number and variety of engineering programs offered. Mechanical, mining, architecture, chemical and civil engineering programs began to emerge as separate and distinct fields of study. It was during this time that the profession of engineering education began experimenting with the notion of technology education. Figure 2 represents typical engineering programs offered today. Yet it would be several decades before engineering technology, as well as associated disciplines such as industrial distribution, would be recognized as separate disciplines.

The Influence of the Grinter Report

In 1952, the Committee on Evaluation of Engineering Education of the American Society of Engineering Education (ASEE) appointed L. E. Grinter and his committee to make recommendations regarding the direction engineering education should take in an attempt to keep pace with rapid developments in science and technology [11]. In 1955, this committee published a report entitled *Report on Evaluation of Engineering Education*, commonly known as the “Grinter Report”. This report continues to be widely known and recognized as a driving force in engineering curriculum design and organization. However, in the little-known preliminary Grinter report, this committee proposed the need for two types of engineering programs: 1) a general professional program whose graduates would participate in the engineering problem-solving area to satisfy the needs of industry, and 2) a scientific professional program that would be based more in math and science. This preliminary program for a dual-path engineering approach was summarily rejected by the ASEE Board of Directors. The final Grinter Report did not include this dual-path approach, but instead only included the scientific professional program [12].

Despite industry demand for a recognized hands-on, experiential learning program (or some sort of general professional), academia was slow to adopt this new discipline. Industry, however, continued to demand students who were competent in the more practical application of engineering principles. Over time, engineering technology programs emerged to fill the gap.

The Emergence of Industrial Distribution Programs

The aforementioned early baccalaureate business, engineering and engineering technology programs in the U.S. did not include curricula specifically designed to train stu-

dents in interdisciplinary study. However, due to increasing demands from industry to provide increased numbers of better trained and qualified students to market, sell and apply technical products, several higher education institutions started responding to these needs by the mid-1950s to 1960s. Industrial distribution programs began to emerge on the higher education landscape to fill this need in industry.

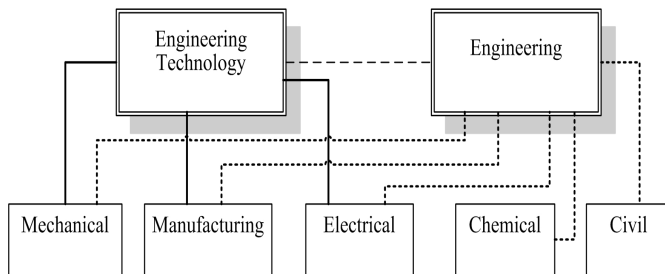


Figure 2. Post-secondary Engineering and Engineering Technology Disciplines

Industrial Distribution

To understand the industrial distribution industry, it is necessary to have some historical perspective on the industry, its culture, behaviors, evolution and environment. During WWII, many countries within the European region were devastated. Their ability to rebuild was compromised by the destruction of manufacturing plants. Europe’s ability to rebuild, as well as its economic recovery, was highly dependent upon a good trading relationship with the United States. Within the U.S., wartime production facilities quickly converted to post-war, consumer-driven production, driven in large part by European markets. The European market included a high demand for industrial products. This change in market economy would mark the emergence of industrial distribution as a distinct field within industry and, in later years, a distinct discipline within academia.

While distribution of products was happening pre-WWII, it was the incredible industrial growth that took place during post-WWII that allowed industrial distribution (I.D.) to formalize and to be recognized as a distinct field. Professionals within the industrial distribution industry helped to streamline, or improve, post-WWII production and distribution of products. This was done by helping to reduce inventories, improve marketing strategies, and radically changed how logistics and transportation was being handled for industrial products [13].

Industrial distribution is simply a channel through which manufacturers of industrial products can take their products to market. An inherent advantage of the I.D. industry is that as manufacturing plants continue to change locations—for

example, many companies that sent manufacturing to China over the last two decades are now bringing that same manufacturing back to the United States—the need and role of the industrial distributor has not changed. That role is to provide technical sales, marketing and service of these manufactured products to the end users of said products. Corey et al. [15] succinctly state the importance of industrial distributors: “if farms and factories are the heart of industrial America, distribution networks are its circulatory system.”

Today, as evidence of the progress the I.D. industry has made, several universities throughout the United States offer bachelor’s degrees in industrial distribution or other similar disciplines (e.g., Texas A&M University, Purdue University and the University of Nebraska at Kearney).

Despite little scholarly research on the industry, the wholesale distribution industry represents a significant force in the U.S. economy. Fein [14] estimates that the wholesale distribution segment of the U.S. market is over \$4.2 trillion, represents approximately 7% of the private U.S. gross domestic product (GDP), and employs nearly one out of every 20 workers in the U.S.. The top ten wholesale distribution industries are represented in Table 1.

Table 1. U.S. Wholesale Distribution Industry Revenue

Major Industry Sector	2005 Revenue (\$B)
Grocery and Foodservice Wholesale Distributors	\$ 510.30
Oil and Gas Products Wholesale Distributors	\$ 509.80
Pharmaceutical Wholesalers	\$ 362.80
Industrial Distributors	\$ 338.30
Motor Vehicle and Motor Vehicle Parts Distributors	\$ 324.10
Electrical and Electronics Wholesalers	\$ 323.30
Miscellaneous Durable Goods Distributors	\$ 238.40
Other Consumer Products Wholesale Distributors	\$ 222.90
Computer Equipment and Software Distributors	\$ 182.80
Agriculture Products Wholesale Distributors	\$ 179.90

Industrial Distribution Education Today

Industrial distribution programs today continue to struggle with their own identity. Throughout the United States, I.D. programs are housed in Colleges of Education, Business, Technology and Engineering. Over the years, proposals have been made within the educational community to merge, marginalize, abolish, rename, reconfigure or otherwise change I.D. programs. One of the challenges for these I.D. programs is to mitigate the effects that these subordination attempts have had on the discipline. Today, I.D. programs are often confused with Supply Chain Management. While I.D. is integral to the supply chain process, as illustrated by Figure 3, I.D. has a more specific role in the manufacturer's supply channel.

Products and technology play an instrumental role in the I.D. model. For example, I.D. personnel utilize management

information technology to interface with supplier manufacturing operations, sales and marketing, logistics and engineering functions, which allow for effective and efficient communication and operations. Despite the evolution of products and technology over time, the specific role of industrial distributors remains the same. The business model of industrial distribution continues to include a strong emphasis on technical sales and may include other aspects of operations and customer service.

It has been shown that the trend for higher education is to place more emphasis on theory rather than practice [16]. While the need for content-rich curricula is demonstrated in many educational disciplines (such as chemistry, biology, physics, etc.), the requirement for hands-on experiential education could never be so important as it is in industrial distribution where the integration of theory and practice is critical for the thorough understanding, safety and professional progress of students.

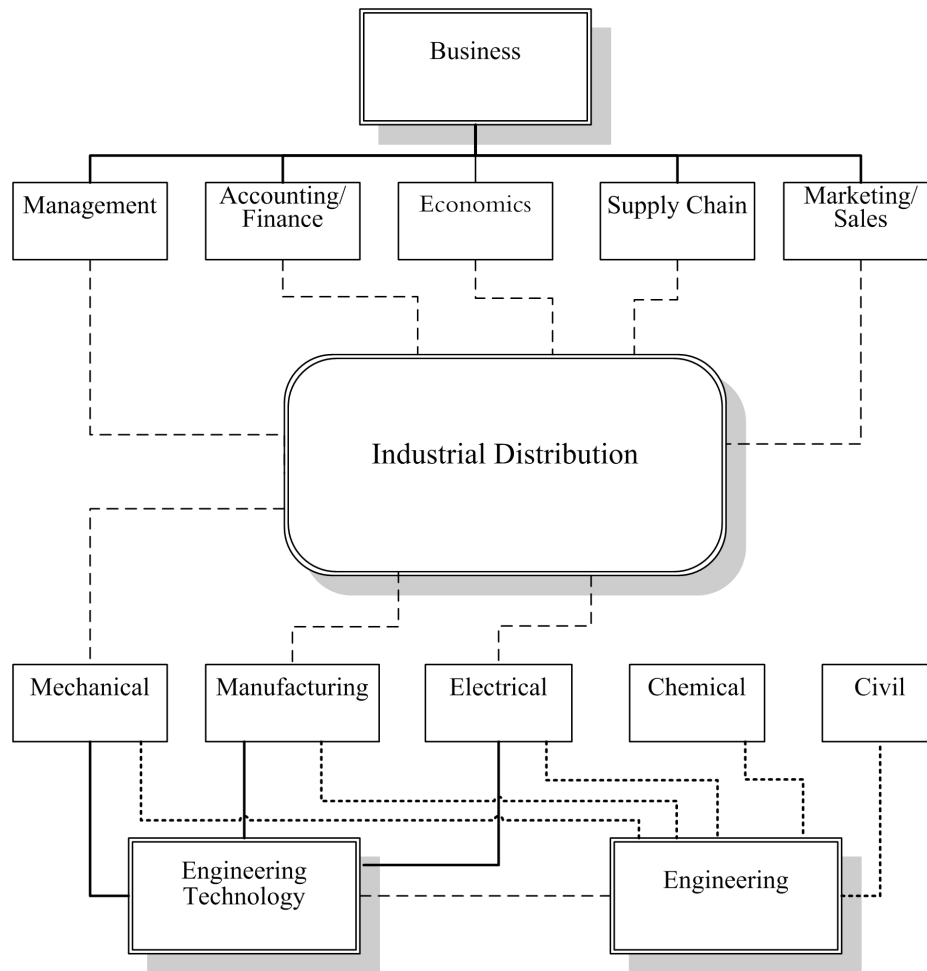


Figure 3. The Integration of Business and Engineering Disciplines

Conclusion

The need for a specialized degree in industrial distribution was originally driven by industry and continues to be a discipline in high demand. As these programs began to prepare technical sales people, it was found that they were successful because they had the soft skills of sales personnel, the knowledge of business operations, and the ability to learn and understand technical products and applications.

Industrial distribution, as an academic discipline, continues to evolve as the needs of industry change. Many industrial distribution programs have moved away from a technical sales emphasis to a logistics/supply chain emphasis. While the need for logistics and/or supply chain management may be important for many industries, it has not, nor should not, supplant the need for technical sales people. With the increase of technical products, the need for people with a combination of sales skills and technical skills is greater than it has ever been. Industrial distribution needs to continue to focus on this mission.

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Biographies

JAMES L. TOPPEN is an Associate Professor of Industrial Technology at the University of Nebraska at Kearney (UNK). He earned his Ph.D. from Arizona State University. He worked in the wholesale distribution industry before joining the UNK faculty in 2008. He teaches professional selling and branch operations courses in the Industrial Distribution program. Dr. Toppen can be reached at toppenjl@unk.edu

ROD L. FLANIGAN is an Assistant Professor of Industrial Technology at the University of Nebraska at Kearney (UNK). He earned his Ph.D. from Utah State University. He spent over 25 years in the wholesale distribution industry before joining the UNK faculty in 2011. He teaches courses in fluid power, power transmission, and leadership in the Industrial Distribution program. Dr. Flanigan can be reached at flaniganrl@unk.edu

JANET LEAR is an Assistant Professor of Business Education at the University of Nebraska at Kearney (UNK). Dr. Lear earned her Ph.D. from the University of Nebraska at Lincoln. Prior to joining the faculty at UNK in 2002, Dr. Lear enjoyed a successful career as an independent business owner. She teaches courses in Business Communications, Introduction to Business, and Business Education. Dr. Lear can be reached at learj@unk.edu

GARY STEWARDSON is an Associate Professor of Technology and Engineering Education at Utah State University (USU). Dr. Stewardson earned his Ph.D. from the University of Maryland. He teaches courses in manufacturing processes, automation and controls, engineering design, and specializes in the history of engineering education. Dr. Stewardson can be reached at gary.stewardson@usu.edu