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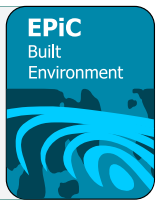

The Early History of Undergraduate Construction Education in the United States

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The history of undergraduate construction education in the United States has garnered faint attention by academics and little is known about construction programs in existence before the formation of the Associated Schools of Construction (ASC) in 1965. This study uses contemporary historical documents to identify construction programs that existed before the second world war, and programs created during or shortly after the war. A total of nine programs with courses related to the "building industry" are identified as being in operation prior to 1941 and 23 programs are identified as existing by 1946, and 36 programs by 1953. The research also identifies, and analyzes a study conducted by Arthur A. Hood of the Johns-Manville Company who has a major influence on establishing programs during and after the war. Over half of the institutions represented at the inception meeting of the ASC were identified as being established as a result of this study and the actions of Arthur A. Hood. There is a strong case to be made for Arthur A. Hood being the founding father of construction education in the United States.

Key Words: Construction Education, History, Curriculum, Industry, Associated Schools of Construction

Introduction

The history of the conception and inception of the Associated Schools of Construction (ASC) in 1965 is well documented on the association's website. The fourteen representatives from nine universities that met at the University of Florida, on March 19 and 20, 1965 included representatives from Arizona State University, Auburn University, Clemson University, Colorado State University, University of Florida, Michigan State University, University of Minnesota, University of Nebraska and Virginia Polytechnic Institute. The discussion at that meeting suggests that the discipline of building construction had matured to a point where 4-year degree programs were justifiable and that a formal association was both desirable and necessary (The Associated Schools of Construction, 2019). The history of construction education in the United States has been paid little attention since the formation of the ASC in 1965. The author was unable to find any definitive study on the subject in the

publications of the ASC nor in any other database. The subject has been partially addressed in previous research. Robson (1995) claimed the first identifiable construction program started at the University of Florida in 1936. In studying the evolution of construction education at two institutions, the authors identified the use of the college catalog as a tool for gathering information about the history of a program. The research identified the programs at Texas A&M University and Colorado State University as having their programmatic starts as a Bachelor of Science in Architectural Construction in 1948 at the Agricultural and Mechanical College of Texas and as the Light Construction and Management program in 1946 at the Colorado Agricultural and Mechanical College. Significantly the program at Colorado State was identified has having been developed "in response to a study conducted by Johns-Manville citing an industry need for more and better trained manpower" (Burt et. al, 2008). This claim suggests a significant industry involvement in establishment of at least one early program. There is a need therefore, to document the early history of construction education in the United States to better understand industry's involvement, as a means to guiding us in developing curriculum, accreditation etc. The previous research identified above shows programs were in existence prior to the second world war and some programs were established following the end of that conflict. Using contemporary historical documents this paper seeks to identify those construction programs existing before the second world war and programs created during or shortly after the war. The research also seeks to identify, and analyze the study conducted by Johns-Manville and determine its impact on the history of construction education in the United States.

Method

Identifying construction programs existing before the second world war or created during or shortly after the war

In order to identify the construction programs existing before the second world war or created shortly afterwards, the author analyzed college guides from the early 1950's. *Lovejoy's College Guide* is a reference guide to the colleges and universities of the United States. The 1953/54 edition references 2,049 colleges and universities. Individual degree programs are listed under various career tracks. The only career track found that is applicable to construction is called "Building Industry". This track identifies 36 institutions that offer 4-year degrees in this career track (Lovejoy, 1953).

The process began by identifying names of the 36 programs from the 1953/54 edition of the *Lovejoy College Guide*. Once the names of these programs were identified, the next step was to find, where possible, the date when the program was first offered. Analysis of each individual institutions annual college catalogs or bulletins were used to identify both the name and possible starting date of the program.

Identifying and analyzing the study conducted by Johns-Manville

Identifying the study by Johns-Manville mentioned in *Celebrating the Past, Building the Future," A Historical Perspective of Construction Education at Colorado State University from 1946 to 2006* was much more complex. Initial enquiries to the Corporate Records Management Specialist at the Johns Manville failed to identify this document. Searches of catalogs of schools identified in Lovejoy's guide also made no mention to the study. Eventually an article entitled *To Beat the Housing Crisis* in a November 1948 edition of the Wisconsin alumnus magazine provided the first connection between the Johns Manville company and a new construction curriculum. The article is about the first cohort of graduates from the University of Wisconsin's Light Building Industry program. The article

states that "the curriculum in Light Building Industry at Wisconsin is a direct outgrowth of the efforts of Arthur A. Hood, formerly of the Johns Manville company, now editor of the *American Lumberman*. Mr. Hood visited many universities the country over to urge the administrative officers to install education facilities for the great industry which he represented" (Wisconsin Alumni Association, 1948, p.15).

With a name to associate to the study and Mr. Hood's association with the American Lumberman, searches using the *WorldCat* database and trade magazine indexes eventually identified the study mentioned in the Colorado State history. The study written by Arthur A. Hood and published by Johns-Manville is titled *New Career Opportunities in the Building Industry for High School Graduates Planning to enter College* and was published in 1942. The study makes a compelling case for the *Light Construction Industry* playing a major role in the post-war economy. It identifies the educational problem of the absence of a training program for the building industry and recommends curriculum be developed at colleges and universities to solve the problem. The study also identifies 11 universities having installed courses in "light construction engineering and marketing" (Hood, 1942).

Additional contemporary documents were identified and analyzed to determine the impact this study had on construction education. This involved analysis of university catalogs, journal articles and trade publications.

Results

Construction Programs operating prior to Second World War

From the 36 programs identified in the 1953/54 edition of *Lovejoy's College Guide*, it has been possible to identify at least nine programs in operation prior to 1941. Table 1 shows the nine programs together with the year they were established and the name of the program. The program names and the year of creation were identified mainly by analyzing university course catalogs and bulletins. The author identified the program within the catalog having the greatest alignment with the building industry.

Table 1
Construction programs in operation prior to 1941

Institution Name	Year	Program Name
University of Denver	1938	Building Industry and Real Estate Program
University of Florida	1936	Building Construction
Iowa State College	<1938?	Architectural Engineering
Kansas State College	1925	Architectural Engineering
University of Kansas	1913	Architectural Engineering
University of Kentucky	1934	Civil Engineering with Special Emphasis on Architectural Engineering
Massachusetts Inst. of Technology	1927	Building Construction
State Uni. of N.Y. Agri. & Tech. Inst. (Delhi)	1937	Building Construction
Penn State College	1922	Architectural Engineering

It is clear from the above table that programs teaching construction curriculum were offered under many different titles. The earliest program called Building Construction is at Massachusetts Institute of Technology (1927). This four-year course is listed in the catalog as preparing students to enter "the

business of building". The curriculum is based on the Civil Engineering course with classes also taken in Architecture. The focused building construction classes cover building finance and management; cost accounting; professional and industrial relations; analysis, details and assembly of the materials of building; and construction methods and procedure.

The program at Kansas State Agricultural College (1926) in Architectural Engineering is located in the Division of Engineering. The curriculum is listed as being "for the student who wishes to specialize in the constructional side of the building profession". Some of the fields identified that the graduate could go into include "superintending of building construction, general contracting, and the estimating of costs for construction projects".

Construction Programs started during or shortly after the Second World War

From the 36 programs identified in the 1953/54 edition of *Lovejoy's College Guide*, it has been possible to identify at least 14 programs that started during or shortly after the end of the second world war. Table 2 shows the 14 programs together with the year they were established and the name of the program.

Table 2
Construction programs established after 1941

Institution Name	Year	Program Name
Alabama Poly. Inst.	1945	Building Construction
Colorado A & M College	1946	Light Construction and Marketing
Georgia Inst. Of Technology	1950	Building Construction
University of Illinois	1950	Architectural Engineering
University of Maine	1946	Civil Engineering: Light Building Construction Option
Michigan State College	1948	Light Construction and Lumber Marketing
University of Minnesota	1951	Forestry: Building Products Merchandising and Light-Construction
University of New Hampshire	1943	Building Construction and Marketing
State University of. L.I. Agri. & Tech. Inst. (Farmingdale)	<1947?	Building Construction
Syracuse	1942	Retail Merchandising & Light Construction
North Carolina State College	1949	Construction
Oregon State College	1953	Construction & Design
Texas A & M	1948	Bachelor of Science in Architectural Construction
University of Wisconsin	1945	Light Building Industry

Interestingly the majority of these programs include the word construction in the program name, with only one program using Architectural Engineering. The name "Light Construction", not seen in the pre-war programs is a common theme among the post war programs. The program at Alabama Polytechnic Institute (now Auburn University) is a good example of a program that was created during this period. A survey conducted by the American Society for Engineering Education (1941) identified courses being offered in both architecture and engineering. A total of three construction classes were offered in the School of Architecture and Applied Arts, the earliest of which was first offered in 1929. The annual bulletin for 1940/41 lists a "Construction Option" in the School of Architecture and Applied Arts. This 5-year program "is for the student who plans to engage particularly in the structural field of architectural practice, or who wishes to prepare himself for the business of contracting, the manufacture or sale of building materials, or other branches of

construction" (Alabama Polytechnic Institute, 1941). By 1942 there was also a "Light Construction Option" being offered in the Division of Engineering. The curriculum for this option is listed as being "especially designed to meet the urgent need for trained engineers in the building trades industries" (Alabama Polytechnic Institute, 1942). By 1945 the two construction related options have been consolidated into a four-year degree in "Building Construction" in the School of Architecture and the Arts (Alabama Polytechnic Institute, 1945).

The Impact of the Arthur A. Hood and Johns-Manville Study

Prior to the publication of *New Career Opportunities in the Building Industry for High School Graduates Planning to enter College* published in 1942, Arthur A. Hood made a significant impact on both the lumber and construction industries. He was born in Sioux City, Iowa in 1891, and entered the lumber industry after graduating high school working in lumber yards. By 1914 he was the sales manager of James Lumber co. in St. Paul Minnesota (Building Materials Merchandiser, 1965). In 1930, he was serving as the President of the Associated Leaders of Lumber and Fuel Dealers of America. In this capacity he proposed establishing a mortgage company to support lumber dealers to compete with the mail-order home building industry (The Southern lumberman, 1930). By 1931, this proposal had resulted in the formation of the National Homes Finance Company with Hood as the temporary secretary (The Southern lumberman, 1931). Mr. Hood was the vice-president and general manager of this organization in 1933 (The Southern lumberman, 1933). By 1937 he was working for the Johns-Manville Sales Corporation of New York as Manager of the Housing Guild Division (Hood, 1937). The National Housing Guild was up and running by 1940 under the sponsorship of the Johns-Manville Company. Arthur Hood is credited as proposing the plan to make "the lumber and building materials dealer as the focal point for the building industry in every community in the country, coordinating the activities of all the various factors who contribute to furnish a complete home". He also proposed training programs for dealers to familiarize them with modern merchandising methods, correct estimating procedure, and other tools (Brown, 1940, p. 43). As part of establishment of the National Housing Guild, Hood (1940 p. 47) identified education as a key issue " to enable the dealer to train his executives, salesmen, employees, contractors, and other building industry factors on the parts they individually play in making this machinery work for the benefit of all members of the industry and the consumer."

The Johns-Manville company published *New career opportunities in the building industry for high school graduates planning to enter college* in 1942. However, it would appear that Hood had identified the need to include colleges and universities in his planning sometime beforehand as he had visited institutions prior to 1942 (Wisconsin Alumni Association, 1948). The study identifies the absence of a training program adequate for the needs of the industry. The heterogeneousness of the industry and the complexity of the process are cited as some of the major factors for this absence. The "Light Construction Industry" defined as including new homes, structural improvements and farm buildings is identified as a significant part of the post-war economy. In order to educate the men and women to produce these new homes, the study identifies 50 subjects as the knowledge needed for these individuals. A complete listing of these subjects is beyond the scope of this paper. The list however does include many of the topics required under the American Council for Construction Accreditation standards (2006) prior to its revisions in 2015. These are set out in table 3 below.

Table 3
Examples of subjects identified in "New career opportunities in the building industry for high school graduates planning to enter college"

Construction Supervision & Danger Points	Material Uses, Application, Fabrication &
Grammar and Composition	Assembly

Materials Identification & Grading	Drawing & Sketching
Money, Finance & Banking	Blueprint Reading & Quantity Surveys
Philosophy & Ethics	Specification Writing
Zoning, Codes & City Planning	Estimating
Introduction to the Sciences	Logic & Creative Thinking
Industrial Relations	Business Mathematics
Accounting, Statistics & Budgeting Practices	Public Speaking
Economic Principles	Contracts, Documents, Reports and Business Law
Business Organization & Management	Retailing and Marketing Principles

The report claims the study of these subject areas can only be found at a college or university. Most of the subjects are identified as already being taught at many universities across many different courses such as civil engineering, architecture, forestry, liberal arts, sciences and business administration. The challenge was to amalgamate the subjects into a complete course and assign the administration to a suitable academic home. By 1942, 11 universities are identified as having risen to this challenge and are offering courses in "light construction engineering and marketing". These are: Alabama Polytechnic Institute, University of Denver, Iowa State College, Massachusetts Institute of Technology, Michigan State College, University of Minnesota, University of New Hampshire, New York State College of Forestry at Syracuse, North Carolina State College, University of Wisconsin, New York State Agricultural and Technical College (Hood, 1942).

Following the publication of *New career opportunities in the building industry for high school graduates planning to enter college*, there appears to be additional institutions considering adding this curriculum (Kowalsky, 1942). Writing in *The Southern Lumberman*, Hood (1942) announces that there will shortly be similar courses at Iowa State College and the University of Wisconsin. As the second world war is drawing to a close, Hood is able to report that "Fifteen universities…have been persuaded to add new courses, which give the degree of bachelor of science in light construction engineering and marketing" (The Southern Lumberman. 1944). By 1946 there are 23 universities offering four-year courses in light construction leading to a degree and a further three courses being planned. These 23 institutions are set out in Table 4 (The American Lumberman, 1946).

Table 4.
Institutions offering four-year courses in light building leading to a degree in 1946

Institution	Location of Course
Massachusetts Institute of Technology,	Department of Building Engineering and Construction,
Rensselaer Polytechnic Institute	Department of Architecture,
Alabama Polytechnic Institute	School of Architecture and the Arts
North Carolina State College	Department of Civil Engineering
University of Minnesota	Department of Forestry,
Michigan State College	Department of Forestry,
University of Wisconsin	School of Commerce,
Oregon State College	School of Forestry
Georgia School of Technology	Department of Architecture
Massachusetts State College	Division of Engineering,
University of Maine	Department of Civil Engineering,
University of Kansas	Department of Architecture,
Colorado A & M College	Division of Science and Arts,
Syracuse University,	New York State College of Forestry
University of Denver	School of Commerce, Accounts and Finance,
University of Idaho	Department of Agricultural Engineering,

University of New Hampshire	Department of Architecture
Kansas State College	Department of Architecture,
Iowa State College	Division of Engineering
Oklahoma A & M College	School of Architecture
University of Kentucky	College of Engineering
Louisiana State University,	College of Commerce
Virginia Polytechnic Institute	Department of Architectural Engineering

Even though the program at MIT appears in table 1 as being a program in existence before Hood's initiative, up until 1942 there was not a "Light Construction" option being offered as part of the Building Engineering and Construction degree (Massachusetts Institute of Technology, 1941). By the following year, there are options being offered in both "Heavy" and "Light" construction (Massachusetts Institute of Technology, 1942). In 1946 Hood became the Vice President and Editor of the *American Lumberman.* In his introduction to readers he is described as "the greatest individual champion of the Nation's lumber and building material retailers" and his contributions to educational progress are also noted. His role in leading the campaign to establish courses in Light Construction Engineering and Marketing at universities and colleges is acknowledged and this educational progress is seen as the start of "an era of better merchandising and better building." (The American Lumberman, 1946). By the time of his death on December 8th, 1965 his obituary in the Building Materials Merchandiser (1966) that was spread over six pages claims he helped organize courses in light construction and marketing at over 30 institutions.

Discussion

This study identifies a number of "building Industry" courses operating in the United States prior to the start of the second world war. This number grew considerably after the end of the war and there is a strong case to be made that the "light construction" industry under the leadership of Arthur A. Hood played a significant role in this. It is evident from some of the names of programs listed in table 2 that there is a strong correlation with Hood's proposed name of "light construction engineering and marketing". A study of the course curriculum with the 50 subjects set out in *New career opportunities in the building industry for high school graduates planning to enter college* may well go some way in confirming Hood's influence, but this is beyond the scope of this paper (Hood, 1942).

The limited amount of scholarship conducted previously on this subject suggests this is an area of research requiring greater investigation. The existence of programs before the war in Architectural Engineering at colleges now having accredited construction programs such as Kansas State and Iowa State suggests they may have evolved from these programs, but only a thorough analysis of the institutions course catalogs or bulletins will answer this. The existence of a Building Construction program at MIT is also of interest. A construction program is currently not offered in either of the Schools of Architecture and Planning or Engineering at this world-renowned institution. What is the story behind this program's establishment, evolution and ultimate decline?

This study makes a significant contribution to the body of knowledge by setting out the history of undergraduate construction education in the United States prior to 1965. There is clear evidence of the construction industry's involvement in the establishment of programs during and after the second world war. This strong industry involvement in the creation of accreditation standards and practices is continued through the American Council for Construction Education (2019) which currently accredits 72 undergraduate construction programs and requires programs to establish an effective relationship with industry. By 1965, when the ASC was formed. It is interesting to note that of the nine schools represented at the inception meeting, five of them, Auburn University, Colorado State

University, Michigan State University, University of Minnesota and Virginia Polytechnic Institute appear to have acquired their start due to Hood's initiative. We correctly acknowledge the 14 attendees at that initial ASC meeting in 1965 as the founding fathers of ASC, but there is a strong case for Arthur A. Hood as the founding father of construction education in the United States.

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