
Don Lux and Jim Buffer

The Ohio State University

by
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Many vocational education, technology education, and now technology and engineering education leaders have made their mark on our profession. Their legacy is something that members of the profession enjoy and have a responsibility to continue and build upon.

The Legacy Project focuses on the lives and actions of leaders who have forged our profession into what it is today. Members of the profession owe a debt of gratitude to these leaders. One way to demonstrate that gratitude is to recognize these leaders and some of their accomplishments.

This *Legacy Project* piece focuses on The Ohio State University. Historical information is being supplied by three professionals affiliated with OSU and includes the origins and development of industrial arts curriculum projects.

History of The Ohio State University Industrial Arts/Technology Education Program

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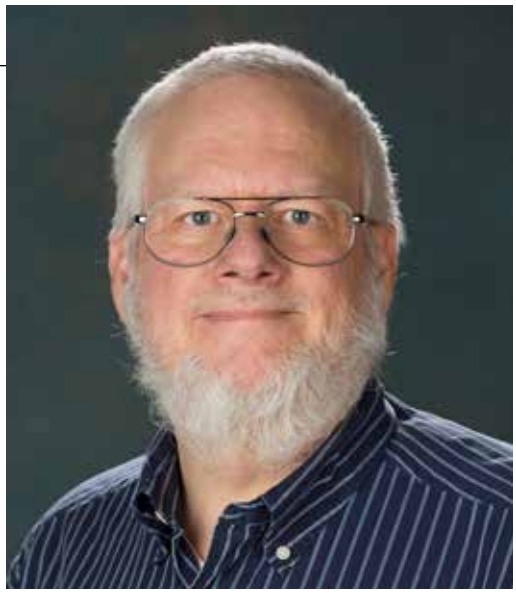

The Ohio State University was founded in 1870 as a Land Grant institution. The university's early engineering program included some manual training. After serving as President of the United States, Rutherford B. Hayes became a trustee of the university. Hayes was an outspoken proponent of manual training, in part due to the impact the Scott Manual Training School of Toledo had on his youngest son. Hayes proposed both a separate department of manual arts and, after the state im-

proved the funding structure of the university, a building to house manual training. The trustees decided to honor Hayes' work by naming the building Hayes Hall. Though a part of engineering, the program did not have leadership that understood the theoretical and professional elements of manual training and was not successful at attracting preservice teachers. During this time there were both a manual training program for engineers and a manual training program for teachers. There was much course overlap and, in reality, little beyond technical skills for teachers.

The OSU College of Education was founded in 1907, with manual training added in 1910. In 1913 Eldon Usry was hired as the first faculty member with a degree in manual training (an M.A. from Teachers College at Columbia University). He significantly revised the curriculum for manual training teachers and increased enrollment. In 1918 the name was changed to the Industrial Education Department. This was the time of the Federal Smith-Hughes Act, and the department organized to take advantage of the funding. For a time, there was also a new and separate Department of Vocational and Commercial Education. William E. Warner (B.S. in Education, 1923 and M.S. in Education, 1924, both from the University of Wisconsin) was one year into his Ph.D. program at Teachers College, Columbia University when he joined the department in 1925. After Usry's death, Professor William H. Stone came from the Department of Vocational Education as head of the Department of Industrial Education. He quickly renamed the department the Department of Industrial Arts to better fit the times. Warner saw the need to raise the esteem of the profession. A phrase he often used was the need to "come out of the basement" (Ezell, 1982, p. 111) referring to both the common physical location of industrial arts classes and the perceived placement of industrial arts in the education hierarchy. With Warner's guidance, the graduate program focused on developing leaders and quickly grew.

While William E. Warner's contributions to the field merit a separate Legacy Project article, it's important to mention his valuable roles in the establishment of Epsilon Pi Tau and the American Industrial Arts Association (now ITEEA). What was important to the future of the OSU program was that Usry, Stone, and Warner all saw Industrial Arts as separate from Vocational Education. Though at times the programs were in the same department, the Industrial Arts faculty worked to develop curriculum designed to be a part of general education and preparing teachers to lead in the implementation of the curriculum.

In the late 1950s Edward R. Towers and Willis E. Ray joined the faculty. In 1959 Towers became involved in an OSU and US-AID project to improve education in India. Professor Ray also participated in the project as did OSU alumni Donald G. Lux, then on his way to becoming a full professor at the University of Illinois where he was department chair. Lux served two years as a visiting professor at OSU during the project. With the impending retirements of Warner and Robert W. Haws, Donald G. Lux and Robert E. Blum were hired in 1965. Lux was hired as a full professor. In 1963, while still at the University of Illinois, Lux and University of Illinois colleague Jacob Stern started working with Towers and Ray from OSU on a curriculum development proposal to be submitted to the U.S. Department of Education. The project was funded, and work on the Industrial Arts Curriculum Project (IACP) began in June of 1965. Enrollment growth and the project created a need for more faculty. In 1968 a college reorganization led to a separate department, Industrial Technology Education, with Edward R. Towers as Chair. Donald G. Lux, and Willis E. Ray were professors. Robert Blum, James J. Buffer, Jr., A. Dean Hauenstein, Victor Hoffman, and John Jenkins were assistant professors. The following year there was a disagreement over the direction of the IACP project. Towers and Blum subsequently left to pursue their vision. Soon afterwards (1970), E. Keith Blankenbaker and William D. Umstattd joined the faculty as assistant professors. The IACP and some of its spin-off activities dominated the direction of the program for almost two decades. The contribution of IACP to the thinking about the philosophy of the field and its curriculum are still felt. It continued an emphasis on the general education nature of Industrial Arts at OSU. That emphasis was common with a number of other projects from that era. The 1980s saw a number of retirements and the addition to the faculty of Michael L. Scott, Paul E. Post, and Karen F. Zuga.

The focus on professionally developing the field continued with an emphasis on professional involvement. Professor Ray served as AIAA president. Blankenbaker, Zuga, and Scott served on the AIAA/ITEEA board at different times. Faculty have also served in a variety of roles nationally at AIAA/ITEEA, the Mississippi Valley Conference, and at the state and local levels. OSU faculty have also assisted in the writing of state standards and the development of model curriculum. Retirements over the years since the 1990s have not brought replacement faculty. OSU no longer offers a preservice technology teacher program, but M.A. and Ph.D. programs continue. A close relationship between the Technology Education and College of Engineering programs has developed, resulting in a joint Ph.D. program. In an echo of earlier times at OSU, the College of Engineering has established a Department of Engineering Education. In the current College of Education and Human Ecology, technology and engineering education is part of STEM education in the Department of Teaching and Learning. STEM and Engineering Education work together in a number of ways and plan to continue doing so.

A Graduate Student's Perspective of the Ohio State University During the Industrial Arts Curriculum Project Era

William E. Dugger, Jr., Ph.D., DTE

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OSU has a rich history as an academic institution. It is a premier land grant institution known for its variety of degree options and athletic programs. The industrial arts program at OSU was established in the early part of the 20th century. Over the past decades, the industrial arts program provided leadership to the U.S. and the world through its excellent faculty, including Dr. William E. Warner (1925–1967). The Industrial Arts Curriculum Project (IACP) was a notable accomplishment at OSU.

Dr. Warner was an Industrial Arts Education visionary. He was instrumental in the development of industrial arts education and its recognition as a profession. Among his professional accomplishments, he founded Epsilon Pi Tau (EPT) in 1929. EPT continues today as an international industrial arts fraternity. He also founded the American Industrial Arts Association (AIAA) (now the International Technology and Engineering Educators Association/ITEEA) and served as its first president. He was responsible for a number of industrial arts education initiatives. Dr. Warner traveled throughout the U.S. and the world to lecture and develop industrial arts programs in elementary, secondary, and post-secondary schools.

Warner was responsible for identifying major industrial arts organizers (or clusters), many of which that are still used in programs today. Additionally, he founded the "Laboratory of Industries" course, part of a notable 1940s curriculum effort. As a new graduate student, I had the honor and pleasure of being in Dr. Warner's last "Laboratory of Industries" class in the summer of 1967. The major focus of the class was to learn firsthand about industries: their history; location; what they did, who was involved; how they produced their products; and why they were in business. Each class featured different industries located in the Columbus, OH area. Industry representatives either spoke to us or provided field trips to their business. The final class gala featured a delicious banquet at a local restaurant with all industry representatives and class members attending. It was a class that one never forgets. Dr. Warner was a master promoter, organizer, and teacher.

My Experiences as a Graduate Student at OSU

> *One looks back with appreciation to the brilliant teachers, but also with gratitude to those who connected on a human level. The curriculum is so much necessary raw material, but warmth is a vital element for the growing plant and for the soul of the child.* (Carl Jung)

Childhood was a bittersweet mixture of love, happiness, and tragedy for me. My father died early in his life, leaving my mother and me (at age 6). He was the founder of a cotton mill in a rural town in Virginia in the late 1930s that is still in operation today. One of the important legacies that he left me was his ability to innovate and build things. As a result, he made or assembled most of the early machines in the mill. His fascination with doing things and working with one's hands and mind has been a dominating factor throughout my lifetime.

After graduating from high school, I completed a B.S. degree at Virginia Tech in industrial arts education. From 1959 to 1967, I served as the electronics teacher at Martinsville (VA) High School. My teaching there was a great pleasure, and I taught and motivated many students. During the summers, 1965 to 1967, I completed an M.S. degree at Appalachian State University in industrial arts education. During that time, I realized that I wanted to be a professor at a university, so in the summer of 1966 I visited quite a few doctoral programs in the East and Midwest part

of this country. As a result, I decided to pursue a Ph.D. degree at The Ohio State University.

When I entered OSU in 1967, I was given a graduate research assistantship with the Industrial Arts Curriculum Project (IACP). Dr. Edward Towers was my advisor. IACP began in 1966; Drs. Towers, Don Lux, and Willis Ray organized the processes of industrial technology in a conceptual document called *A Rationale and Structure for Industrial Arts Subject Matter*. In their subsequent textbooks, *The World of Construction* (1970) and *The World of Manufacturing* (1971), they further refined the technical design for curriculum in industrial technology education by focusing on the processes of manufacturing and construction and by structuring the teaching materials with student performance objectives. My primary assignment was to work with Dr. A. Dean Hauenstein and the assessment team at IACP on the assessment instruments for *The World of Construction* (1970). Later, I also was on the assessment team that prepared the assessments for *The World of Manufacturing* (1971). Dr. Towers left the IACP in 1968, and Dr. James Buffer became my advisor. During the three years at OSU, I served also as a graduate teaching assistant and taught some classes in electronics and metalworking. In my final year, 1970, I worked on my dissertation, served as a graduate research assistant, and taught industrial arts at a high school near the university.

The IACP was very well organized and highly structured. Drs. Lux and Ray, as well as Drs. Buffer and Hauenstein, provided excellent leadership and served as role models for all the graduate students who worked with IACP. In 1963, OSU submitted a proposal to the U.S. Department of Education for a multi-year research and development project (IACP) that was to be funded out of the career education portion of the Vocational Education Act of 1963. Additionally, supporting individuals and groups such as Society of Manufacturing Engineers, Building and Construction Trades Department of the AFL-CIO, Associated General Contractors of America, and many others contributed advisors for days and even weeks upon request (Lux, 2002).

The IACP project first prepared *A Rationale and Structure of Industrial Arts*. *The World of Construction* was developed initially and published in 1970, and *The World of Manufacturing* was developed about one year later and was published in 1971. Dr. Lux directed *The World of Construction,* and Dr. Ray directed *The World of Manufacturing*. The initial structure of both documents was similar. A number of agencies, associations, and industries supported IACP philosophically. IACP conceptualized, produced, field-tested, and revised and retested for three years, two complete courses for early adolescents. Dr. Lux stated in an article published in the *Journal of Technology Studies* in 2002 that "agreements were made with field-test center schools in Chicago, IL, Trenton-New Brunswick, NJ, Dade County, FL, Austin, TX, Long Beach, CA, and Cincinnati, OH. To be participants, school systems each had to provide two certified industrial arts teachers and two classes of students, both boys and girls, and of varied abilities. The teachers were to teach a normal full load exclusively in industrial arts.

The IACP staff worked very closely with the graduate students in the development of curriculum material. Seminars, small groups, and individual sessions were commonplace in the day-to-day operation of the project. Activities were designed by the staff and administered to students and were tested before inclusion in the curriculum materials. IACP developed laboratory manuals for both *The World of Construction* and *The World of Manufacturing*. Teacher Manuals were developed in the implementation of the curriculum.

Throughout the IACP project many presentations were given at national, regional, and state conferences. Additionally, numerous articles were published on the planning, organization, and controlling that took place within the project. Drs. Lux and Ray were masters at public relations, and most of the industrial arts profession, governmental agencies and professional associations, and key business and industry decision-makers were very knowledgeable about IACP.

Formal implementation of IACP's *The World of Construction* and *The World of Manufacturing* materials began in the early 1970s. According to Dr. Lux, once the formal implementation of IACP began, distributing the products became the next concern. IACP never produced or employed the use of "kits." The goals were to provide students with hands-on experiences, encouraging individual problem solving focusing on industrial design, architecture, engineering, and production. In addition, the use of city and regional planning technologies and lifelong values, such as home maintenance skills, career interest development, and hobbies were employed. (Lux, 2002). Today, we continue to see interest in students' learning by doing these types of hands-on activities.

Dr. Lux's 2002 article stated:

> *IACP was unique in several ways. It was the only major industrial arts curriculum effort that was rooted in an analysis of the structure of knowledge. It was the first project to produce instructional materials and a sequence of courses correlated with a taxonometric classification of a body of knowledge. The intensive field testing and in-service teacher education which accompanied the development was unequalled. Finally, IACP was the only program that has produced a substantial group of integrated instructional materials and made them available through a commercial publisher. In view of these attributes, IACP is considered by many to be the outstanding accomplishment of past decades in industrial arts curriculum development* (pp. 92-93).

What I Learned as an OSU Graduate Student

My experiences at OSU were rich and long-lasting. I worked with outstanding faculty on a very innovative project to establish a curriculum in construction and manufacturing for the nation. Likewise, my experiences with other graduate students who became leaders in the profession were stimulating, and I learned a lot from them. I learned about leadership and excellence. After graduation, I realized that the organizational and perseverance skills that I learned were important to me and my future. Additionally, the faculty members at IACP strengthened my philosophy that industrial arts education (now technology and engineering education) should be an integral part of general education and made available to all students.

Edward M. Reeve, Ph.D., DTE

Professor, Utah State University, 1987 to Present

At least two well-known curriculums were created by professors working in the department—Laboratory of Industries and Industrial Arts Curriculum Project (IACP). Dr. Reeve briefly describes the main thrust of each curriculum and an opinion as to how these projects brought attention to the department and university while leading the profession.

The Industrial Arts Curriculum Project (IACP) was a junior high school industrial technology curriculum project (1965-1971) with a primary objective to develop, refine, and institutionalize new and relevant two-year junior high industrial arts programs. Known as "The World of Construction (7th grade)" and "The World of Manufacturing (8th grade)," the courses were developed and tested over a six-year period, and the final curriculum included textbooks, laboratory manuals, teacher's guides, achievement tests, related hardware, and audiovisual materials.

Development and testing of the IACP materials were widespread, as the materials were field-tested over a four-year period with 20,000 students in 13 states. Workshops were conducted in 45 colleges and universities that prepared teachers to adopt or adapt the IACP curriculum. This large curriculum project brought a great deal of attention to the university and the department, helping to establish Drs. Donald Lux, Willis Ray, and James Buffer as leaders in the field. Drs. Lux and Ray served as the project coordinators of the curriculum, and Dr. Buffer served as the project's evaluator.

It is evident that the IACP project helped establish the OSU Industrial Technology (or Ed InTech) department as one of the top programs in the country. As a result, it attracted many well-qualified graduate students to the program, many of whom became leaders in the profession. Notable examples include Drs. Bill Dugger, Karen Zuga, Jim LaPorte, Michael Scott, Gerald Lovedahl, and Bill Paige.

Beginning my studies in the department in 1975, it was interesting to note that we were taught about the IACP project and used some of its activities in our required "hands-on" practical courses, but the curriculum was never "forced" upon us. We learned about the different curriculum projects and movements being used at the time.

While I knew little about the "Laboratory of Industries" project, Dr. Bill Dugger shared that it was created by William E. Warner at OSU in the early 1940s. He noted that the concept of the project was presented at the first American Industrial Arts Association (AIAA) conference held in Columbus in 1947. After World War II, the laboratories in the industrial arts building were fashioned after the Laboratory of Industries.

You were working on your degree at OSU when the field evolved from industrial arts, to industrial technology, to technology education. What were the key factors being discussed during those transitions? Were there concerns that the field

Ed Reeve and Don Lux (1982).

might go in a different direction than the department? How was the faculty influential in guiding the direction of the profession at the state and national levels?

My time at OSU was fantastic. The faculty was very involved in providing service to the profession at both the state and national levels (e.g., Dr. Ray was president of the American Industrial Arts Association [now ITEEA] in 1978). I believe Dr. Ray's leadership in the AIAA was very influential and instrumental in guiding the direction of the field of industrial arts.

In addition to professional involvement, the faculty was also involved in research and scholarship to move the profession forward. They were respected "visionaries" who challenged the profession to think about its identity and direction. I believe these writings helped shape the transition to technology education. Presented below is a select sample of publication titles that were released by Drs. Ray and Lux during my time at OSU that I believe were influential in shaping the profession:

- **Dr. Donald Lux:** *Industrial Literacy* (1973); *Back to Basics Won't Work* (1979); *Is IA an Idea Whose Time has Come?* (1980); *Science and Technology: A New Alliance* (1983).
- **Dr. Willis Ray:** *Industrial Arts – An Educational Responsibility for Interpreting Technology* (1972); *The New and the Renewed – A Joint Responsibility* (1978); *A School-Wide Practical Arts Program – Technology for All Students* (1978); *Toward Consensus Regarding and Industrial Arts Curriculum Base* (1980).

In addition to the work of Drs. Ray and Lux, other OSU faculty helped shape the profession by exploring topics that are still timely and pertinent. For example, Drs. Buffer and Scott were interested in the importance of serving "special needs" students in industrial arts and the role of cognitive science in learning. Dr. Keith Blankenbaker was interested in industrial arts and elementary education, technological literacy, and developing hands-on learning in the area of construction and plumbing.

Drs. Don Lux and Willis Ray completed the IACP Project and were nationally known OSU faculty in the industrial arts/technology education profession. What were they known for as educators beyond the Project? Please describe their concerns about education and specific interests.

Beyond IACP, I consider Dr. Lux to be both a leader and visionary to the profession of industrial arts/technology education. Although some may have considered his personality at times to be somewhat "haughty," I believe he had the credentials to back it up. He was a respected leader in the field and was always ready to "discuss" his viewpoints on the topic at hand.

During my time at OSU, Dr. Lux was the department head and had the responsibly of supervising and leading a very strong faculty (e.g., Drs. Jim Buffer, Willis Ray, William Umstadtt, and Keith Blankenbaker) and a very large and diverse pool of graduate students. In his capacity as department head, I believe he did an outstanding job.

Beyond IACP, I also consider Dr. Ray to be a visionary in the profession of industrial arts/technology education. I believe some of Dr. Ray's strong assets were his attention to detail and helping students to think critically. His evaluations of student work were often filled with red-mark corrections and questions to encourage additional thought.

Thank you to our contributors for providing this very informative and interesting piece on the contributions of The Ohio State University. Readers realize that it is not just the contributions of organizations, but the people within those organizations who make those contributions. Although some of the information was duplicated in this article, it is interesting to read the different perspectives of those initiatives and how they have helped form today's technology and engineering education profession.

We would be remiss without special recognition of Dr. William E. Dugger, Jr's contribution to this article. Dr. Dugger passed away prior to its publication. Bill has published a multitude of articles and books and was a premier leader. This article may very well be the last published under his name.

Important Documents

Below are some important documents produced from The Ohio State University during the 1970s and 80s as well as Dr. Lux's 2002 article. In some cases, the complete citations could not be found.

Ezell, E. B. (1982). *Industrial technology education at The Ohio State University: Its origin, development, leaders, and influence through the Warner era.* (Electronic Thesis or Dissertation). Retrieved from https://etd.ohiolink.edu/

Lux, D. G. (1973). *Industrial literacy.*

Lux, D. G. (1979). *"Back to basics" won't work.*

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Lux, D. G. & Ray, W. E. (1970). *The world of construction: Industrial arts curriculum project laboratory manual.*

Lux, D. G., Ray, W. E., & Hauenstein, A. D. (1971). *The world of manufacturing: Industrial arts curriculum project laboratory manual.*

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Ray, W. E. (1978). A school-wide practical arts program. *Journal of Epsilon Pi Tau, 4*(1), 4-13.

Ray, W. E. (1978). *Technology for all students.*

Ray, W. E. (1980). *Toward consensus regarding an industrial arts curriculum base.*

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William (Bill) Dugger, Ph.D., DTE, *served as ITEEA Senior Fellow until just before his passing in May of 2018. The technology and engineering profession will feel his influence for many years to come.*

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