

AC 2008-2622: CREATING CLASSROOM LINKS BETWEEN PUBLIC ADMINISTRATION AND CIVIL ENGINEERING DISCIPLINES

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Creating Classroom Links between Public Administration and Civil Engineering Disciplines

Abstract

Professionals from the public administration and civil engineering fields are always working together in practice. Public administration professionals are decision makers who provide the long-term plan and vision for development within federal, state, and local levels. As decision makers, these professionals decide which projects are viable. Engineering professionals design, analyze, and execute planned projects. These professionals take the vision to a reality that ultimately the public uses and the public administration professional needs to maintain.

Though public administration and engineering professionals work together, they often misunderstand one another's roles. The public administration professional works within a public policymaking process and regulatory sphere that determine what projects are funded and supported. The engineer works within a set of standards and professional protocols that constitute acceptable design practice. Understanding one another's constraints and motivators forms the basis of a productive working relationship.

At our university, public administration and civil engineering disciplines are working cooperatively to bring future professionals together in the classroom. By exposing students to the views of the other discipline within the context of their own studies, students become aware of processes involved in developing projects rather than needing to develop this skill on the job.

Introduction and Background

With the ever-increasing demands to replace deteriorating infrastructure, public officials must make continual decisions on the best courses of action. When these officials need to make decisions beyond their training and experience, they often hire and must rely on the knowledge and expertise of consulting engineers. Engineers assess the problems identified by the public officials and provide solutions for repair, replacement, and expansion. Though the technical solutions are accurate, the public officials must balance the political and economic impacts to reach the best answer for the given situation.¹

Engineers are technically trained to examine safety, economics, and efficiency problems for the best solutions as they review deteriorating infrastructure from the aspect of materials, design, and standards imposed through professional practice. Engineers base solutions on the best methods and tend to be insulated from the political environment. Consequently, in working with one another, public officials and engineers have different perspectives on the best ways to proceed. Public officials operate in the political problem-solving environment whereas engineers operate in the technical problem-solving environment. Their differing perspectives, professional jargon, and varied experience levels provide the ingredients for miscommunication between public officials and engineers. Both professions strive to act in the best interests of the public,

but their approaches often collide. Meanwhile, seeing bridges that fail and public works projects wrought with issues, the public asks why these problems are not resolved.²

A natural way to bring these important professions together in terms of better understanding and communication lies in the college classroom. As students are learning their respective professions of public administration or civil engineering, they need to be exposed to the perspectives of their counterparts. What goes into the policy decision? What is involved in the technical process? At our university, we have begun to focus on cross-discipline teaching to look at what information can be presented to either public administration or civil engineering student to better future lines of communication and inquiry.

Public Failures

The infrastructure of the United States is deteriorating at a rapid pace. Dramatic failures highlight the problems at a time when limited budgets restrict what is improved. Americans have come to expect a reliable infrastructure that is uninterrupted, safe, and provides immediate service. The American Society of Civil Engineers (ASCE), a professional organization of practicing civil engineers throughout the United States, was formed in 1852 to develop and advocate consistent practices. ASCE is an active advocate for the adequate maintenance of the infrastructure. One of the most informative pieces that ASCE is developing is an Infrastructure Report card that makes a dramatic statement about the condition of the nation's infrastructure. This report card is based on the input of practicing professionals throughout the country. The report card is released every two years and is used as a demonstration of the state of the infrastructure. In highlighting infrastructure needs, the report card is a valuable tool for public administrators. The most recent report card indicates an overall infrastructure score of D.³ Through the ASCE report card, the public gains a greater awareness of the state of the infrastructure and advocates administrative action. Public awareness of these infrastructure problems highlights the need for greater communication between the public administrator and the engineering community.

Dramatic events such as the collapse of the I-35W Mississippi River Bridge in Minneapolis at rush hour on August 1, 2007, underscore the importance of replacing deteriorating structures. People were killed in the collapse. The news media played the tragedy in living rooms across the country for several days, then reprised the collapse when, months later, the National Transportation Safety Board released the findings of its investigation.⁴ The public wondered about the integrity of the bridges of their respective communities. Greater public awareness of the fragile infrastructure mobilized political will that, in turn, supported public administrators in setting higher priorities for infrastructure maintenance investment. Public administrators needed engineering assessments to make the important decisions for infrastructure improvements to protect the safety of the public.

Professional Collision

The public administration arena is created through a working network of stakeholder interests. These stakeholders compete for limited resources as set through administrative processes. Public administrators establish the budgets and policies needed to carry out legislative mandates, public programs, and the living standards expected by the constituents. Within the public arena, public hearing processes allow interested citizens to be part of

development in publicly funded projects. Depending on the particular project and the laws of the community, private projects are also subject to public review. Under the Intermodal Surface Transportation Act (ISTEA, pronounced “ice tea”) legislated in the 1990s, the public gained a greater role in the decision making process for the development of transportation infrastructure. This legislation also required the consideration of other modes of transportation before the traditional installation of a highway or bridge structure. ISTEA further included the consideration of the impacts of the transportation projects to the environment and ways to mitigate these impacts.

Public administrators work within both a political and bureaucratic environment. Political leaders put forth the desires of their constituents resulting in laws and regulations. The bureaucracy administers these regulations through programs created to benefit the constituents. Political influences often affect the programs and priorities can be changed to reflect the influences. As priorities shift, stakeholders make the process more fluid sometimes more flexible and sometimes more unstable. Depending upon the level of bureaucracy, the bureaucratic process can be multi-layered. A complex bureaucracy may require several stages in the decision process, often involving extended formal and informal public input, and often extending the decision process far longer than desirable.⁵

Engineers tend to be lineal thinkers and follow systematic processes in developing solutions to problems. They use established design protocols and professional standards to put together uniform solutions. Within the confines of systematic practices, engineers often generate limited choices. As greater public input is introduced into projects, engineers may take only the information that they have generated to create the project, sometimes disregarding public input. This input may be disregarded as not important in making the technical decision. Though the information doesn't contribute to the technical process, it is often integral to the project's success. Because the technical delivery of a project is based on professional standards, interested stakeholders may not understand what is being developed. Technical presentations on the project may be misunderstood as jargon clouds explanations.

In developing public projects, the public administrator and engineer must work together to ensure the best possible outcome. The administrator enforces the regulation and ensures adherence to the bureaucratic process. The engineer needs to follow the regulation and the technical process that is within the standard of professional practice. Options are limited and regulations establish constraints. The engineered design may be very limited and not take into account the inputs critical to the political environment. The administrator and the engineer can have unnecessary and counterproductive conflict based on misunderstanding. The engineer may not understand the political environment and bureaucratic process. The administrator may not understand the technical aspects of the design. Technical implications may not be part of the administrator's decision process. Budget constraints may compromise designs or severely limit the development of the project. Trust between the two parties becomes strained and the project falters.

University Cooperation

Recognizing the need for understanding between the public administration and engineering fields, professors at our university are developing a cooperative effort to train students in collaborative decision making. Though students in public administration and

engineering will likely work together in the future, they are not ordinarily exposed to each other's profession while in school even though, somewhat ironically, students in one discipline sometimes work directly with professionals in the other field. Civil engineering students, in one case within the last few years, worked informally with local officials to assess the functional and structural integrity of a privately owned bridge that had become a town responsibility through property tax default. In a second case, the state department of transportation formally engaged public administration students to assess public reaction and impact regarding a "context-sensitive solutions model" planned for a road reconstruction project through a pristine coastal community.⁶ These activities were excellent for enabling students to provide a public service as they accumulated knowledge and experience; however, both projects missed the opportunity to create cross-disciplinary student teams. (The DOT-commissioned survey arose, in part, from belated recognition that transportation engineers needed to work closely with dozens of communities in the major road-improvement initiative of which this one but one segment.) After all, productive future relationships emerge through a common working environment whereas problems often result from misunderstanding or poorly understanding the perspectives and responsibilities of other parties

Consequently, at our university, a professor of public administration and one of construction management technology are collaborating to bring these professions together at the student level—a collaboration that seems to have received little attention in the pedagogic literature of either discipline. The professors are working on a three-phase collaboration to be introduced to students over time. The first phase consists of each respective professor presenting a topic in the classroom of the other discipline. The second phase consists of these professors presenting their respective positions on a topic in the classroom of the respective disciplines. The last phase consists of creating a joint class or workshop in which students from the two disciplines work together to arrive at a solution.

The first phase is the presentation of the opposite discipline within the classroom. This presentation gives the student an awareness of the other discipline they will be working with in the future. During the fall 2007 semester, the construction management (CMT) faculty member spoke to the second year public administration class about technical jargon and the make-up of infrastructure. The professor gave a brief background of what infrastructure is and why this infrastructure deteriorates. He then gave definitions of common technical terms that the students may hear in regards to public infrastructure projects, explaining terms such as gravel, asphalt, BOD, and sewage treatment plants. The CMT professor showed a plan set and explained a few terms shown on these sets. The public administration professor spoke to the engineering class about the public policy process. He discussed the make-up of regulatory boards, the legislative process, and the influence of stakeholders. He spoke about what goes into a decision beyond the design and limited scope of the technical requirement. Though no formal survey was conducted, several students indicated to the professors that they were interested in the discussions brought to them from the other discipline's perspective.

The first phase broadens over time to include other cross-fertilization guest topics. The two faculty members plan to co-present communications-related topics to students in each discipline. Topics are likely to include processes and techniques for bridging the discipline-based divide – topics such as project "coordination" sessions; Voice of the Customer (VOC) analysis and Quality Function Deployment (QFD), which turn public input into design specifications; and activities of organizations such as Engineers Without Borders.

The planned second phase began during the spring 2008 semester to foster the process of students' recognizing the linkage between the disciplines of engineering and public administration. Using a retrospective about the Minnesota I-35 bridge collapse, professors gave an overview of the design of this bridge and the technical information determined prior to and after the collapse of the structure. From the political perspective, the known information was presented up to and through the collapse. Students adopted roles within the actual event to determine the course of action. The public administration perspective includes issues of funding, stakeholders, priority competition, and the public participation process for development. The engineering perspective includes the constraints of design, the materials used, and the design life cycle. A practicing public administrator and a consultant engineer participated in the classroom discussion. The goal in the exercise was to have students understand that quick judgments in construction practice, maintenance practice, and political funding priorities all enter the equation of sound decisions. Without focusing direct blame for this failure, the perspective that a student should develop is one of cooperative effort in decision making and its consequences. A pretest/post-test survey compared the positions of the respective student groups. The results of this exercise were not available at the time of preparation of the paper.

The planned third phase is an interdisciplinary course with students from both disciplines working on a common project. Students collaborate in teams to reach decisions and pursue solutions on a chosen project. Their resolutions are compared to see what similarities and unique characteristics are developed and the students themselves then consider the challenges and benefits for the collaborative process in which they engaged. The three-phased experiment is, in effect, a pilot project that will undoubtedly be adjusted and may ultimately serve as a model for a permanent part of the curriculum in both disciplines.

Summary

Public projects are developed through the collaborative workings of public administrators and engineers. This collaborative effort is often strained because of the misunderstandings of these two professions. The engineer doesn't realize the full impact of the stakeholders and the public process. The public administrator doesn't understand the technical aspects of the project and the jargon that explains how the engineer developed the project. These misunderstandings hinder finding and executing the best and most practical solutions. The misunderstandings develop largely because of the limited exposure of each party to the other's professional position – and we, as educators who tend to confine ourselves and our students to narrow hardy-real-world disciplines, contribute to the inter-professional communication challenge. Exposing students to a professional perspective other than their own makes future collaborations potentially more productive for the engineers and administrators involved and more effective for addressing the public's needs.

References

1. Appleby, Paul H. (1949) Policy and Administration. University of Alabama Press.
2. Pool, Robert (1997) Beyond Engineering: How Society Shapes Technology. Oxford University Press.
3. American Society of Civil Engineers (ASCE). (2005) report Card, <http://www.asce.org/reportcard> (Dec. 2005)
4. "Design Flaw Said to Have Cause Minn. Bridge to Collapse," by Del Quentin Wilber and Michael Laris. Washington Post (January 15, 2008): A03, <http://www.washingtonpost.com/wp-gyn/content/article/2008/01/14/AR2008011402782.html>.

5. Gortner, Harold F., Kenneth L. Nichols, and Carolyn Ball. (2007) *Organization Theory: A Public and Nonprofit Perspective*. Thomson-Wadsworth.
6. Curtis, Karen, Michelle Mason Webber, and Kathy Weymouth. (2006) "U.S. Route 1 Reconstruction in Warren, Maine: A Survey of Community Response to the Department of Transportation's Application of Context Sensitive Solutions." Orono, Maine: University of Maine Master of Public Administration Program
<http://www.umaine.edu/pubadmin/resarch/route1warren.htm>.