Ideologies of Engineering Education

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Section 2

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Section Introduction

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Questions about the ideological underpinnings of engineering are not new, as evidenced by the efforts of a handful of pioneering historians and sociologists who dared tackle the topic. Layton's classic *The Revolt of the Engineers* (Layton 1986), for example, showed how the professional ideals and aspirations embraced by many American engineers during the Progressive Era stood in marked tension with business imperatives and bureaucratic loyalty – and with the latter ultimately prevailing. Covering similar historical and conceptual territory but more Marxist in outlook, Noble's *America by Design* (Noble 1979) persuasively portrayed a growing alignment of the U.S. engineering profession with the logic of market capitalism and an almost mystical ideology of quasi-autonomous technology. Both works helped contextualize the profession's development in America from the late 19th to mid 20th century, including by demonstrating how prevailing engineering values and attitudes were frequently interchangeable with business ethos, and powerfully inculcated through dominant pathways of education and career development.

Still other works have helped show how partially unique configurations of ideology and engineering have emerged in other national and cultural contexts, as reflected in Alder's argument that the early modern history of the engineering profession in France was "energized by a radical ideology that justified social hierarchy by reference to national service" (Alder 1999, p. xii). A growing body of cross-national comparative research by scholars such as Downey and Lucena has also more broadly shown how engineers respond to – while at the same time likely shaping – prevalent codes of meaning, such as dominant understandings of what counts as national progress, or what it means for engineers to serve government and/or private industry (Downey and Lucena 2004). As these works make clear, the ideological commitments of engineers and engineering not only profoundly inflect what it means to be an engineer or practice engineering, such commitments may also vary considerably by time and place.

The chapters in this section continue and extend these traditions of scholarship. They do so by reminding us of many important, recurring questions about how the ideological foundations of engineering as a modern discipline and profession resonate (or, perhaps just as importantly – may fail to resonate) with other prevalent beliefs and values – whether economic, technological, political, social, cultural, or otherwise. Qin and Jesiek's chapter, for example, looks to China as an underexplored yet increasingly important context for investigating the ideology-engineering nexus. More specifically, the authors identify three relevant ideological currents that can enable a better understanding of the intellectual context of engineering in China: Confucianism, Marxism and economic pragmatism. Starting from three questions that are traditionally raised in studies of engineering ethics and professionalism by U.S. scholars (and which often take a Parsonian-functionalist approach, as repre-

sented by the authors' reference to Davis' work), they first give the most common answers. Yet by pushing their analysis in directions more sensitive to the Chinese ideological context allows them to propose alternate answers to these questions, thereby revealing some of the blind spots that may occur when scholars view partially unique local cultures of engineering through Western lenses. More practically, their chapter potently suggests how successful multi-national collaborations in engineering may require keen sensitivity to the relevant intellectual environments of engineering education and professional practice.

Slaton's chapter to some extent brings our focus back to the U.S., albeit with many broader implications. She begins by describing the historical dominance of two ideological logics in engineering. The first of these is *technocratic*, which paints engineering as ultimately an apolitical enterprise that can be separated from its social foundations. The second logic she proposes is *meritocratic*, which privileges individual ability and responsibility to succeed in engineering while demonstrating technical excellence. Consistent with a neoliberal worldview, these two logics pose considerable challenges for those who identify with movements toward democratization, including by promoting a far more inclusive, participatory, and liberatory climate of technical education and professional practice. Hence, pivotally important for the author are questions about how the content and aims of engineering are inextricably linked to the matter of who can be (or become) an engineer, not to mention what counts as epistemic authority in engineering. These themes are illustrated through a rich variety of literature and examples, from discussion of the trials and travails of various diversity and inclusion initiatives to explorations of how some specific student populations (e.g., those with low socioeconomic status or atypical kinds of cognitive dis/abilities) are "othered" against the backdrop of a powerfully normative status quo in engineering.

Finally, Cech and Sherick's contribution serves as a fine compliment to Slaton's work given its focus on the notion of an "ideology of depoliticization." In summary, their chapter nicely captures the pervasive view that the technical dimensions of engineering work can and should be separated from any associated political, social, or cultural considerations. This kind of ideological boundary work – which might be contrasted with the sort of "strategic politicization" described in Zhu and Jesiek's discussion of Marxism and engineering in the Chinese context – projects a sanitized image of engineering as ultimately divorceable from anything deemed subjective, sociocultural, or humanistic – that is, anything "non-technical." As a consequence, engineering is portrayed as not only technocratic, following Slaton, but also somehow above ideology, artfully concealing the inherently value-laden and social character of engineering work behind a veil of purported objectivity and rationality. Of particular note in this chapter is the authors' discussion of how engineering education helps perpetuate this ideology, including by protecting and preserving historically dominant – but increasingly outdated – images of the profession's epistemological, ethical, and ontological foundations. In turn, this hegemonic reproduction poses considerable impediments to reforming and transforming engineering faculty, courses, curricula, and culture to meaningfully breach the boundaries between the technical and sociocultural.

In summary, the chapters comprising this section offer a compelling invitation for further studies that help enhance our understanding of the ideological considerations that undergrid the education of engineers and their practice as professionals. Each in their own way, these authors invite us to increase our awareness of the im-

portance of the intellectual, cultural, and ideological contexts associated with both the objects of our research, i.e., engineers and engineering, and our own work as scholars. And if such ideological contents are offered, imposed, or revealed in very explicit ways in certain contexts, what about the implicit beliefs we no longer question because we no longer see them? As these chapters suggest, considerations such as free market principles, efficiency, economic growth, political ideology, and techno-optimism are often inextricably bound up with questions about what counts as engineering and who can be an engineer. This section can be seen as opening up opportunities for further efforts to expand the breadth and depth of ideological considerations under consideration, including through cross-institutional and cross-national comparative studies.

References

Alder, Ken. (1999). *Engineering the Revolution: Arms and Enlightenment in France, 1763-1815.* Princeton University Press.

Downey, Gary L., and Juan C. Lucena. (2004). "Knowledge and Professional Identity in Engineering: Code-Switching and the Metrics of Progress." *History and Technology* 20(4): 393-420.

Layton, Edwin. (1986). *The Revolt of the Engineers: Social Responsibility and the American Engineering Profession*. The Johns Hopkins University Press.

Noble, David F. (1977). *America by Design: Science, Technology, and the Rise of Corporate Capitalism.* Alfred A. Knopf, Inc.