PREPARING TEACHERS TO TEACH THE STEM DISCIPLINES IN AMERICA’S URBAN SCHOOLS
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PREPARING TEACHERS TO TEACH THE STEM DISCIPLINES IN AMERICA’S URBAN SCHOOLS

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FOREWORD

*teachHOUSTON: Interdisciplinary, Experiential STEM Reform*

F. Michael Connelly

What is one to make of a book with the title *Preparing Secondary STEM Teachers to Teach in America’s Urban Schools* with what appears in the Abstract to have the subtitle *teachHOUSTON*? One part is rather grand and universal and the other more specific and local. I tend to think of subtitles, stated or implied, as reliable content descriptors. But my expectations faded as page after page and chapter after chapter unfolded. To be sure, *teachHOUSTON* names a concrete geographically limited program. The book assesses the status of teaching and learning in the STEM fields and describes a specific program to address the worrying picture that emerges. The program has direct consequences and possibilities for the Houston area. But the book as a whole and its account of this program addresses critical educational issues worldwide and demonstrates a kind of interdisciplinary action research rarely seen. Both the program and its practical demonstration of interdisciplinary action provide models useful in other jurisdictions and for other interdisciplinary sets. Unlike some, perhaps most, reform-oriented books, this one does not move inexorably step by step from problem to program to solution. Instead, different entry points and perspectives come in and out of focus in different chapters. Late in the book, in Final Words section, it is observed that the volume might be thought of as a mélange. Readers accustomed to step-by-step reform accounts might benefit by jumping from the opening overview chapters to Final Words section to better prepare them for the rich, original work found throughout. This book has insights and learnings for, and beyond, the STEM fields. Readers with different interests will find the book filled with suggestion and insight. Some of these possible readings follow.

The book describes a curriculum reform program in more or less standard educational change terms. The text begins with a thoughtful account of the educational learning problem, a description of the reform initiative to address the problem, and short-term demonstrations of evidence suggesting the problem is on its way to being solved. There is much to be learned about the status of STEM education and what might be done about it in the book’s pages. As a Canadian reader, I would have welcomed a slightly expanded global picture but the language used to address the problem is readily applicable to a larger landscape. But what grips my attention and makes this book special in the literature of STEM
education and educational reform is that suffusing a more or less traditional educational reform structure are two initiatives that warrant two follow-up monographs: interdisciplinary collaboration and the link between reform experience and content. It is well known that educational reforms rarely outlast the input of reform support and, when they do, they fade and become invisible over time. I am struck by the thought that this book describes two qualities that have a chance to defy these reform “facts.”

Joe Schwab (1960) who is featured throughout this book showed how scientists within disciplines adhere to particular forms of thought. Both he and the philosopher Kuhn (1970) pointed out that changing these formal ways of thinking constituted revolution within fields of inquiry. School education and the education of teachers are cross-disciplinary. The purpose is to educate persons, not advance inquiry in a discipline. It is reasonably well known that any curricular reform must be done in the context of all the other school subjects and disciplines. Add some science to the school day, subtract some geography. Thus, the STEM disciplines are inherently in conflict with one another in traditional educational reform. The reform brilliance of STEM is that it puts the disciplines on the same side. This, however, is where Schwab and Kuhn’s insight into forms of disciplinary thinking comes into play. If it is revolutionary for a scientist within a discipline to confront new ways of thinking about his or her discipline, consider the problem of STEM with different disciplines at work, each with their own traditions of thought. Moreover, educational scholars rarely fit easily among those in the traditional disciplines, thereby immensely confounding the interdisciplinary mix. Add to the interdisciplinary mix the voice and action of school teachers and teacher educators whose ends in view are the education of persons in contrast to the advancement of a discipline. The resulting logical interdisciplinary stew is immensely complex. This frames the work of the complex teachHOUSTON STEM Project. There is a telling study by Seymour Fox (1972), one of Schwab’s students, who sets up a curriculum deliberation study involving school-based educators and subject area academics. He found that the educators deferred to the academics such that this dimension of interdisciplinary planning was missing. But throughout this book remarkable things are described. Two academic university departments joined hands. Academic educators and school people joined in. Chapter by chapter, the reader is led through what I consider to be remarkable settings...mathematicians talking to scientists, professors learning from school teachers, teacher educators and curriculum specialists providing ideas, literature, and experiential research methods shaping the mix.

The picture that emerges is rich and borders on the edge of believability. I would love to see a follow-up manuscript that made the remarkable interdisciplinary qualities described herein the subject of inquiry. What does it take among the disciplines, and among educators and practitioners, to carry off a successful interdisciplinary collaboration? What difficulties were encountered? How were they conceptualized and solved? Is there any evidence that Schwab and Kuhn might have overdramatized forms of thought or, perhaps, that there are cultural
shifts toward more organic ways of thinking? Were there, one wonders, members of the teachHOUSTON team who were influenced by Chinese or Asian thought, which might have influenced the willingness to work across disciplinary lines of thought?

The second standout quality of this book is what I earlier called the link between reform experience and content. The massive international curriculum reforms of the last century, broadly falling under the heading of post Sputnik mobilization, led to an educational industry of reform and reform study. One of the mostly unchallenged insights from that industry is that telling school people what to do does not work. Yet it is clear that people with ideas about the practical value of their disciplines or their work look for ways to implement their ideas. People with good ideas about teaching and learning are perennially trapped in the logistic web of the wise and knowledgeable teaching the unwise and unknowledgeable. Returning to Schwab and Kuhn, and speaking rather broadly, the form of thought is one that the philosopher McKeon (1952) called logistic. Work out good ideas, and figure out how to train people to use them. The general failure of this form of thought about school change led to elaborate, often quite sensitive and responsive, ways of implementing ideas. Turned upside down, School-Based Reform took hold. teachHOUSTON stands in between and has it both ways. On the one hand, the best disciplinary ideas are at play. On the other hand, advanced notions of experience and their role in learning and in research method are at work. I know of no other major educational reform program that utilizes experiential method and theory in the context of an ongoing disciplines-based reform. The idea that the disciplines can bring insight and make a difference to schooling while, at the same time, learning from participating school practitioners is a rare quality in the study of educational reform. The fact that these processes are sufficiently recognized by teachHOUSTON participants at all levels to warrant specific research methodology built on the uncontrolled quality of experience is special. As with everything described in these pages, this quality requires intellectual strength and leadership along with collaborative interdisciplinary spirit and action. Again, I urge the authors/participants to consider a follow-up manuscript in their intended three-book series to unpack this “secret sauce” quality so vital to understanding teachHOUSTON and the interdisciplinary practices and research embedded in it.

My final thought is that in reflecting on my remarks about this book I have not been altogether transparent about my knowledge of the intellectual and practical dynamics at play. I was a student of Schwab and spent much time thinking about many of the issues discussed in this book. Moreover, I have followed Professor Craig’s work for many years and am aware of her international reputation in experiential school-oriented thought. I do not know with certainty that her Asian studies influenced the holistic interdisciplinary thinking evident in this book (Craig et al., 2018). But the shape of the teachHOUSTON project and of the book built around it is consistent with the philosophical and practical trajectory of Craig’s work. There must be something special about the Houston educational environment that brought so many diverse participants together in this atypical interdisciplinary, experiential, collaborative journey.
REFERENCES


