

SCIENCE TEACHERS AS TECHNICIANS: THE FALSE DICHOTOMY OF THEORY AND PRACTICE

Andrew Gilbert

Kent State University

Vexation

How can we impact pre-service teachers vision for the intellectual nature of science teaching and learning in an age of decreased teacher professionalism and limited intellectual freedom in the classroom?

This vexation has been an ever-growing concern of mine during my first five years on the tenure track. It is a daunting task to kindle the beauty and love of science teaching and learning in a time of escalating educational fascism. The central thesis of this discussion hinges on the notion that the persistent disconnection between theory and practice, that permeates the field of education, has led to a vision of the teacher as a pedagogical technician as opposed to thinking intellectual. Secondly, the manuscript will briefly discuss the role the sciences had in placing limits on the curricular freedom of teachers and lastly will venture into possibilities that may help to alleviate some aspects of the current malaise of US classrooms.

In the spirit of *situation recognition*, I highlight my own struggles as an Assistant professor in a mid-sized state university and a member of the science education community. There have been numerous calls (within our associations: NARST, ASTE, AERA etc.) to bring teachers into these research-oriented organizations. We have discussed ideas concerning how to be more welcoming to teachers and to design research that will benefit classroom teachers. In my opinion, it is not enough to provide lip-service invites for teachers to attend our conferences, rather those working in higher education need to examine larger issues concerning how we prepare, initiate, and craft professional teachers. Many of our higher education institutional practices work to manufacture this seeming separation between theory and practice. The following are just a few examples for how our practices fuel this separation:

- structure of teacher education programs where methods courses are taught as individually bounded content areas (science, literacy, mathematics, etc),
- expectations of professional journals that distinguish themselves either written for teachers or academics and do not often envision a holistic notion of theory and practice,
- politics of academic life where areas of scholarship are separated between discovery and application creating a false dichotomy between theory and practice,
- efforts to standardize curriculum across districts and states, textbooks, and packaged curricula that treat content as bounded and discrete,
- and the structure of our professional organizations themselves.

I have worked within this space (between theory and practice) and believe that the integration of these aspects can lead to meaningful insights for educators looking to create more democratic approaches to learning.

At the core of this vexation lies one key element: the continual distrust of teacher professionalism and ability. Unfortunately, the science community played an active role in wresting control of content-related curricula after the turmoil created in the wake of the launching of Sputnik satellite (Tanner & Tanner, 2007). This led to a wave of curricular approaches that contained scientifically accurate academic/pedagogical approaches that were easy for teachers to implement so that “even the least talented football coach can get his physics class underway without a fumble” (Rudolph, 2002, p. 96). These “teacher-proof” curricular and evaluation techniques proliferated during the subsequent decades. In response some curricular theorists began to reconceptualize curriculum studies in an effort to recapture the complexity of curriculum development and resuscitate the “progressive project” (Pinar, 2004, p. 9). This reconceptualization of curriculum studies challenges the notion that merely finding the right pedagogical technique will solve a myriad of complex educational problems (Pinar, Reynolds, Slattery & Taubman, 1995). Recently, the science education community itself also seems to grasp the notion that merely creating teacher technicians is insufficient to create a strong new generation of scientists. I wish to offer the following speculative thoughts that may begin to lessen the manufactured distance between the research community and teachers.

I would be remiss if I did not mention that this venture focuses solely on one aspect concerning the continued separation of theory and practice. It is beyond the scope of this piece to address large-scale policy issues such as No Child Left Behind, but instead will consider the possibilities of helping educational professionals envision teaching as an intellectual pursuit. The process is complicated by the structure and design of our undergraduate education system. This system is based on of the principles of the Tyler Rationale where schools represent efficient curriculum models, where classes are presented as self-contained packets of information as opposed to

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interconnected ideas that build and support one another. As an example, I often see the results of this approach when asking students to incorporate issues of social justice/equity into their science classrooms and they respond, "We already did that in our *Teaching in a Diverse Society* course." In my opinion, given the experiences we provide these students, we should expect these types of responses.

Venture

Settlage (2008) reminds us to not lose sight of the past for the rich and important guidance that those ideas can provide in a modern context. To this end, this venture borrows heavily from the progressive movement which articulated that a holistic approach to teaching must take into account not only subject matter but also self and social understanding to realize the democratic possibilities within education (Dewey, 1997/1938). Informed by this Deweyian spirit and a reconceptualist curriculum lens, I wish to interrupt this disconnection using a multi-layered holistic integration strategy.

I am currently working with my departmental colleagues to integrate our content-area courses within the current structure of our teacher education program (social studies, mathematics, literacy and science). This is being done through co-teaching and combining class sections around issues of energy, global warming, and other large-scale easily integrated topics. This is made possible because all students, in our K-3 program, are concurrently enrolled in a cohort model as well as field placement in local schools. The final 2.5 years in the program are mapped out for students in this manner, which affords our program some flexibility in combining sections and creating experiences for students to envision how classroom content intersects with important social issues that span multiple content areas. In addition, we have blocked out four Friday mornings sessions (12 hours total) where each instructor takes the lead in a particular integrated lesson/project. We feel this is an essential element of creating dynamic elementary educators who better understand the complexity of providing meaningful and intellectual approaches for children.

However, this initial approach feels incomplete in facilitating students to better understand the larger theoretical foundations for their teaching choices made not only by their content area professors but also their own future teaching actions. Thus, the second stage of the integrative process would be to reconstruct our undergrad course sequence structure. Instead of several disconnected courses, students would sign up for 12-15 hour credit blocks at a time (as opposed to four or five separate courses...although the transcripts would still list the individual sections to address NCATE and State mandates). The goal would be to integrate curriculum and pedagogical theory, political and socio-cultural issues, along with standards-based classroom content. This approach would allow the university teaching team to clearly work through many of the essential elements of our teaching: theoretical foundations informing aspects of curriculum, pedagogy, and assessment, particular political stances embedded in our teaching actions, critiquing of institutional mechanisms that structure inequity, and lastly how to develop meaningful content approaches within these larger issues. It is my hope that this venture would mitigate the ever-increasing distance between theory and practice as well as restore a measure of intellectual curiosity to science teaching and learning.

There exist many overarching questions surrounding this venture, which need further interrogation to refine and negotiate future opportunities (listed in increasing importance to the author):

- How have others handled structural difficulties associated with transcripts and state requirements associated with combining traditionally separate courses?
- With increasing grade level there is increasing content demands beyond the College of Education...how does this complicate these ideas? Is it conceivable that this approach may be most appropriate for use in K-3 or K-6 teacher education programs as opposed to secondary programs?
- Are undergraduate students developmentally [sic] ready to be presented these broad interconnected ideas and be able to transition into schools that are increasingly compartmentalized...particularly in the context of their own K-12 experience?
- Would this alleviate or exasperate the common refrain "just tell me what to do in my classroom" and facilitate teachers viewing their classroom work as intellectual?

I believe that this approach offers fruitful avenues to begin to challenge future teachers to envision themselves as more than just someone who can implement pre-packaged curricula. The hope is to develop teachers with the passion, courage, and intellectualism to stimulate the beauty of learning in their students.