

NCLB and research funding in the US: Implications for university based researchers

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'Positioning education research - Doing the public good'

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ABSTRACT:

The US federal government's recently established research arm, the Institute of Education Sciences (IES), suggests an inability on the part of the education research community to provide large-scale rigorous studies from which generalizations can be made to support education policy decisions. By defining, instigating and supporting particular types of research and evaluation, IES aims to support the identification and implementation of educational practices supported by rigorous evidence. It has instituted new guidelines requiring funded projects to employ randomized-trial designs, while another initiative, the What Works Clearinghouse, provides an online database of research findings that the Department of Education has decided meet the new federal guidelines for methodological rigor. These features of the context for education research funding support in the US are analyzed and implications drawn for university-based researchers. The particular case of teacher education researchers is examined. It is argued that education researchers need to be able to 'read the field'; that is, they need to explore the purposes for which research in their field is supported and used, the contexts and the relationships of those who judge it, and the criteria by which it is being judged.

Introduction: The US context - No Child Left Behind legislation

Discussions about appropriate methods for education research have escalated in the wake of the US No Child Left Behind (NCLB) Act of 2001 and related changes to federal policies for educational research and its funding. This legislation highlights the importance of what it calls 'scientifically-based research' and in particular foregrounds the use of randomized trials in which educational treatments are tested by comparing an experimental group that received a particular treatment to a control group that did not. It is argued that such methods mitigate the potential for researcher bias and allow findings to be generalized more readily. The US Department of Education's research arm, the Institute of Education Sciences (IES), has instituted new guidelines requiring funded projects to employ randomized-trial designs, while another federal government initiative, the What Works Clearinghouse, provides an online database of research findings that the Department of Education has decided meet the new federal guidelines for methodological rigor.

This paper examines this context and explores implications for education research in universities, particularly teacher education research. It is argued that rather than asking the question 'What is good education research?' the more appropriate question to ask in order to understand the situation is "How is good research designated?" It is suggested that we must 'read' the fields in which research findings are judged and consider, 'Who are the people making the judgments?', 'What evidence about the researcher and the research do they use when making these judgments?', and 'What specifically are they looking at when they decide whether or not something is good?' (Yates, 2004)

An examination of the field of teacher education research – its histories and contexts, the nature of the teacher education enterprise, and the purposes for which the findings of teacher education research are used - provides the basis for considering teacher educators' situation in the current research funding context, how their research is valued, and who is making this judgment. Building on this, some discussion about ways in which teacher educators must be able to respond to critics of teacher education and teacher education research is offered.

Background: US Department of Education, Institute of Education Sciences

The **Institute of Education Sciences (IES)**, established by the Education Sciences Reform Act of 2002, is the research arm of the US Department of Education and aims to make education research more rigorous in support of evidence-based education.

Its mission is to expand knowledge and provide information on practices purported to improve academic achievement and the effectiveness of Federal and other education programs. Its goal is the transformation of education into an evidence-based field in which decision makers routinely seek out the best available research and data before adopting programs or practices that will affect significant numbers of students. (From the IES website November 2004, see <http://www.ed.gov/about/offices/list/ies/index.html>).

In November 2002, Grover J. (Russ) Whitehurst was appointed to a 6-year term as the first Director of IES. IES is made up of the Office of the Director and three centers - the

National Center for Education Statistics, the National Center for Education Research, and the National Center for Education Evaluation and Regional Assistance. It aims to ultimately support at least eight national research and development centers each one focusing on one of the eleven topics of research listed in the statute. The centers will develop, test, and disseminate new approaches intended to improve teaching and learning, and ultimately, student achievement. In addition to a focused program of education research in its topic area and the dissemination of information to educators and policy-makers, the centers also aim to 'provide national leadership in defining research and development directions within its topic area'.

IES Centers:

1. The *National Center for Education Research* (NCER) engages in research activities that aim to provide:

...high quality education for all children, improvement in student academic achievement, reduction in the achievement gap between high-performing and low-performing students, and increased access to and opportunity for post-secondary education. NCER research examines the effectiveness of educational programs, practices, and policies, including the application of technology to instruction and assessment. The goal of NCER research programs is to provide scientific evidence of what works, for whom, and under what conditions. Current research initiatives funded by NCER focus on early childhood education; education, finance, leadership, and management; English language learners, mathematics and science education; reading comprehension; social and character development; student learning; and teacher quality. New initiatives in FY2005 target social and character development interventions, mathematics education, and teacher quality.' (From the IES website November 2004, see <http://www.ed.gov/about/offices/list/ies/ncer/index.html>)

2. The *National Center for Education Statistics* (NCES) collects, analyzes, and reports education information and statistics on the condition and progress of education at the preschool, elementary, secondary, postsecondary, and adult levels, including data related to education in other nations. Included among its data collection efforts is the National Assessment of Educational Progress (NAEP).

3. The *National Center for Education Evaluation and Regional Assistance* (NCEE) evaluates - through grants, cooperative agreements or contracts - the impact of federal programs, and synthesizes and disseminates information from evaluation and research. It aims to produce 'rigorous scientific evidence' on the effectiveness of education programs and practices and plans to change the types of methodology considered legitimate in evaluation studies.

These studies are using the most rigorous evaluation designs possible. In many cases, the Center is using randomized trials. ... In some instances, randomized trials are not feasible to conduct. For those studies, designs such as interrupted time series or carefully matched comparison groups are being used. However, in all cases, the impact evaluation studies are intended to answer a bottom-line question of causality-- Did program X raise student achievement? The evaluation studies supported by the Center are using only those methodologies that can

provide credible scientific evidence to answer questions of causality. ... NCEE in fiscal year 2003 launched several program effectiveness studies in the following program areas: Reading First, Early Reading First, Teacher Preparation, Professional Development, Educational Technology, Even Start, After School Programs, English Language Learning, and Charter Schools. In each area, the evaluation is using a random assignment of schools, teachers, or students to an educational program or a comparison program. (From the IES website November 2004, see <http://www.ed.gov/rschstat/eval/resources/studyplans.html>)

The following examples of NCEE Evaluations Initiated in 2003-04 highlight the comparative method stressed as necessary for 'rigorous scientific evidence':

a) Impact Evaluation of Teacher Preparation Models

This evaluation is assessing the effects of two types of teacher training on student achievement, between teachers who acquired an alternative certificate with low traditional education coursework and teachers who graduated from traditional preparation programs requiring high levels of education coursework. The researchers chose pairs of new teachers in the same grade with one teacher having taken the traditional route and one the alternative route to certification. Students are randomly assigned to teachers in each pair. The main outcome measure is student test scores.

b) The Impact of Professional Development Models and Strategies on Teacher Practice and Student Achievement

This study is evaluating the impact of two professional development approaches, one a week-long summer institute and the other approach adds an in-school coach. Both teacher practice and student achievement in early reading are examined as outcome measures.

As part of its accountability framework, the Institute annually assesses the quality and relevance of newly funded research projects, as well as the quality of research publications that result from its funded research projects. For new projects, a panel reviews the quality of a randomly selected sample of applications, and determines the percentage that are deemed to be of high quality. Second, applications are evaluated to identify those that address causal questions and then to determine what percentage of those projects use randomized field trials to answer the causal questions. In order to evaluate the relevance of proposed new projects, a panel of experienced education practitioners and administrators reviews descriptions of a randomly selected sample of these projects and rates the degree to which they believe the projects are relevant to educational practice. Similarly, the quality of research publications which are the products of funded research projects is determined by a panel who reviews the quality of a randomly selected sample and the percentage of those publications that are deemed to be of high quality is determined. Second, publications that address causal questions are identified, and are then reviewed to determine the percentage that employ randomized experimental designs. As funded research projects are completed, the Institute subjects the final reports to similar reviews. In addition, to evaluate impact, the Institute surveys a random sample of K-16 policymakers and administrators once every 3 years to determine

the percentage who report routinely considering evidence of effectiveness before adopting educational products and approaches.

The *What Works Clearinghouse* (WWC) was established in 2002 by the IES 'to provide educators, policymakers, researchers, and the public with a central and trusted source of scientific evidence of what works in education' (From the IES website November 2004, see <http://www.ed.gov/about/offices/list/ies/ncee/wwc.html>). It evaluates the strength of the evidence of effectiveness of educational interventions using the following standards for review:

- "Meets Evidence Standards"—randomized controlled trials (RCTs) that do not have problems with randomization, attrition, or disruption, and regression discontinuity designs that do not have problems with attrition or disruption.
- "Meets Evidence Standards with Reservations"—strong quasi-experimental studies that have comparison groups and meet other WWC Evidence Standards, as well as randomized trials with randomization, attrition, or disruption problems and regression discontinuity designs with attrition or disruption problems.
- "Does Not Meet Evidence Standards"—studies that provide insufficient evidence of causal validity.

In addition, the standards rate other characteristics of design, such as intervention fidelity, outcome measures, and generalizability.

The topics chosen for review are prioritized according to the following criteria:

- potential to improve important student outcomes;
- applicability to a broad range of students or to particularly important subpopulations;
- policy relevance and perceived demand within the education community; and
- likely availability of scientific studies.

Current topics include:

- Adult Literacy—Interventions for Increasing Adult Literacy
- Character Education—Comprehensive Schoolwide Character Education Interventions: Benefits for Character Traits, Behavioral, and Academic Outcomes
- Delinquent, Disorderly, and Violent Behavior—Interventions to Reduce Delinquent, Disorderly, and Violent Behavior in Middle and High Schools
- Dropout Prevention—Interventions for Preventing High School Dropout
- English Language Learning—Interventions for Elementary School English Language Learners: Increasing English Language Acquisition and Academic Achievement
- Math—Curriculum-Based Interventions for Increasing K–12 Math Achievement
- Peer-Assisted Learning—Peer-Assisted Learning Interventions in Elementary Schools: Reading, Mathematics, and Science Gains

- Reading—Interventions for Beginning Reading

The assumption that underpins the ‘What Works’ approach is that there are educational practices which have been shown in some way to be more effective in enhancing student learning outcomes, and that these practices are transferable to a variety of contexts with a range of learners with varying prior experiences and learning achievements.

Another publication, the *Guide to Evidence-Based Practices* adds to the articulated and aligned structures, practices and publications that support IES policies on effective education research. It seeks to

... provide educational practitioners with user-friendly tools to distinguish practices supported by rigorous evidence from those that are not. The field of K-12 education contains a vast array of educational interventions – such as reading and math curricula, schoolwide reform programs, after-school programs, and new educational technologies – that claim to be able to improve educational outcomes and, in many cases, to be supported by evidence. This evidence often consists of poorly-designed and/or advocacy-driven studies. State and local education officials and educators must sort through a myriad of such claims to decide which interventions merit consideration for their schools and classrooms. Many of these practitioners have seen interventions, introduced with great fanfare as being able to produce dramatic gains, come and go over the years, yielding little in the way of positive and lasting change – a perception confirmed by the flat achievement results over the past 30 years in the National Assessment of Educational Progress long-term trend. (Institute of Education Sciences, 2003, p.iii)

The guide outlines a step by step process by which practitioners can evaluate whether an educational intervention is supported by ‘rigorous evidence.’

What is good education research?

The question of what is *good* education research is one that many, in addition to education researchers, are currently raising. The media, politicians, government officials, teachers, and academics outside education faculties are asking why there is so little agreement on what education research can tell us about things like effective teaching and learning, and effective school organization, and why there are so many debates in the field and conclusions drawn that often support opposing practices. Comparisons are regularly made with the field of medical research, which it is suggested has systematically and logically built a research agenda over the past century in order to find generalizable answers which have transformed medical practice. It is argued that in order to make gains in education comparable to the medical field, larger studies of a more rigorous nature are needed, and that education research should replicate what seems to have progressed the search for cures in medicine.

In this context the US Department of Education has clearly articulated their parameters of good education research - it is scientifically rigorous, it involves comparisons, it involves randomized trials, and the findings are generalizable. Predictably, this is having significant implications for university-based researchers as well as for schooling practices in the US. The current guidelines for research funding privilege specific methods and

genres as more legitimate than others. Some educators have embraced this view, others have found ways to 'work with it', but many education researchers have critiqued and criticized it as overly narrow and limiting in the way that good research is recognized and enacted, and thus its ultimate impact on schools and schooling. For example, the Council of the American Educational Research Association unanimously passed a resolution on January 26, 2003 affirming the importance of randomized trials as one of the essential elements of sound scientifically-based research but expressed concerns that the U.S. Department of Education was limiting its commitment to problems and issues best addressed through other scientifically appropriate methodologies. Some researchers and policy makers argue that the current federal government approach aims to structure research in order to produce support for particular education policies. Thus the debate often becomes polarized, focusing on issues of methodological rigor and the desirability of 'objective knowledge and proof' and generalizable findings on the one hand, and then on the other it is argued that all research is political or undertaken from a particular perspective with particular interests in mind. The upshot is that each 'group' quickly discounts the findings of the other.

Therefore, the important question to consider is not so much 'What is good education research?' but rather 'How is good research designated?' (Yates, 2004). Yates asserts that good education research is not something that can be defined simply and technically, nor something on which we can expect absolute agreement. It 'is a human, situated practice itself directed at, as well as located in, a field of activity (education) that changes its form over time and place (Yates, 2004, p.3). Thus it is necessary to examine the pragmatics through which judgments of different approaches are made. 'Judgments are not free-floating abstract things, but practices performed in particular contexts, with particular histories and relationships, and using particular materials' (Yates, 2004, p.211). It is not simply a question of which genre is more methodologically sound. Good education research can be enacted, judged, defined and constructed differently in different contexts. One must examine the contexts, relationships and conditions in which those engaged in education research are located.

There are many arenas of education research each with different contexts, genres and 'rules of the game', where judgments about education research get made: the PhD thesis, academic journals, competitive research grants, commissioned research, teacher research, book publishing, and the press/ media (Yates, 2004). In each of these arenas, questions about the purpose of the research, who judges it, and the explicit and implicit criteria by which it is being judged, mean that research that is judged 'good' in one area is possibly different from that which would be judged 'good' in other areas. However, university-based education researchers are often hybrid research workers. They do not usually position themselves solely within one context or arena. Negotiating these arenas and their multiple and often conflicting 'rules of the game' particularly as they play out in relation to tenure and promotion decisions in the higher education sector, is challenging.

Moreover, many education researchers aim to examine the ways in which schools and schooling can redress societal inequities that marginalize and exclude various individuals and groups according to race, ethnicity, socio-economic status and physical and mental capability. So the question then becomes how do education researchers attempt to pursue broader purposes, to work for better reforms of education and fairer social arrangements,

through the work that they do and work across the different arenas and their different 'rules of the game'. It is important that they can 'read' the field, understand the 'contexts and rules of the game' and develop research programs designed to operate in more than one register.

Despite this situation, most agree that good research needs to be technically good, to be making a contribution to knowledge, and to be something that matters. But since the enactment of these things is situated, one has to 'read' the fields in which research findings are judged and consider - Who are the people making the judgments? What evidence about the researcher and the research do they use when making these judgments? What specifically are they looking at when they decide whether or not something is good? (Yates, 2004). IES decisions about the value of education research are being made by focusing on what it does, what topic it is directed to and whether it is scientifically based. In essence, for research to be deemed valuable in IES's view, it must contribute to student learning, it must be accessible and usable by teachers, and it must address causal questions and employ randomized experimental designs.

No Research Left Behind: The case of teacher education research

The remainder of this paper will examine teacher education as a specific field in education research. Like other education researchers, teacher education researchers must 'read' the field and determine the contexts and 'the rules of the game'. They must pay attention to the texts, procedures and persons involved at the point where the decisions are made, and then work out how they can work for better reforms of education and more just social outcomes through their research activity. They have to understand the purposes for which the research is being supported and used, who is judging it and the criteria by which it is being judged.

'Reading' the field of teacher education research: the context

For many years, there have been ongoing debates about the research base for teacher education. Teacher education research is often criticized for lack of generalizability and the various findings from this research have been utilized in a range of ways as evidence in support differing policies and practices. This has contributed to the current precarious position for teacher education where it is becoming increasingly necessary to defend claims for its legitimacy. The question of if and how teacher education matters, has grown in importance with teacher shortages in some teaching subjects and geographical regions and associated pressure to ease entry requirements into teaching.

Within the current context of NCLB legislation, much teacher education research is discounted as flawed:

In his remarks at the White House Conference on Preparing Tomorrow's Teachers, Grover Whitehurst (2002), director of the Department's Institute of Education Sciences, stated, "Research on teacher preparation and professional development is a long way from the stage of converging evidence and professional consensus." Whitehurst noted throughout his discussion that much of the research on teacher quality is dated, methodologically flawed, correlational in nature, and focuses on differences among teachers rather than the interventions

that raise effectiveness for all teachers. He encouraged the field to employ experimental designs in the study of teacher effectiveness. (US Department of Education, 2003)

Historically, teacher education has been viewed in three distinct ways: first as a training problem, then as a learning problem and more recently as a policy problem (Cochran-Smith, 2004; Cochran-Smith & Fries, 2005). These views have impacted the ways in which it has been researched. The shifts have been shaped by the political and professional agendas of the time including public concern about the schools and the economy, criticisms of teacher preparation, and new reforms and other initiatives in teacher education. Most recently, there has been an intensification of the policy focus accompanied by a return to a training view of teacher education. It is assumed that one way policy makers can provide a well-prepared teaching workforce is by manipulating the parameters of teacher preparation most likely to have an impact on student learning. Therefore the 'right' policies are those based on empirical evidence about the value teacher preparation adds to students' scores on tests, highlighting the centrality of randomized trials and causal research.

A current major review of teacher education research by Division K of AERA points out that there are very few studies in teacher education involving randomized experiments, and almost none that demonstrate direct causal links from teacher education programs to student learning (as defined by scores on standardized tests) (Cochran-Smith & Zeichner, 2005). There are many reasons for this other than teacher education researchers simply not producing rigorous research. Major grants are rare in the field of teacher education and as a result teacher educators often study their own teaching and their own programs, producing a wide variety of studies that include many small-scale and unconnected studies of practice. The findings from these studies do not produce convergent findings (indeed they never set out to do so) and therefore are not convincing to policy makers and financial decision makers operating within the NCLB legislative world. Additionally, the lack of randomized trials in teacher preparation probably has a lot to do with the enterprise of teacher education. Teacher education is changeable and varies considerably across all the institutional, accountability and local contexts within which it occurs.

Moreover, it is important to remember that there are two causal links in the teacher education field, that linking teacher preparation with what the pre-service teachers learn, and another linking the knowledge, skills and dispositions that pre-service teachers learn as enacted in the classroom with student learning or other outcomes. This type of research which examines all the links requires far more resources than has traditionally been available in the field. In addition, many teacher education researchers argue that the depth needed to understand the personal journey to becoming a teacher cannot be portrayed by drawing on randomized trials and causal research, and needs more qualitative approaches of narrative and self study to illuminate the full depth of the experience in order for us as teacher educators to learn how to facilitate the learning to teach journey. Teacher educators argue that different questions call for different research approaches and yield different insights. So for example, qualitative studies like case studies and ethnographic research can illuminate how teacher preparation is enacted in specific sites, how its multiple contexts influence the ways in which resources are used

by individuals and groups, and what meanings and understandings participants construct within different contexts.

It is also worth considering that the field of teacher education research is young. It is probably not currently at a stage which would allow general professional consensus about the conclusions of empirical research and its implications for policy and practice. Research on teacher preparation per se (as a body of research separate from research on teaching and research on education in general) only began in the second half of the 20th century. It initially focused on training strategies within programs and then moved to examining teachers' knowledge of subject matter and pedagogy, beliefs and attitudes, problem solving and decision making processes, professional development over time and classroom performance.

The purposes for which teacher education research is used

What appear to be inconsistent conclusions about the quality and strength of the research base often reflect the fact that different questions were asked in the first place and the different purposes for which teacher education research is conducted and used. Marilyn Cochran-Smith suggests that teacher education research has been used as:

- an instrument for political reform
- a warrant for policy decisions
- a basis for curricula decisions
- a stance for generating local knowledge

Teacher education research has been used throughout the 1990s and into the 2000s to support various agendas for reform of teacher preparation – both professionalization and deregulation. Usually this starts with an individual or a group with a particular view and agenda for teacher preparation reviewing the research looking for supporting evidence for their view and evidence to discredit other agendas. Groups such as The Abell Foundation and The Fordham Foundation have done this and featured prominently in arguments supporting deregulation (see for example The Abell Foundation, 2001, p.3). Certainly, the US federal government is focused on 'Reducing barriers to becoming a teacher among otherwise highly qualified individuals' (US Department of Education, 2004, p.2). The establishment of and extensive federal funding support for the American Board for the Certification of Teacher Excellence (ABCTE) (see <http://www.abcte.org/>) exemplifies the federal government's interest in and support for bypassing traditional teacher preparation. The ABCTE was designed to ease entry into teaching by allowing teacher candidates with an appropriate undergraduate degree in a relevant subject matter to take a certification examination rather than complete an approved teacher education program. Likewise, the IES view that in order to close the achievement gap, more needs to be invested in research based highly specialized curriculum programs than in teacher knowledge and judgment, underplays the importance of the teacher.

When teacher education research is used to inform policy decisions, it is judged according to its empirical evidence in relation to the parameters of teacher preparation that policy makers can manipulate. Various groups have assessed the empirical evidence on the components and structures of teacher education about which there has been

considerable debate in the education community (e.g. Cochran-Smith & Zeichner, 2005; Wilson, Floden, & Ferrini-Mundy, 2001). Others have examined causal questions in working to inform state and federal policy makers (e.g. Allen, 2003; Rice, 2003). Comparison studies of teachers prepared in traditional teacher preparation programs and those prepared in alternative ways, have also been used to progress various policy agendas. For example, the IES funded Mathematica Policy Research Inc study examined the impact of Teach for America (TFA) teachers on student achievement compared with a control group of non-TFA teachers, found a positive impact of TFA teachers on math scores and no impact on reading scores (Decker, Mayer, & Glazerman, 2004). The conclusion to be drawn is that such alternative preparation is as effective as, if not more effective than, traditional preparation pathways, when the measure of effectiveness is student learning outcomes as defined by standardized achievement scores.

When teacher education research is used to inform the teacher preparation curriculum, reviews of research aim to identify research based knowledge about students' learning and development, language, content pedagogy etc, to inform the preparation of new teachers. This research often includes research on human learning and development, as well as research about how specific teaching practices influence student learning and how pre-service teachers learn in particular contexts (e.g. Reynolds, 1989). (See also Linda Darling-Hammond's forthcoming work with the National Academy of Education Committee on Teacher Education).

Also, there are national, regional and local initiatives that view research as part of their job in teacher education, where it is part of the culture of the program/s to engage in research that generates local useable knowledge and to make decisions using research and evidence. Thus, any judgment made about teacher education research needs to be made in light of the original purpose for which the research was carried out.

Thus one important component of reading the field of teacher education is understanding the purposes for which research is both supported and used. Another is considering what are considered the expected and researchable outcomes of teacher education.

Criteria by which teacher education research is judged

In addition to arguments about the validity of teacher education research based on method and rigor, there exists conflicting views about the researchable outcomes of teacher education. Many argue that school student learning should be the main outcome of teacher education. While most of us would agree with this, student learning is often defined exclusively in terms of achievement in test scores and these provide only one of the many measures of what, how and how much students know. The influence of teacher preparation on students' attitudes and dispositions, their subject matter knowledge and skills, and their problem solving skills are other outcomes which may not be shown via standardized test scores.

However, even if one agrees that student learning however it is determined is paramount, there are other important outcomes of teacher preparation like pre-service teachers' own learning and their professional practice/ performance. Likewise, issues around teacher recruitment and retention are related to teacher preparation. Many teacher educators research these outcomes of teacher education, and each has its own assumptions and ways of operating.

Those compiling reviews of teacher education research determine which research they will review. To frame their reviews and indeed to make them more manageable, reviewers decide the parameters by which various research will be included in their examination. Sometimes it is geographic (e.g. looking at one country), sometimes it is one segment of the lifelong learning to teach continuum (e.g. preservice), and often it is according to some methodological criteria to do with rigor and validity. Currently these frames are being influenced by the federal government's emphasis on randomized experiments and direct causal links from teacher education programs to student learning. As mentioned earlier, there are few such studies in teacher education. There is however, a large body of emerging teacher education research which takes as the research site the practitioner's own professional context and blurs the roles of practitioner and researcher: for example, self-study, practitioner inquiry, teacher research, narrative research, the scholarship of teaching and learning. However many do not include these studies in reviews of teacher preparation research either because it is too difficult to synthesize them (Wilson et al., 2001) or because they do not meet selected the reviewers' determined scientific criteria for objectivity and distance between the researcher and the subject.

The AERA Panel of Teacher Education (Cochran-Smith & Fries, 2005) drew upon the National Research Council (NRC) Committee on Scientific Principles for Education Research (Shavelson & Towne, 2002) which defines scientific research by principles of inquiry rather than method or genre, as their frame:

1. Pose significant questions that can be investigated empirically
2. Link research to relevant theory
3. Use methods that permit direct investigation of the question
4. Provide a coherent and explicit chain of reasoning
5. Replicate and generalize across studies
6. Disclose research to encourage professional scrutiny and critique

This panel questioned the assumption that research designs and genres unambiguously define rigor, and highlight the need to focus on criteria for rigor appropriate to each genre. They used the following criteria for each genre (adapted from Wilson et al., 2001):

- Experimental and quasi-experimental studies were expected to use random assignment to group or some form of matching for entering characteristics.
- Multiple regression studies were expected to control for relevant differences among students, other than the teacher preparation they received, insofar as data on such differences were available.
- Follow-up surveys were expected to be sent to a representative sample with information provided about the return rate; inferences were restricted to alumni perceptions, not allowing for inferences about the effects of programs on other beliefs and knowledge.
- Comparisons of credentialed and non-credentialed teachers were treated like multiple regression studies, including the expectation that they "controlled" for

- relevant differences among the two groups, other than the characteristic of being credentialed.
- Longitudinal studies of change were expected to check for the effects of attrition and to provide evidence that the changes were not simply due to maturation and teaching experience.
 - Interpretive studies were expected to include a description of processes for data collection and analysis and include as part of the report evidence, such as samples of interview responses or detailed descriptions of events, as part of the report.
 - Practitioner inquiries were treated like interpretive studies; they were expected to have clear descriptions of research questions, processes for data collection and analysis and evidence.

(Cochran-Smith & Fries, 2005)

So, review teams decide their own criteria for including studies in their reviews, for what counts as high quality research within their frames of reference, and again the divergent and often conflicting conclusions drawn are identified as a weakness in terms of policy conclusions that might be drawn.

Concluding comments

I have attempted to lay out the difficult and complex aspects associated with 'reading the field' of teacher education research particularly in relation to the current NCLB legislative context in the US. There are complex policy, political and professional issues that constrain and support teacher education research. Main concerns of policy makers, teacher educators, and researchers include: the entry paths and characteristics of those entering the profession, the contributions of various components of teacher education to desired outcomes, the impact of deliberate efforts to prepare teachers for underserved populations, the accountability processes typically used in teacher education, and the effects of different types of programs, organization structures and routes.

Given this analysis of the teacher education research field, how can teacher educators take the lead in defining high quality teacher education research that will help them and policy makers draw valid conclusions from existing research and also guide future research agendas? We must acknowledge that in teacher education, there are many important questions which cannot be answered by empirical research alone. For example, some of the most contested and debated issues in education deal with fundamental assumptions and beliefs about the purposes and processes of schooling in a democratic society. Likewise there are fundamental differences to do with the purpose of teacher preparation that similarly create heated debates. For example, is the purpose of teacher preparation to prepare people to fit into and sustain the status quo, or should teacher preparation programs aim to prepare people who will be critical, political and activists and work 'against the grain'. This difference is evident when we try to decide how to measure teacher effectiveness. The questions and debates cannot be settled by assembling good evidence. Good evidence is always interpreted through the belief lens of the interpreter and then the evidence is used in different ways.

However, rather than responding either with indignation that no one appreciates the valuable work that we do as teacher education researchers to illuminate the complexities of learning to teach, or acting with undue haste to realign our research methods and questions to compete for both funds and legitimacy within the academy, we need to carefully explore some questions: What are the purposes for which we would like our research findings to be used? What teacher education outcomes do we value? And, given what is currently available in the field, what are the important research questions? How does the research we do build on what has already been done?

As a field we seem ill-prepared to respond to critics who question the value of teacher education. One good thing that has come out of this is a collective sense of the importance of being able to speak to policy makers with our research. For too long, education research has been deemed to be irrelevant but with the calls for 'scientifically based research evidence' research has suddenly become relevant if highly politicized.

AERA Division K previous Vice-President Pam Grossman in her Vice-Presidential address at AERA in San Diego earlier this year, urges that we articulate and enforce standards for high quality research of many kinds, in every aspect of our work, or risk having them defined for us. Drawing on her work with colleagues in the AERA Panel on Research and Teacher Education (Cochran-Smith & Fries, 2005), she suggests that we need more programmatic research on teacher education, research that centers around a critical set of questions and over time, and through a variety of approaches, tries to provide better answer. This research needs to build on its own findings and use common instruments and outcome measures that make it possible to aggregate findings. She also highlights the need for clearly articulated criteria for high quality studies across the wide range of research traditions in the teacher education field from quasi-experimental research to self-study.

Likewise, in the most recent AERA Division K Newsletter (Fall, 2004), the current Vice-President Christine Sleeter reinforces the urgency with which teacher education must shape research that builds clear findings to guide our work and inform practice. She laments the fact that so much teacher education research does not systematically connect with other studies that have asked similar questions, and that the primary sources of data are often pre-service teacher work indicating what they had learned with little or no connection to how well they teach in the classroom later on.

Sleeter urges teacher educators to:

- Situate their work within a comprehensive literature review that identifies studies that have asked similar questions and use their research to build on what is already there;
- Attempt to 'talk' across institutions. Identify colleagues in different institutions who are looking at similar questions or problems in different contexts; and,
- Follow graduates into the classroom, and look for connections between teacher education and the quality of their instructional practice in the classroom. Try to look at how well the teacher education program has prepared them to teach in particular contexts (e.g. high poverty schools, ELL).

We need to be able to respond to critics who question the value of teacher education. We need to articulate and enforce standards for high quality research of many kinds, in every aspect of our work, or risk having them defined for us (both in the research that we do and also in how we use and critique others' research). We need to challenge the assumption that research designs and genres unambiguously define rigor and we need to try to work towards more programmatic research that centers around a critical set of questions and over time, and through a variety of approaches, tries to provide better answers. Moreover, teacher education research for the public good will be constructed relative to the different arenas and times and national, political and historical backgrounds, and attend to the different genres and contexts and constituencies for teacher education research.

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