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ABSTRACT

This collection of papers focuses on the preparation of teachers by university-based education programs. The papers are: "The STEPS That Support P-12 Learning and Achievement" (Diana Rigden), which describes the Standards-based Teacher Education Project (STEP) for improving student learning; "The Responsibility for Assessing Beginning Teachers" (Gary R. Galluzzo), which presents three features essential to high quality beginning teachers (being smart, capable, and persevering); "'It Takes a College': Administrative Support for Teacher Preparation" (Thomas E. Dasher), which describes the administrator's role in a collaborative approach to preparing teachers; "Linking Teacher Quality to Student Achievement through Assessment" (Russell French), which looks at the level of accountability that has reached the teacher education community; and "A Case For A Certain Kind of Teacher Education" (Frank B. Murray), which discusses the need for a new teacher education degree, grounded in the liberal arts and pedagogy. (SM)

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Teacher Preparation: Assessing Teacher Quality, Administrative Support, Standards-Based Teacher Preparation

Anne Rogers Poliakoff, Editor

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BASIC EDUCATION

A Monthly Forum For Analysis & Comment

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Assessing Teacher Quality

Administrative Support

Standards-Based Teacher Preparation

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THE STEPS THAT SUPPORT P-12 LEARNING AND ACHIEVEMENT

This issue of *Basic Education* is devoted to the preparation of teachers by university-based education programs. Our contributors are all committed to the improvement of these programs, and each suggests strategies for doing so. The Council for Basic Education sustains its historical commitment to teacher preparation through its five-year engagement in the Standards-based Teacher Education Project (STEP)™, which CBE manages in partnership with the American Association of Colleges for Teacher Education. STEP began in 1997 on three pilot campuses in Georgia and has expanded from that base to work with twenty-five public and private colleges and universities in Georgia, Indiana, Kentucky, Maryland, and Delaware.

If no child is to be left behind, then every teacher must know the content of the subjects they teach. They must also know how to teach the subject so that all their students learn what they need in order to meet standards. These two powerful statements are at the heart of STEP. By deliberately framing its goals around state and national teaching and learning expectations, STEP provides campuses with a strategy by which they will graduate knowledgeable and skilled teachers while meeting new external accountability measures.

The ultimate goal of STEP is to improve student learning. It meets this goal by improving how teachers are educated and prepared for the classroom. When a college joins STEP, it makes the commitment that every student that it graduates as a potential teacher can demonstrate deep knowledge of the subject he or she plans to teach and how to teach it. The campus agrees to make teacher education an all-campus responsibility with leadership from the academic vice president and deans of both education and the arts and sciences. It

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initiates changes in arts and sciences and education courses, requirements, experiences, and assessments that will ensure the quality of graduating teachers. This commitment marks a major departure from the ordinary teacher education program. It requires what Frank Murray, in his article "The Case for a Certain Kind of Teacher Education," calls "the next wave of teacher education reform." It rests on eight essential steps.

1. *The Standards Framework.* Faculty members learn about P-16 academic content standards and teacher licensure standards, gaining an understanding of the core knowledge that P-12 students are expected to master and that teachers are expected to teach.
2. *The Essential Triad.* Arts and sciences and education faculty members share responsibility for teacher preparation in a new collaborative relationship that builds on their different knowledge and experiences. They work with P-12 teachers in reviewing, redesigning, and implementing the teacher preparation program.
3. *Program Review and Analysis.* Faculty members use P-12 content standards and teacher licensure standards as a template for reviewing the requirements, courses, and field experiences that make up the teacher preparation program, and they analyze the ability of each element to help produce knowledgeable, skilled teachers.
4. *Program Alignment.* Based on their program review, faculty members align the program's requirements, courses, and learning expectations with P-12 and teacher licensure standards.
5. *Assessment Alignment.* Faculty members define a multi-faceted assessment system to ensure that every teacher candidate has the content knowledge, instructional skills, and ability to influence student learning. Gary Galluzzo challenges readers to develop such performance assessments in his essay, "The Responsibility for Assessing Beginning Teachers."
6. *Institutionalizing Change.* The college or university institutionalizes the changes introduced to both the teacher preparation program and cross-campus relationships in order to establish a new starting point for subsequent reforms.

7. *Ensuring Teacher Knowledge and Skills.* Teacher candidates demonstrate how well they know the content of the subjects they will teach and how well they are able to teach their students to learn through a number of different performances judged by arts and sciences, education, and P-12 faculty. In his article, "Linking Teacher Quality to Student Achievement Through Assessment," Russ French outlines specific assessment strategies by which a program can ensure teacher knowledge and skills.

8. *Ensuring Student Achievement.* Elementary, middle, and high school students demonstrate how well they are learning by meeting academic content standards.

Writing that "It Takes a College" to prepare the teachers we need, Thomas Dasher describes the kinds of administrative support required if a campus is to undertake these eight steps successfully.

As the essays in this issue of *Basic Education* suggest, the path a campus chooses to transform its teacher preparation program into one that is standards-based requires an active commitment from both arts and sciences and education faculty members, an investment of resources from deans and administrators, and support from state and national policy makers.

Diana Rigden, Vice President, STEP
Council for Basic Education

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THE RESPONSIBILITY FOR ASSESSING BEGINNING TEACHERS

BY GARY R. GALLUZZO

The now seemingly never-ending quest to pare teaching down to a few simple elements compels us to stipulate what beginning teachers should know and be able to do. It should also, however, force us to consider how to measure that knowledge and skill in professional ways. In an applied field such as teaching, we should be designing ways for beginning teachers to demonstrate that they deserve the privilege to teach children—regardless of the route that placed them in a classroom.

Smart, Capable, and Persevering Beginning Teachers

In this brief essay, the argument is put forward that three features are essential to high quality teachers: that they be smart, capable, and persevering. It is also advanced that those who prepare teachers are obligated to measure these features.

The first feature is founded on the principle that one cannot teach well what one does not know well—traditionally stated, "You can't teach what you don't know." Given the demand in the information society for citizens who know and understand, I've changed the phrase to "teach well" and "know well" rather than simply "teach" and "know." This distinction implies that the teacher must not only master the facts, but must be able to engage students in the implications of those facts—how to compare them to other areas in the subject, or even to other disciplines, for example. Expecting beginning teachers to have this deep understanding of content, or the application of the content to real-life settings, is a minimum qualification for entry into teaching. The general tests that states use to license teachers represent minimum assessment of content knowledge. It is open to debate how well they assure the public that any beginning teacher understands the discipline at a high level.

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The second feature addresses whether the teacher is able to impart that deeply understood knowledge to learners, so that they also learn it well. Now, this is where views on teacher quality diverge. Advocates of traditional routes to teaching believe that there is a body of knowledge that must be mastered, understood, and continuously developed over one's career. Advocates of alternate routes argue equally strenuously that the ability to teach matters far less.

I find this a very interesting debate and have tried to look around for examples and counter-examples of actual practice that might illuminate the divergence. The question is, "Do subject matter experts make excellent teachers?" A good place to look for evidence is in higher education, and especially in the traditional academic disciplines, i.e., the humanities, natural sciences, and social sciences. In order to gain access to the professoriate in these traditional academic disciplines, one must become an expert in the chosen discipline, even create new knowledge through doctoral-level research. Typically, the aspiring professor is expected to hold three degrees in the discipline. In all ways, we could argue that these professors are subject matter experts. Yet, the evidence from research does not suggest that these professors are more effective in promoting student achievement than a classroom teacher in a pre-collegiate setting. If subject matter expertise were all that mattered to teacher quality, then the best teaching in our nation would be found among the liberal arts faculty on any campus.

Deep content knowledge is necessary, but not sufficient for effective teaching.

This rather convincing evidence suggests that deep content knowledge is necessary, but not sufficient for effective teaching. After twenty years as a professor (and a liberal arts major), I cannot say I've seen more examples of high quality teaching and learning in the academy than I've observed in schools. To support my conclusion, I look at how much money university administrators are pouring into faculty development

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programs designed to help professors learn to teach. The cost is in the millions of dollars annually, and the unstated assumption is that there is a body of knowledge about teaching that, once learned, can make a subject matter expert a much more effective teacher. In addition to being qualified in the discipline, a new teacher must demonstrate the ability to teach so that students will learn.

The third feature is the disposition never to quit, even on the most resistant learners in one's charge. It is not enough to possess both subject matter knowledge and the ability to enable students to learn it. It is equally important to prepare teachers to have the patience and professional perseverance to find ways to reach all children. "No Child Left Behind" means that teachers must possess the personal discipline not to quit on those learners who don't grasp the content quickly. If we are looking for teachers who will not leave children behind, we should be measuring them on that precise ability. The alternative, letting anyone into a classroom regardless of knowledge, skill, or disposition, seems myopic and costly in both financial and social terms.

Measuring the Three Features

In my view, there is no way to measure all these features with a paper-and-pencil test. We should want to be assured that the English teacher can write, not just teach writing by the book. We should want to be assured that the biology teacher conducts laboratories that bring the discipline to life for students. We should want to be assured that the elementary school teacher understands mathematics deeply enough so that he or she can determine what sequence of instruction will help struggling learners.

If we are to place into our classrooms the kind of people we really need, all routes into teaching must develop performance assessments of beginning teachers that capture these three essential features. Moreover, those performance measures should be characterized by the degree to which they: (1) are work-related, (2) capture the complexity of teaching, and (3) are worth the time needed to complete. Work-related means the degree to which the assessment measures an activity required

in teaching, and not something simulated, manufactured, or removed from practice. Complexity means the assessment does not falsely simplify teaching. Finally, the assessment itself should add to the beginning teacher's professional capacity by teaching as it tests. If one of these characteristics is missing from the assessment protocol, then the assessment itself is inadequate.

Regardless of the route the teacher takes into the profession, the track record of beginning teacher assessment is not very impressive. State licensing exams may place people in the classroom who are "smart" in terms of academic knowledge, but that is not enough. Placing people in the classroom who are capable of teaching but have no content knowledge is an equal disservice to children. Letting people into classrooms who are not disposed to reach all learners fails to address contemporary notions of school reform. Beginning teachers from both traditional and alternate routes should be measured by how well they understand the discipline, by how capable they are of reaching all learners, and by how hard they persevere in service of their students. The only way to do this is through rigorous, program-based performance assessment.

Gary R. Galluzzo is Executive Vice-President of the National Board for Professional Teaching Standards in Arlington, Virginia, and a member of the STEP Working Group.

"IT TAKES A COLLEGE": ADMINISTRATIVE SUPPORT FOR TEACHER PREPARATION

BY THOMAS E. DASHER

For many years, preparing teachers was seen as exclusively the responsibility of schools of education. Even though undergraduates took general education and content courses from arts and sciences faculty, the belief persisted that the preparation of teachers was handled only by education faculty. As a result, there was often a schism between the school of education and the rest of the campus, especially the school of arts and sciences. Colleagues in education jealously guarded any course that purported to be about teaching, and non-education faculty derided the lack of rigor and content that they believed was the hallmark of education courses. This schism came to define many campuses, and administrators often either exploited it or threw up their hands in frustration.

Over the past decade, this conflict between schools of education and schools of arts and sciences has begun to ease, in some cases, quite dramatically. National reports and organizations, state legislatures, and faculty themselves have called for a new paradigm of teacher preparation. There is growing recognition that preparing future teachers is the shared responsibility of the entire campus. But what does that responsibility look like? What must schools of education and schools of arts and sciences recognize for responsibility to be shared?

First, schools of education must acknowledge that teachers need to understand the academic content of their subjects as well as how to teach the subject, if their students are to learn and excel. Collaboration must extend beyond college faculty to

include K-12 public school faculty. All parties must clearly understand the current school reform environment, including the accountability measures instituted by both state and federal regulators. Schools of education must value all teachers, whether inservice or preservice, by supporting lifelong learning opportunities. Efforts to recruit a more diverse teaching force must be redoubled.

Especially important is the need to assure, through continuous performance assessment measures, that all graduates from teacher preparation programs are well prepared for their initial teaching assignments, with the skills and abilities to increase the achievement of all their students. To help their graduates reach this standard, education faculty must ensure that graduates understand the communities and schools they are entering, and how best to effect change within those contexts. Finally, schools of education must identify and implement sound standards to guide training and measure performance as well as effective practices to enhance the learning environment in higher education and the public schools.

For their part, schools of arts and sciences must recognize that excellent teaching is essential in all courses and that future teachers most often model their teaching on the ways they were taught. Collaboration in preparing teachers involves

Community and regional outreach are essential to meet the needs of . . . schools.

working across disciplines within arts and sciences as well as with colleagues in education and the K-12 sector. Arts and sciences faculty must see that community and regional outreach are essential to meet the needs of the public schools. Furthermore, when arts and sciences faculty embrace their role in preparing teachers, they are shaping the future students who will enroll in their colleges and universities. There must be clear standards across the curriculum and connections between content and performance standards. Finally, arts and sciences must acknowledge the importance of the messages

they send to both their students and colleagues about education and the K-12 sector. Only a unified front can hope to confront the political forces united against public education and school reform. Thus, a shared vision, collaboratively developed among arts and sciences, education, and K-12, is essential.

However, a collaborative approach to preparing teachers cannot become a reality without strong administrative support. To encourage and develop this collaboration, administrators must be willing to do the following:

1. From the beginning, they must recognize and confront the barriers to collaboration. Among those barriers is the often intense distrust between faculty in education and in arts and sciences. Administrators must understand the history on a campus and then work to move beyond it. Most often that history has been shaped by a lack of communication, of incentive for faculty to work together, of any infrastructure to support collaboration, and—most importantly—of any shared vision of teacher preparation.

They must . . . confront the barriers to collaboration.

2. To establish a lasting infrastructure and open channels of communication, administrators must encourage the establishment of a unit with equal representation from both education and arts and sciences to coordinate the program in teacher preparation. This Teacher Education Unit must meet on a regular basis, clearly understand the program's standards, and have the authority to recommend policies.
3. There must be incentives and rewards for faculty responsible for preparing future teachers. Administrators must encourage faculty members in both education and arts and sciences to become involved in both on-campus and off-campus service to support teachers, and must reward this service in promotion and tenure as well as annual performance appraisals. More important on many campuses, the administration must encourage and reward faculty for

conducting research and publishing on pedagogy and for participating in regional and national conferences with sessions devoted to collaboration in preparing teachers.

4. Establishing trust among formerly hostile or indifferent colleagues is especially difficult. It often requires almost daily encouragement. Colleagues who once talked only *about* one another are now expected to talk *with* one another. Those conversations should be on a regular basis and supported by chairs, deans, and academic vice presidents. When the state establishes new guidelines, when legislation is pending, when new standards and assessments are discussed, on-campus conversations must involve all stakeholders, including K-12 faculty, who almost always have the clearest understanding of how proposed changes will affect inservice teachers.

5. Administrators, with faculty input, establish institutional priorities and allocate resources. If true collaboration in teacher preparation is to occur, then administrators must continually make it a priority and include it in conversations with faculty and other administrators. As faculty positions with significant impact upon teacher preparation open up, administrators must define them from the beginning of the search so as to ensure they support the institution's goals. Administration must allocate additional resources to curriculum development, especially if new courses are designed to support content standards for teacher preparation. Needs vary from program to program, but without resources, new initiatives cannot succeed. At the same time, administrators must remember that resources alone will not effect change.

These developments in teacher preparation are exciting and challenging. Challenges can, unfortunately, lead to more talk than action. Administrators must be sure that their actions, as well as words, support initiatives that are best for the institution and its students. There is no more important goal for an institution today than to graduate qualified teachers, and administrative support to achieve that goal is crucial and one of the great opportunities for our campuses.

Thomas E. Dasher is Provost of Berry College in Georgia and a member of the STEP Working Group.

LINKING TEACHER QUALITY TO STUDENT ACHIEVEMENT THROUGH ASSESSMENT

BY RUSSELL FRENCH

Scene 1. The year is 1992. The location is an unnamed university in an unnamed state. Merrilee Worthmore is shaking the hand of the university president and receiving her diploma in teacher education. The smile on her face conveys her joy in her accomplishment and her sense of security in knowing that she has completed all course and field experience requirements needed for licensure. She has two job offers, based on those credentials and the reputation of her preparation program as one of the best in the state.

Scene 2. 2002. The location is the same. Martin Short sits in the audience at graduation watching his smiling peers receive their diplomas. Martin is deeply disappointed, for he had expected to be marching across that platform until a few days ago, when he learned that he had failed to provide evidence of his ability to produce substantive learning in students during his student teaching experience.

Scene 3. 2002. The location is the same. Dean William Dean is holding an emergency meeting of department heads within the College of Education. The State Board of Education has placed two of the college's teacher preparation programs on probation because more than 20 percent of their prospective graduates failed to provide evidence of their ability to produce learning in students. If the college does not resolve the problem in two years, the programs in question will lose state accreditation.

Some readers may perceive scenes 2 and 3 as fantasy, but they reflect the new accountability that has come to teacher

education. The *NCATE 2000 Standards*, which set the standard for most U.S. teacher education programs, require:

1. That teacher candidates have in-depth knowledge of their subject, as established by professional, state, and institutional standards, which they demonstrate through inquiry, critical analysis, and synthesis.
2. That teacher candidates accurately assess and analyze student learning, adjust instruction appropriately, and have a positive effect on learning for all students.
3. That the teacher education program use its assessment system to provide regular, comprehensive data on program quality, operation, and candidate performance at each stage of the program.

It is not surprising that this level of accountability has reached the teacher education community. Our colleagues in P-12 schools have grappled with accountability for student achievement for years. Those of us in the teacher education community are now partners in accountability and accomplishment.

Most teacher preparation programs will need to rethink assessment of teacher candidate performance.

Most teacher preparation programs will need to rethink assessment of teacher candidate performance in three areas: subject matter knowledge, application of pedagogical skills, and production of learning. Rethinking assessment will inevitably mean changes in teacher education curriculum and instructional practices.

Assessment of Subject Matter Knowledge

The new NCATE standards require evidence of the prospective teacher's in-depth subject knowledge demonstrated through inquiry, critical analysis, and synthesis.

That statement conveys that course-by-course assessments and grades aren't sufficient and implies assessments quite different from traditional paper-and-pencil tests. It further implies a continuous assessment that enables faculty to identify the student's progress toward the target, and a capstone assessment.

Assessment of Pedagogical Skills

In preparing teachers, we aren't interested in the acquisition of pedagogical knowledge and skills for their own sake, but rather for the prospective teacher's ability to apply these. Therefore, assessment of pedagogical skills requires an instructional setting and forms of performance assessment (observations, structured interviews, performance tasks, etc.) that show what candidates can do with what they know. (We have found the structured interview to be a very creditable means of evaluating such areas as planning and assessment of student learning.)

Assessment of Teacher Ability to Produce Learning

We are responsible for the learning of those we teach, and the bottom line is achievement. We can and should proceed with humaneness, but relationship is not the end product—learning is.

How can we who prepare teachers demonstrate that our graduates enable students to learn? There are three sources of evidence: standardized tests, analyses of student products (student work samples), and analyses of teacher instruction (teacher work samples).

- *Standardized Achievement Tests.* To use standardized test data to assess the quality of teaching, when a candidate is only in the classroom for a quarter or semester and does not have full responsibility for that class, is simply invalid.
- *Student Work Samples.* Analyzing samples of student work is an arduous task. The approach works well, however, if one's interest is the teacher's ability to analyze student work and determine the next instructional steps. Then, a sampling procedure is appropriate. If, however, the purpose is to assess the teacher's ability to produce achievement in *all* learners

within a classroom, considering individual differences, the subject taught, and the conditions of instruction, this methodology is seriously flawed and enormously difficult to implement.

- *Teacher Work Samples*. The teacher work sample methodology (TWSM), originally developed and tested at Western Oregon University, has begun to receive widespread attention as a tool for assessing a teacher's impact on student achievement. The six-step process of TWSM documents a unit of instruction and its results: (1) description of classroom context and students; (2) description of desired learning outcomes; (3) instructional plans; (4) assessment plan; (5) evidence of student achievement acquired from analysis of pre- and post-assessments of all students; and 6) reflections on student achievement, instructional process, assessment, and so forth.

The methodology not only provides evidence that students did or did not learn, it also provides evidence of the teacher's subject knowledge and his or her ability to make long-range plans, to identify and address individual student differences, to implement and interpret a systematic assessment plan, and to become a reflective practitioner.

Accountability requirements now in place for both P-12 schools and teacher preparation programs offer the possibility of developing a seamless program of teacher assessment.

Although this discussion of accountability and assessment has focused on teacher preparation and preservice teachers, there are implications for P-12 school systems as well. While the majority of states are not yet value-added assessment states like Tennessee, where the quality of teaching is measured through gains made by students on standardized tests, there is no state, school system, or school that can any

longer ignore the need to demonstrate that good teachers produce high levels of student achievement. The accountability requirements now in place for both P-12 schools and teacher preparation programs offer the possibility of developing a seamless program of teacher assessment that would serve multiple purposes: meeting demands for accountability, demonstrating that teachers (preservice and inservice) are producing student achievement, and developing a database for improving programs. It won't be easy and will require extensive collaboration, but it can be done!

Russell French is Director, Institute for Assessment and Evaluation at the University of Tennessee.

(An expanded version of this article, with references, appears at the CBE website, www.c-b-e.org.)

A CASE FOR A CERTAIN KIND OF TEACHER EDUCATION

BY FRANK B. MURRAY

Let's consider the kind of education a teacher would need to negotiate the following classroom event. The teacher was exploring patterns of odd number interaction with even numbers. Out of the blue, one pupil, Sean, exclaimed that some numbers are both odd and even.

What could Sean possibly be thinking about? Should time be taken from the next topic in the prescribed curriculum to review this topic, undoubtedly worth only one or two items on the state's standardized test? Should the teacher correct Sean by simply restating the odd-even numbers definition and be done with it?

What kind of education would the teacher need, concerning the nature of numbers, of knowledge, of children's thinking, of pedagogy, in order to explore this proposal? Asked by the teacher how numbers could be both odd and even, Sean replied that six was an odd-even number because two went into it an odd number of times, while eight was not such a number because two went into it an even number of times.

What kind of education would the teacher need to evaluate Sean's answer? This is the question for today's teacher educators. Does Sean's analysis have mathematical or pedagogical merit, and should the class consider it? Another pupil in Sean's class noticed that every other even number was one of these even-odd Sean numbers—six was, eight was not, ten was, twelve was not, and so forth. Others noted that adding Sean numbers and non-Sean even numbers always yielded a Sean number. The same relationships held for subtraction, while other outcomes held for multiplication.

After further exploration, the class was asked whether these numbers should be added to the mathematics curriculum.

Should they vote on it, as some proposed, or is democracy a poor mathematical procedure, as others thought?

Sean numbers, in fact, do not have much of a mathematical future. But was this a time-wasting discussion, an engaging diversion, or at the core of doing mathematics? It is exactly the kind of classroom lesson many standards commissions and

Natural or naive teaching, however, will lead to serious pedagogical mistakes for both weak and superior students.

other reform groups seek, and yet it is the kind of lesson most at risk owing to current accountability efforts that would make no room for this lesson and to weak teacher education programs that fail to equip the teacher with the intellectual resources to hold up her end of this classroom dialogue. It would seem to be exactly the kind of elementary school mathematics lesson, however, that we seek in the twenty-first century.

Yet, it is at risk because the inherently unpredictable fruits of such classroom discussions are so difficult to capture by the standardized test-maker, the standard-setter, and the current teacher education curriculum. One might assume that the university teacher education program would support and advocate the kind of teaching Sean and his classmates experienced. While such programs could conceivably support the deep knowledge of number and children's thinking required for a teacher to take a chance on Sean's observation, the rigorous study of subject matter and cognitive development is not typically a signature strength of teacher education programs.

The argument against professional teacher education is rooted in the undeniable fact that teaching is a naturally occurring human behavior. We are a teaching species whose young cannot survive unless taught by their guardians, most of whom have no formal schooling as teachers. Natural or naive teaching, however, will lead to serious pedagogical mistakes for both weak and superior students. It provides

insufficient guidance for the solution of difficult and novel challenges, like Sean's contribution to the lesson, that go beyond the teacher's reliance on "telling and showing," the core of the natural style of teaching.

When teacher and pupil have dissimilar backgrounds, we can expect that the natural teaching mechanisms that support instruction within the family will not operate to the student's benefit. Well-meaning and well-read persons with good college grades will still make the following mistakes with pupils for whom they have low expectations, regardless of how they came to have these expectations. They will treat these pupils not as individuals but as a group, seat them further away and outside the classroom zone of frequent teacher-pupil interaction, look at them less, ask them insignificant questions, call on them less often, and give them less time to respond, fewer hints when called upon, and less praise and more blame than other pupils.

This untrained person will not want to embarrass the pupil by asking difficult questions or prolonging her embarrassment by giving her hints or more time. The professional teacher, in contrast with the natural teacher, must discipline such instincts and implement an equitable and disciplined approach to bring about high levels of achievement among those pupils for whom the teacher would otherwise have had low expectations. These professional actions are frequently counterintuitive and as a result require practice, one hopes not entirely on-the-job and at the expense of the school's students.

These professional actions are frequently counterintuitive and . . . require practice.

A further limitation of natural teaching is that it doesn't take the superior pupil, like Sean, much beyond the kind of information that can be shown and told. Declarative knowledge is important, but knowledge constructed by the pupil is key to advanced academic performance.

Showing and telling have not been found, except in very unusual circumstances, to be effective means of teaching

necessity. It is one thing to know that a statement is true, but quite another to know that it must be true. A pupil can be told and shown, for example, that A is greater than B and that B is also greater than C, but the knowledge that A *must* be greater than C cannot be simply given to the pupil. The origins of necessity, and other pivotal concepts, seem to lie in dialectical instruction, which asks for more demanding intellectual action on the part of the teacher and the student.

Along with natural teaching often comes a naïve, pervasive, and limiting view of the human mind as merely a container. It is limiting because it gives us no way to account for many distinctive human activities like number sense, improvisation, and interpretation. Naive views of the mind's workings, coupled with equally naive views about the nature of academic knowledge as received and objective truth, further limit the benefits of nonprofessional teaching. The naive view of subject matter shows itself, for example, in the view that scientific theories are proved, that art is only decoration, that facts exist apart from theories, that sentences should not end with prepositions, that creationism is a viable scientific theory, or that Sean was simply wrong.

Today's teacher education degree program, even if it typically does not foster the kind of teaching Sean needed, is still presumably the place where the weaknesses in the naïve views of teaching, the mind, and academic knowledge, should be addressed and corrected. A new teacher education degree, grounded in the liberal arts and pedagogy, is needed, and that is the challenge of the next wave of teacher education reform.

Frank B. Murray is H. Rodney Sharp Professor at the University of Delaware and a member of the STEP Working Group.

(This essay is based on remarks delivered March 19, 2002 at a meeting of the Council of Independent Colleges in New York City. The episode involving "Sean" was reported by Deborah Ball, professor of math education in the Michigan State University School of Education and teacher of third-grade mathematics in East Lansing.)

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