A Union of Professionals

Seeking Success with Students

New Teachers Can't Be Successful—and Won't Stay in Teaching—Without Help from Their School

The decade that began in 2000 will see massive teacher retirements and the need to hire 2.2 million teachers nationwide. The need for teachers will be even greater in math, science, special education, and in high-poverty schools. To attract talented new teachers to fill the shoes of those retiring, policymakers are proposing a raft of programs: signing bonuses, accelerated teacher preparation, housing assistance, scholarships, and more. Policymakers are also proposing financial incentives—like bonuses for teachers whose students' test scores rise more than expected and higher salaries for teachers who become mentors—in an effort to head off attrition of talented teachers, be they new or veteran.

Some of the recruitment plans make sense, some don't. Some of the proposals for financial incentives make sense, some don't. But what virtually all these proposals fail to address is the astonishing speed and rate at which newly recruited teachers flee their schools or their profession altogether: Fifty percent of new teachers leave teaching by the end of five years. Another 12 percent transfer each year; in high-poverty schools, the portion who leave or transfer is even higher.

Why are they leaving? Former Chicago teacher Leslie Baldacci gives voice to the gritty, discouraging realities that drove her and other new teachers from their schools. Susan Moore Johnson and her fellow researchers at the Project on the Next Generation of Teachers conclude that the poor conditions, lack of help in learning the ropes of teaching, and the unprofessional treatment that Baldacci faced are not uncommon—and are largely behind the high turnover rate among new teachers.

Johnson and her colleagues go further, arguing that we are amid a generational change. In particular, a huge portion of new teachers, like their peers in every other segment of the economy—and unlike their predecessors—do not anticipate remaining in their first workplace, or even their first career, for a lifetime; they see teaching as one job among several that they will eventually hold. Close to half of new teachers have already held one or more jobs—in entering teaching, they're seeking a new, more meaningful career. If teaching doesn't provide these new teachers with what they are looking for, they will move on.

So what do they want? Above all, to be successful teachers. And to do that, they need help—from administration, fellow teachers, and other school staff. According to their research, too often, they're struggling on their own. Further, Johnson and her colleagues find that teachers who get the support they need—both administrative support and real assistance in learning the ropes of teaching—are very likely to stay. As an example, see the story of Fred, page 20. Teachers who don't get the support, like Mrs. Baldacci, are very likely to leave, either to a new school—or a new profession.

Providing that support ought to be at the top of every agenda aimed at assuring a high-quality teacher workforce in the future. There is no point turning somersaults to attract talented new teachers, if half of them just run out the door.

—Editors

AFT Resolutions

PEER ASSISTANCE AND REVIEW FOR NEW TEACHERS: TAKING CHARGE OF OUR PROFESSION

WHEREAS, the quality of education our students receive depends on many factors, including curriculum quality, students' readiness to learn, and the quality of teaching they experience. As an organization that represents teachers, we have a particular commitment to quality teaching. Plus, our own experience and volumes of research demonstrate that such teaching is critical to student achievement; and

WHEREAS, since its founding, the American Federation of Teachers has passed legislation, bargained contracts, lobbied legislatures and argued in policy forums for a wide variety of reforms to ensure teaching quality. We have advocated for strong preparation for new teachers, a rigorous entry exam and effective induction programs. We have called for an end to out-of-field teaching, helped create and support the National Board certification, and insisted on quality, sustained professional development. We remain committed to each of these reforms; and

WHEREAS, that said, we note that with a new teacher turnover rate of up to 50 percent, depending on the data set reviewed, the most sensible, cost-effective way to strengthen teaching quality is to focus on the "front end": to assure (1) that new teachers get the professional development and support they need and (2) that only capable, well-prepared teachers who meet high entry standards are offered permanent positions. If our school systems can do these two things right, we will have moved a long way toward assuring the quality of teaching in the future; and

WHEREAS, experienced, expert teachers are the people who are positioned to offer the best assistance to probationary teachers and to make the most credible judgments about their capabilities, through a process of peer assistance and review designed and established through collective bargaining. Where there is no collective bargaining, a peer assistance and review process can be established by an agreement reached after extensive teacher input, through a collegial labor-management process, and with approval by the local union; and

WHEREAS, teaching expertise, like all professional expertise, develops on a continuum. Thus the probationary period of a teacher's career should be regarded as an induction into the profession. The induction should be a coherent, ongoing process that encompasses hiring and orientation, intensive professional development, support and mentoring, and a final review that determines whether each aspiring novice meets high standards of practice; and

WHEREAS, right now, neither the support nor review aspect of induction is done well in many schools. While evidence suggests that many ineffective teachers leave anonymously through attrition, an ineffective early evaluation system can permit unqualified teachers to receive continuing contracts. Other teachers with great potential remain, but may not become as effective as they could, because they never received the upfront, ongoing support that would have started them off right. At the same time, many promising teachers leave their districts and the profession in their first few years of teaching, driven out by poor conditions, disrespect, and lack of comprehensive and consistent support; and

WHEREAS, a high-quality peer assistance and review program for new teachers can profoundly improve hiring decisions, teaching quality and teacher retention—and thereby raise student achievement. Peer assistance and review for new teachers should play a major role in our continuing drive to strengthen the teaching profession, and the American Federation of Teachers resolves to make it a priority to support affiliates seeking to establish such programs. In order to reflect local realities and needs, as well as the best thinking of a district and its teachers, these programs must be devised collaboratively by the district and the union (through collective bargaining where it exists or, as noted above, through an appropriate collaborative process). The program should include the following characteristics:

- Expert teachers, jointly selected by the union and administration through a fair and quality-conscious process, are responsible for mentoring and assisting new teachers.
- These expert teachers are provided sufficient training, time and resources, and responsibility for working with new teachers through their probationary period.
- Those expert teachers are provided ample release time to do this work either on a full-time or part-time basis.
- These expert teachers, according to a fair process agreed to by union and district representatives, take responsibility for making wise, tough, evidence-based recommendations to decision-makers about whether a new teacher merits continuing employment.
- These judgments are to be made based on agreed-upon, transparent, evidence-based professional standards.
- The program must be guaranteed adequate and sustained support through the regular district budget; and

WHEREAS, when peer assistance and review programs were first established by American Federation of Teachers affiliates, they were controversial. Questions were raised: Did peer review violate a basic union principle by designating some teachers as "expert" and giving them the right to evaluate other teachers? Could the union establish such a program without violating its duty of fair representation? Did it diminish the due-process rights of new teachers? Would it weaken the union? Would members accept the notion that this was an appropriate union role? And, would it actually lead to better hiring decisions and better teaching?; and

WHEREAS, for more than 20 years, a number of local American Federation of Teachers affiliates have used the collective bargaining process to establish these kinds of programs. We can now, based on their experience, confidently say: Where quality peer assistance and review programs exist, they are overwhelmingly popular with union members. Not one peer assistance and review program has been held by a court to violate a union's duty of fair representation. Through the collective bargaining process, the union has found fair, quality-conscious, member-supported ways to select mentor teachers. It has found ways to raise entry standards that also cultivate good teaching.

WHEREAS, in making this resolution, we recognize four realities:

1. **The traditional process for supporting and evaluating new teachers is outdated and inconsistently implemented in schools.** Though credible data is difficult to come by, a new report says that teacher evaluation typically consists of "a single, fleeting classroom visit by a principal or other building administrator untrained in evaluation, the evaluation rarely leads to assistance for teachers who need it, and evaluation standards often vary across buildings."
2. **Establishing peer assistance and review programs for new teachers will advance the teaching profession.** Professionals have a compact with the public: The profession defines, according to the best available evidence, the standards of good practice—and agrees to impart them and enforce them. In return, the public grants professionals substantial autonomy. In taking on responsibility for peer assistance and review, we move ourselves toward such a compact with the public.
3. **Credible, thoughtful support and evaluation relies on knowledgeable, sustained and engaged human judgment—which is our response to the growing appetite for quick, cheap, mechanical fixes to evaluation.** The failure of traditional evaluation by administrators has produced an appetite for an even worse evaluation system, one based on student test score gains and barely fettered by human judgment. In fact, rigorous decisions about who should enter teaching—decisions that will profoundly influence student learning in the long run—will require greater reliance, not less, on expert, knowledgeable human judgment.
4. **Teachers want peer assistance and review because it recognizes our role and interest in maintaining the quality of our profession.** In polls of American Federation of Teachers teacher members, 72 percent of teachers say their reaction is "very positive" or "somewhat positive" to a peer assistance and review program for new teachers. And where the program already exists, surveys show member support for the program, both for the way it supports new teachers, and for the way it takes responsibility for good teaching so that only teachers who meet high standards remain in the profession; and

WHEREAS, the American Federation of Teachers finds that peer assistance and review for new teachers is one of the most effective ways to strengthen teaching quality and to further establish teaching as a genuine profession. The American Federation of Teachers' support for peer assistance and review programs for new teachers should go beyond the few district-union programs currently operating. Establishing these types of programs is an urgent priority for our union:

RESOLVED, that:

- **the American Federation of Teachers urge all locals to consider engaging in peer assistance and review programs.**
- **the American Federation of Teachers increase awareness and understanding of these programs among our members and leadership, by devoting attention to peer assistance and review programs in publications and at a wide variety of leadership meetings.**
- **the American Federation of Teachers work actively to support an increasing number of affiliates interested in negotiating such peer assistance and review programs.**
- **the American Federation of Teachers identify and pursue various ways of providing policy and financial support to these programs through foundation assistance and legislation.**
- **the American Federation of Teachers project a national voice on this issue, establishing in the public mind the desire of teachers around the country to take on greater responsibility for ensuring high standards of professional practice, and to lay the basis for exercising greater leadership in their schools, districts and profession through peer assistance and review programs; and**

RESOLVED, now is the time for action. With this resolution, we are further placing ourselves on a well-established path toward greater professionalization. We look forward to welcoming into our profession the new teachers who meet rigorous professional standards.

(2008)

AFT Resolutions

PROFESSIONAL COMPENSATION FOR TEACHERS

As we begin the 21st century, well-prepared, highly qualified teachers are essential if we are to ensure that all students achieve the high standards necessary for them to lead fulfilling lives and become productive citizens. In today's competitive marketplace, it is increasingly difficult to attract and retain the best teachers; to accomplish this, we must guarantee a salary commensurate with their education, experience and the challenging and complex tasks they perform.

We need a compensation system for teachers that has a competitive base pay and benefits for all, and, when possible, forged through cooperative labor-management relations that include multiple opportunities for teachers to advance along the salary scale in addition to seniority and education level. Given the teacher shortage and the need for highly skilled teachers who can deliver standards-based instruction resulting in improved student achievement levels, the AFT believes we must enhance the traditional compensation schedule using approaches that contribute to more effective teaching and learning.

We are not alone in our interest in improving teacher quality by enhancing existing compensation structures. School boards, administrators, state legislators, governors and business groups are proposing various strategies to promote teacher quality, several of which include recommendations on how teachers should be compensated.

The AFT has long believed that professional pay is an integral part of an educational system that promotes teacher quality. The late Albert Shanker, former AFT president, had a vision that school systems must move beyond the "rigid hierarchy" of the traditional salary schedule and compensate teachers as other professionals in our society are compensated, when he remarked:

> If we are to achieve professionalism, we have ... to develop new processes, new institutions, new procedures that will bring us what teachers want in addition to what we get from collective bargaining status, dignity, a voice in professional matters, the compensation of a professional.[1]

It is clear, then, that AFT must take the lead in engaging our members and the public in a discussion of teacher compensation issues. Indeed:

- Teacher quality is uppermost on the reform agenda. Study after study has documented the important relationship of teacher quality to student achievement. A survey conducted by Recruiting New Teachers found that the public is aware that higher teacher salaries are critical to increased quality, and they are willing to pay more for quality teachers.
- Teachers are significantly underpaid, and the public knows it. The profession lacks a competitive edge in the wider job market. According to *Education Week*'s "Quality Counts 2000," beginning teachers are paid on average almost $8,000 less than graduates with comparable education, and that gap widens to more than $23,000 after 15 years of teaching.
- The United States is experiencing a significant shortage of qualified teachers. Over the next 10 years, more than 2 million teachers must be hired to meet the demand for teachers caused by rising student enrollments and teacher retirements. At the same time, surveys have shown that fewer college students are interested in pursuing teaching as a career. Although some professionals unsatisfied with their jobs have moved into teaching, the majority of second-career seekers reject teaching for its low pay and tough working conditions.
- New state policies and local contract negotiations regarding professional compensation for teachers have looked at additional approaches to increasing teacher salaries. These policies include various forms of "pay for performance," including individual and group incentives, pay for knowledge and skills, and recruitment incentives such as loan forgiveness and low-interest housing loans.

In keeping with Shanker's vision, the AFT believes that the union should achieve professional compensation not by eliminating the traditional salary schedule but, instead, by considering ways to enhance and improve it. The AFT believes it is time to explore viable, fair and educationally sound teacher compensation options that will raise salaries while contributing to efforts already under way to assure high-quality, well-prepared teachers for all students. Current AFT policy on teacher compensation supports the following:

- endorsing additional compensation to teachers who earn advanced certification by passing the demanding, performance-based assessments of the National Board for Professional Teaching Standards (NBPTS);
- placing new teachers in shortage fields (e.g., math and science) further up on the salary schedule; and
- paying teachers for mentoring, peer support and other professional development activities.

Furthermore, AFT affiliates have implemented additional pay options such as:

Pay for additional roles: Several affiliates--Boston, Cincinnati, Dade County, Fla., Minneapolis, Philadelphia, Pittsburgh, Rochester, N.Y., and Toledo, Ohio, to name a few--offer financial incentives to teachers who take on different roles and responsibilities. In Rochester, N.Y., the long-standing "Career in Teaching" program offers a progression of job responsibilities and opportunities for professional growth throughout one's teaching career and offers financial incentives to the top two levels of the four-level program.

Pay for National Board Certification: Numerous districts with AFT affiliates offer fee support and/or salary supplements to teachers seeking and/or achieving National Board Certification. As of October 2000, 17 had fee supports and salary supplements, eight had fee supports only, and 21 had salary supplements only. In Minneapolis, teachers with National Board Certification qualify for the next lane on the salary schedule. Those already in the final lane of the salary schedule receive an additional $1,500 per year.

Pay for schoolwide improvements: Several affiliates--Cincinnati, Rochester, N.Y., Boson, Minneapolis and Douglas County, Colo.--have developed schoolwide incentives to encourage teacher collaboration on improving student growth. In Douglas County, teachers set a goal, construct a plan for achieving that goal and submit a final report on the effects. A Group Incentives Board determines whether to award a bonus. In New York City, the United Federation of Teachers is experimenting with its Chamber of Commerce and school district on a plan, "Breakthrough for Learning," that provides professional development and awards bonuses to all staff in schools that reach predetermined targets for student achievement.

Pay for knowledge and skills: A few AFT affiliates--most notably Cincinnati and Douglas County, Colo.--have developed innovative knowledge- and skill-based pay systems.

Where We Are: The Traditional Salary Scale
Despite the innovations described above, today, and for the greater part of the last century, most teachers across America have been paid according to a salary schedule that awards compensation to teachers based almost exclusively on levels of education and years of experience. This system was originally created to accommodate an industrial model of education where teaching was perceived as requiring low-level skills. Teachers were perceived as "interchangeable parts," each doing the same thing in isolation of their colleagues and under the watchful eyes of supervisors.

The traditional salary schedule was developed in response to discriminatory practices and to ensure fairness in the system. Implemented prior to collective bargaining, the current teacher salary system was designed to eliminate differential pay based on gender, race or educational level of students taught (elementary, middle or secondary). The current system rewards teachers with more experience and those who had attained "greater knowledge," as demonstrated by their earning additional college credits and degrees. In the absence of more proximate measures of teacher quality, this approach has a commonsense validity—the more you know about teaching and the longer you do it, the better you should be at it. And, this traditional salary schedule is easy to understand and administer, predictable and perceived as objective by teachers.

Nonetheless, the traditional salary schedule has several limitations. It has not produced salaries for teachers that are competitive in the current job market given their education, nor does it reflect the complexity of the work they do. In many salary schedules, it takes a very long time to reach the top of the schedule, which undermines teacher recruitment and retention efforts. As typically implemented, the traditional salary schedule does not reward additional skills and knowledge that benefit children (e.g., licensure in multiple fields), exemplary practice (e.g., attainment of National Board Certification) or extraordinary circumstances (e.g., teaching in hard-to-staff schools). It does not respond to market forces (e.g., shortages in particular teaching fields such as science, math and special education), nor does it provide incentives for teachers to assume differentiated roles (e.g., mentor, lead teacher, curriculum developer). Finally, it fails to provide incentives for teachers to acquire skills and knowledge needed to deliver standards-based instruction.

Failed Merit Pay Schemes
While the AFT is encouraging locals to explore various teacher compensation systems based on local conditions, it is not abandoning the traditional salary schedule. Failed attempts to implement differentiated pay options, like merit pay systems, identified a few teachers as "outstanding" and paid them extra, rewarding teachers on the basis of supervisory ratings or student test scores. Nevertheless, these schemes have failed. Why did they fail? Research and experience show that the merit pay schemes:

- were underfunded;
- used quotas for determining quality;
- had questionable or difficult-to-understand assessment procedures for evaluating teaching, resulting in perceptions that favoritism rather than merit was driving the system,
- were designed so that either you earned merit or you didn't--there were no gradations of merit, only "winners" and "losers";
- gave rewards to teachers in the wealthiest schools more often than to those teaching the neediest students;
- did not improve student performance and were unconnected to outcomes; and
- created teacher morale problems stemming from the creation of unfair competition in a profession where cooperation and collaboration are valued.

Professional Compensation: The Requirements
Teacher compensation should not be considered in isolation but instead must be considered as part of an educational system that includes curricula aligned with standards, continuous professional development for teachers and paraprofessionals, and the other necessary conditions and resources to support teaching and learning. Indeed, to achieve the goals of standards-based reform, address the teacher shortage, advance the teacher quality agenda and make teaching a true profession, teachers' careers must include:

- rigorous, in-depth preparation;
- clear, enforced standards and qualifications for licensure;
- access to mentoring and induction activities;
- ongoing, high-quality professional development for all teachers,
- teacher evaluation based on professional standards of best practice, and
- professional compensation systems, with opportunities for earning additional pay, that have the potential to attract new teachers and retain experienced ones.

The following conditions and resources should be incorporated into any professional compensation system if they are not already in place:

An adequate salary base for all teachers: The base salary of any teacher compensation system, including the entry level, must be competitive with the salaries of other professionals to assure an adequate supply of skilled, qualified teachers and the retention of those already in the profession. Moreover, any new teacher compensation initiatives must accompany sufficient salary increases for all teachers. Indeed, the public and policymakers have come to recognize that efforts to address the teacher shortage and improve teacher quality will require additional monies for teachers. This may require additional state and federal resources for localities whose tax base cannot support such salaries.

Sufficient funding: If teachers are going to seek out additional professional development opportunities, take on additional responsibilities or more difficult teaching assignments, or subject themselves to the rigorous National Board for Professional Teaching Standards evaluation process, there must be meaningful financial incentives to encourage teachers.

Credible, agreed-upon standards and measures of professional practice: Compensation proposals that reward teachers for their skills and abilities must be based on clear, agreed-upon standards designed by the profession. The evidence upon which those standards are judged must be apparent to all, and the roles of teachers and supervisors in the evaluation system must be clearly defined.

Clear steps to improving professional practice combined with the necessary supports: A viable teacher compensation system must include a well-developed and adequately funded professional development system, designed by the profession, to help teachers achieve the necessary skills and knowledge to improve teaching and learning.

Labor/management collaboration based on mutual trust and respect: Redesigning and implementing teacher compensation systems are labor/management responsibilities. No system will succeed if it is imposed on teachers by the district or the state. It must have credibility and the buy-in of teachers, and that can best be achieved through labor/management negotiations.

Incentives that are available to all eligible teachers: Any teacher compensation system must be fair and open to all teachers who meet the criteria for additional pay, without quotas or reductions in individual monetary amounts as more teachers qualify.

Easily understood standards and procedures for awarding teachers additional compensation: Clear and concise information about proposed teacher compensation systems must be provided to all teachers.
Compensation systems could include the following components and conditions:

Incentives that focus on the acquisition of knowledge and skills that support the goals of districts, schools and teachers: Financial systems must be in place to encourage teachers to acquire knowledge and skills in areas that are of importance to schools (e.g., earning a second credential in a shortage field, using technology in instruction, enhancing knowledge and skills related to teaching reading, learning a new, research-based program, etc.).

Multiple opportunities to increase teacher compensation and advancement: Teachers should be eligible to earn additional compensation in a variety of ways. Systems might be developed that compensate teachers for advanced skills (e.g., reward for achieving National Board Certification or meeting high standards of professional practice); for acquiring new knowledge and skills; for assuming additional responsibilities (e.g., peer assistance and review, providing professional development to colleagues, mentoring other teachers, serving on curriculum committees); for working in hard-to-staff schools; and for schoolwide efforts that result in noteworthy changes in student achievement, attendance, reduced dropout rates, parental involvement or other valued educational indicators.

Incentives for teachers who agree to teach in low-performing schools, hard-to-staff schools and/or shortage areas: Increased compensation is necessary to attract teachers to difficult assignments and shortage areas if we are to have qualified teachers in every classroom. Such financial incentives are not, however, the only solution. In addition to meaningful pay incentives, districts must be held accountable for making such schools safe and orderly, assuring that high-quality leadership is present and that ongoing professional support is available to all staff.

Multiple measures of student progress for schoolwide and/or group incentives: Teachers working together make a significant difference. Compensation systems with schoolwide rewards based on multiple measures of student outcomes (e.g., standardized test scores, student work, classroom assessments), as well as other indicators (e.g., attendance rates, dropout rates, disciplinary incidents and the like) might be considered. Such programs encourage the collegiality and support that promote student growth. Nonetheless, it is critical that any schoolwide or group incentives be developed jointly by management and labor; include credible, technically defensible indicators of student progress; and assure that determinations of student progress are based on improvement, not absolute scores, with comparisons based on similarly situated schools.

AFT Recommendations on Compensation for Teachers
The AFT encourages and will support local unions and/or state federations that choose to explore fair, flexible, labor/management-designed teacher compensation proposals that:

- provide adequate competitive base salaries, including entry-level pay
- encourage collegiality and improve professional practice and student learning.

While some districts and local unions have been moving in this direction for several years, others are just beginning to consider these issues. Depending on local circumstances and experiences with teacher compensation proposals, and mindful of the urgency of providing an adequate salary base to attract new teachers and retain qualified teachers in our profession and our schools, exploration might include increased professional compensation for:

- knowledge and skills that advance and/or address high-priority educational goals;
- schoolwide improvement;
- achieving National Board Certification;
- mentoring new and veteran teachers, providing peer assistance and review, serving as lead teachers, etc.;

- teaching in shortage areas;
- agreeing to teach in hard-to-staff and/or low-performing schools;
- assuming additional responsibilities; and
- instructional practice that meets mutually agreed-upon high-quality professional standards.

Teachers are the most basic educational resource communities provide to students. By assuring a competitive salary base and an enhanced salary schedule, together with rigorous preparation and licensure qualifications, mentoring and induction, on-going professional development and evaluation based on professional standards, all students can be afforded equal access to well-prepared, qualified teachers. Anything less denies students access to the quality education they deserve.

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[1] Albert Shanker. "The Making of a Profession," *American Educator*. Fall 1985.

(2002)

A Union of Professionals

AFT Resources

1. **After the Election: Making the Right Choices for Education and the Economy,** Randi Weingarten Speech at National Press Club , November 17, 2008
2. **Professional Compensation for Teachers,** AFT Resolution
3. **Peer Assistance and Review for New Teachers: Taking Charge of Our Profession,** AFT Resolution
4. **Meeting the Challenge: Recruiting and Retaining Teachers in Hard-to-Staff Schools,** AFT
5. **AFT Innovation Fund: Overview for AFT Leaders**
6. **Investing In A Well-Qualified Teacher in Every Classroom,** AFT
7. **Community Schools,** AFT
8. **More High-Quality Choices for Students: New Schools and Redesigned Low-Performing Schools,** AFT
9. **Charter Schools,** AFT
10. **Where We Stand: Early Childhood Education & Fact Sheet,** AFT
11. **"A Measured Approach: Value-Added Models Are a Promising Improvement, but No One Measure Can Evaluate Teacher Performance,"** AFT American Educator
12. **"Taking the Lead: With Peer Assistance and Review, the Teaching Profession Can Be in Teachers' Hands,"** AFT American Educator
13. **"Professional Development *Is* the Job,"** AFT American Educator
14. **"Critical Thinking: Why Is It So Hard to Teach?,"** AFT American Educator
15. **"Seeking Success with Students" & "Why New Teachers Leave …And Why New Teachers Stay,"** AFT American Educator
16. **"A Forced March for Failing Schools: Lessons from the New York City Chancellor's District,"** Education Policy Analysis Archives
17. **Learning, Working, Investing and Succeeding in America,** AFL-CIO Resolution
18. **Randi Weingarten Speech on Proposed New School Accountability System,** March 13, 2008
19. **Testimony of Randi Weingarten, President, American Federation of Teachers Before the House Committee on Ways and Means,** October 29, 2008
20. **Building Minds, Minding Buildings,** AFT

21. **Reversing Course: The Troubled State of Academic Staffing and a Path Forward,** AFT

22. **NCLB: Let's Get It Right – AFT's Recommendations for No Child Left Behind**

23. **"Teacher Attrition in Charter Schools,"** Education Policy Research Unit

24. **"A Better Bang of the Buck: The Economic Efficiencies of Defined Benefit Pension Plans,"** National Institute on Retirement Security

25. **"State Revenues Plummet: July-September Revenue Numbers Are Worst in Years,"** Center of Budget and Policy Priorities

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Professional Development *Is* the Job
By Anthony Alvarado

The standards movement presents us with enormous challenges, and they don't always take the form we expect. We all know that if standards are to succeed in raising student achievement, there will have to be a massive change in the way we do business. Most people tend to took at the change in terms of its impact on students: The kids will have to do more challenging and rigorous work, and they'll be held accountable for their success. But after we set these high and demanding standards and we have assessments that tell us our kids are not performing to the standards, we'll turn to one another and say, "Our kids were not jumping very high before, and now we expect them to jump higher. What makes us think we can get them to do that?"

There are a million theories operating in the United States of America about what it takes to educate a kid and why we do things the way we do. When the theory is that the teacher and the child--that dyad--is where the rubber meets the road, all roads lead to professional development. But in the new world of standards-based education and helping our students meet them, it is professional development of a kind that we have not previously experienced. In the past, it has been a fairly mundane and superficial matter of speakers and workshops, with here a new technique or procedure for classroom management and there an inspirational talk about diversity. The new professional development must be different and much more powerful, and it will involve solving problems and collaborating at levels that we have never even contemplated.

Teachers and administrators will have to think together about how to create conditions that allow, in fact ensure, that kids meet the demands of standards-based education. We will have to change practice, and to do that we need a theory of action. I have a very simple one: We want children to perform at much higher levels, and that will happen as a result of an interaction with teachers. Therefore, what teachers do will have to be different and much more powerful. We will have to find ways of getting deeply into the specifics of how to help students master subject matter. And we will have to create contexts that support changes in thinking and pedagogy on the part of teachers. The standards movement is, first and foremost, a challenge to the adults because it is what they do that will determine the quality of the work the kids do.

Deciding About the Cow

A little while ago, my office got a call from a representative of a dairy association. This was the message that was left on the answering machine:

> Every eight years, we bring a cow into the San Diego elementary schools, and because of the needs of the cow, it has to come in the morning. We are hearing that, because you have a morning literacy bloc, the cow is being denied entrance into the schools. We think this is a fabulous program. Will you call the schools to let the cow in?

experiences, to knowledge, to skill that can give them the power to get every kid not merely to understand the criteria but to meet them. That is a daunting task; the expectation for teachers is as sophisticated and complex as the Manhattan Project was for the scientists who participated in it. Do we understand when we talk about standards-based education what we're really asking a system to do? This is tough, demanding work, and it requires a kind of professional development that is of a different order from any we've seen before.

Learning from a Master

What would professional development look like in this new world order of standards-based education? Here are some snapshots, but the truth is they are merely suggestions because everything has to be based on what goes on in particular schools, and no two schools are alike. So schools have to invent their own versions because working on standards, above anything else, is intellectual work; it means thinking, solving problems, gaining knowledge, and applying it in situations so that one can create a new situation.

One component of the new professional development would certainly be encouraging teachers to visit one another's classes. We all know that, now, our classrooms are separate units and teachers are essentially isolated from one another. If we are to do standards-based education in a meaningful way, we must move private practice into the public sphere. In a school where classrooms are open, teachers will be talking to one another and in each other's classrooms, frequently and with a purpose. This isn't social visitation: I am going into the second-grade classroom because I am looking at "writers' workshops," and I want to find out how this master teacher uses them to link reading and writing in this grade. When I understand, I don't just take my knowledge and go back to my classroom. I have a responsibility to spread what I've learned to the rest of the faculty. And I need to do it quickly--in weeks, not months or years.

The cycles of change in our schools are very slow. We decide to try out a new little idea in September, and we're going to check in June to see how well it's working. Well, you know what schools are like in June. So maybe we say, "Wait until September," and by then a year has passed. (And maybe we never bother to check.) We have to develop a sense of urgency, to speed up the pace, or we'll all be 110 and Godot will have arrived before we get change in the schools. Or, more likely, we will lose the franchise in the meantime.

What this means in practical terms is that the teachers who visit the writers'-workshop master take her ideas and try them out. The master teacher answers their questions and goes into their classrooms to help them make the idea work. Then, they make a presentation to the full faculty. In six weeks, a school working like this can get writers' workshops up to the highest quality of practice.

And this kind of activity doesn't stop because we think we've gotten there. The underlying vision for professional development is that it is continuous, and that it is for everybody. The best people in the United States of America in any profession are the people who work hardest at improving their practice. Jerry Rice of the San Francisco 49ers is a great pass receiver, but he doesn't say, "I'm the best receiver in pro football today, so I don't have to work at it." No. He says, "In order for someone who does great work to get a little better, that guy has to work ten times harder." If you run a mile in eight hours, it doesn't take much to run it in seven hours and fifty-nine minutes. But if you run it in three-and-half minutes, each one of the seconds you knock off is a killer. You may strain a year to do it. That's the kind of attitude and approach to growth--the culture of growth--that has to be present in schools.

So, continuous visitation is one way of stimulating the professional growth I'm talking about. When I was superintendent in New York City's District 2, almost a quarter of our professional development budget always went right there: Teachers went singly or in pairs to visit other teachers in their school and they went to visit classes in other schools. We thought at the beginning that one round of visitations within a school would be the classroom? The PTA president's daughter is in her class." This attitude is understandable, but it loses sight of the goal, which is to raise all boats, rather than create isolated Masters.

There are many other ways to create professional development based on the idea of continuous improvement; they will vary with individual schools or districts. For example, in District 2, we sat down with the union and created the Distinguished Teacher Program, a variant of the master teacher idea. The idea was to identify an outstanding teacher and assign him or her as a consultant--or visiting expert--to a struggling school. In the case I'm thinking of, the distinguished teacher co-taught the literacy bloc with other teachers for part of the day and then spent the rest working individually with other teachers. The results were dramatic. In one year, the school moved from having only 27 percent of its students meet the state reading standard to 70 percent.

Are cadres of National Board certified teachers part of this story? They could be, but our efforts in that direction are still minuscule. If we're serious about making them part of the continuous professional development I'm talking about, somebody has to get moving. I hear, "Oh, I have eight National Board certified teachers" (in a system of 150,000 kids). Or "Oh, I have ten National Board certified teachers." Unless we step up the pace, Godot's *son* will have arrived before board certification has had an impact. Again, the issue is not, "Is this a good idea?" It is, "Will this work in my school?" and "How quickly?"

A New Brand of Collaboration

The professional development I've been talking about rests on money and on time. Unless teachers can visit classes in their school (and other schools), unless they can be coached and coach, there is little possibility of affecting practice in this way. It also rests on collaboration. The basic collaboration is the one between a teacher and a master teacher or coach. It is about the practice of a particular person, and it cannot be figured out in the central office or legislated by a school-based council. Ideas and frameworks for what might be done can come from lots of places, and the process can be jointly developed. But the kinds of changes I'm talking about have to be worked out where the teaching takes place--in a particular teacher's classroom.

But inventing and refining practice in one or two classrooms is not enough; invention has to go on throughout a school or school district, and to achieve that, we need collaboration among all the levels of the school or district. For example, we need a new kind of collaboration between teachers and principals-indeed, we need a new role for principals. Since professional development, as I am describing it, is not something that happens at certain times and places, the principal has to be involved, on a day-to-day basis, in making the new professional development work: scheduling, arranging, facilitating, monitoring. Instead of being a very occasional classroom visitor and the person in charge of discipline and keeping the physical plant running, the principal must now be as vitally engaged in teachers' ongoing professional development as teachers are themselves.

We will also need a new kind of labor-management pact that is geared to the intellectual expectations of standards-based education and this view of professional development. School boards and administrators on the one hand and teacher unions on the other have been struggling for a long time to collaborate over contractual and management issues, and we've been making progress; we're growing up. But the issues we've previously squabbled over are trivial compared to the ones we face now. This is no longer about who said what or how the third item in a checklist for classroom evaluations should be worded or even about a policy for hiring and transferring teachers--important though that is. These issues will not even get us into the ballpark of standards-based education, with the professional development we need to make it work. But we don't have any choice; we have to put our heads together; even though there is going to be tension and debate about how we do it.

The necessity of speeding up the pace of change will intensify some of the tensions we'll

Critical Thinking

Why Is It So Hard to Teach?

By Daniel T. Willingham

Virtually everyone would agree that a primary, yet insufficiently met, goal of schooling is to enable students to think critically. In layperson's terms, critical thinking consists of seeing both sides of an issue, being open to new evidence that disconfirms your ideas, reasoning dispassionately, demanding that claims be backed by evidence, deducing and inferring conclusions from available facts, solving problems, and so forth. Then too, there are specific types of critical thinking that are characteristic of different subject matter: That's what we mean when we refer to "thinking like a scientist" or "thinking like a historian."

This proper and commonsensical goal has very often been translated into calls to teach "critical thinking skills" and "higher-order thinking skills"—and into generic calls for teaching students to make better judgments, reason more logically, and so forth. In a recent survey of human resource officials[1] and in testimony delivered just a few months ago before the Senate Finance Committee,[2] business leaders have repeatedly exhorted schools to do a better job of teaching students to think critically. And they are not alone. Organizations and initiatives involved in education reform, such as the National Center on Education and the Economy, the American Diploma Project, and the Aspen Institute, have pointed out the need for students to think and/or reason critically. The College Board recently revamped the SAT to better assess students' critical thinking. And ACT, Inc. offers a test of critical thinking for college students.

These calls are not new. In 1983, *A Nation At Risk*, a report by the National Commission on Excellence in Education, found that many 17-year-olds did not possess the "'higher-order' intellectual skills" this country needed. It claimed that nearly 40 percent could not draw inferences from written material and only one-fifth could write a persuasive essay.

Following the release of *A Nation At Risk*, programs designed to teach students to think critically across the curriculum became extremely popular. By 1990, most states had initiatives designed to encourage educators to teach critical thinking, and one of the most widely used programs, Tactics for Thinking, sold 70,000 teacher guides.[3] But, for reasons I'll explain, the programs were not very effective—and today we still lament students' lack of critical thinking.

After more than 20 years of lamentation, exhortation, and little improvement, maybe it's time to ask a fundamental question: Can critical thinking actually be taught? Decades of cognitive research point to a disappointing answer: not really. People who have sought to teach critical thinking have assumed that it is a skill, like riding a bicycle, and that, like other skills, once you learn it, you can apply it in any situation. Research from cognitive science shows that thinking is not that sort of skill. The processes of thinking are intertwined with the content of thought (that is, domain knowledge). Thus, if you remind a student to "look at an issue from multiple perspectives" often enough, he will learn that he ought to do so, but if he doesn't know much about

Daniel T. Willingham is professor of cognitive psychology at the University of Virginia and author of Cognition: The Thinking Animal *as well as over 50 articles. With Barbara Spellman, he edited* Current Directions in Cognitive Science. *He regularly contributes to* American Educator *by writing the "Ask the Cognitive Scientist" column. His research focuses on the role of consciousness in learning.*

Illustrated by Nenad Jakesevic and Sonja Lamut

Critical thinking is not a set of skills that can be deployed at any time, in any context. It is a type of thought that even 3-year-olds can engage in—and even trained scientists can fail in.

an issue, he *can't* think about it from multiple perspectives. You can teach students maxims about how they ought to think, but without background knowledge and practice, they probably will not be able to implement the advice they memorize. Just as it makes no sense to try to teach factual content without giving students opportunities to practice using it, it also makes no sense to try to teach critical thinking devoid of factual content.

In this article, I will describe the nature of critical thinking, explain why it is so hard to do and to teach, and explore how students acquire a specific type of critical thinking: thinking scientifically. Along the way, we'll see that critical thinking is not a set of skills that can be deployed at any time, in any context. It is a type of thought that even 3-year-olds can engage in—and even trained scientists can fail in. And it is very much dependent on domain knowledge and practice.

Why Is Thinking Critically So Hard?

Educators have long noted that school attendance and even academic success are no guarantee that a student will graduate an effective thinker in all situations. There is an odd tendency for rigorous thinking to cling to particular examples or types of problems. Thus, a student may have learned to estimate the answer to a math problem before beginning calculations as a way of checking the accuracy of his answer, but in the chemistry lab, the same student calculates the components of a compound without noticing that his estimates sum to more than 100 percent. And a student who has learned to thoughtfully discuss the causes of the American Revolution from both the British and American perspectives doesn't even think to question how the Germans viewed World War II. Why are students able to think critically in one situation, but not in another? The brief answer is: Thought processes are intertwined with what is being thought about. Let's explore this in depth by looking at a particular kind of critical thinking that has been studied extensively: problem solving.

Imagine a seventh-grade math class immersed in word problems. How is it that students will be able to answer one problem, but not the next, even though mathematically both word problems are the same, that is, they rely on the same mathematical knowledge? Typically, the students are focusing on the scenario that the word problem describes (its surface structure) instead of on the mathematics required to solve it (its deep structure). So even though students have been taught how to solve a particular type of word problem, when the teacher or textbook changes the scenario, students still struggle to apply the solution because they don't recognize that the problems are mathematically the same.

Thinking Tends to Focus on a Problem's "Surface Structure"

To understand why the surface structure of a problem is so distracting and, as a result, why it's so hard to apply familiar solutions to problems that appear new, let's first consider how you understand what's being asked when you are given a problem. Anything you hear or read is automatically interpreted in light of what you already know about similar subjects. For example, suppose you read these two sentences: "After years of pressure from the film and television industry, the President has filed a formal complaint with China over what U.S. firms say is copyright infringement. These firms assert that the Chinese government sets stringent trade restrictions for U.S. entertainment products, even as it turns a blind eye to Chinese companies that copy American movies and television shows and sell them on the black market." Background knowledge not only allows you to comprehend the sentences, it also has a powerful effect as you continue to read because it narrows the interpretations of new text that you will entertain. For example, if you later read the word "Bush," it would not make you think of a small shrub, nor would you wonder whether it referred to the former President Bush, the rock band, or a term for rural hinterlands. If you read "piracy," you would not think of eye-patched swabbies shouting "shiver me timbers!" The cognitive system gambles that incoming information will be related to what you've just been thinking about. Thus, it significantly narrows the scope of possible interpretations of words, sentences, and ideas. The benefit is that comprehension proceeds faster and more smoothly; the cost is that the deep structure of a problem is harder to recognize.

The narrowing of ideas that occurs while you read (or

How Do Cognitive Scientists Define Critical Thinking?

From the cognitive scientist's point of view, the mental activities that are typically called critical thinking are actually a subset of three types of thinking: reasoning, making judgments and decisions, and problem solving. I say that critical thinking is a subset of these because we think in these ways all the time, but only sometimes in a critical way. Deciding to read this article, for example, is not critical thinking. But carefully weighing the evidence it presents in order to decide whether or not to believe what it says is. *Critical* reasoning, decision making, and problem solving—which, for brevity's sake, I will refer to as critical thinking—have three key features: effectiveness, novelty, and self-direction. Critical thinking is effective in that it avoids common pitfalls, such as seeing only one side of an issue, discounting new evidence that disconfirms your ideas, reasoning from passion rather than logic, failing to support statements with evidence, and so on. Critical thinking is novel in that you don't simply remember a solution or a situation that is similar enough to guide you. For example, solving a complex but familiar physics problem by applying a multi-step algorithm isn't critical thinking because you are really drawing on memory to solve the problem. But devising a new algorithm is critical thinking. Critical thinking is self-directed in that the thinker must be calling the shots: We wouldn't give a student much credit for critical thinking if the teacher were prompting each step he took.

—D.W.

listen) means that you tend to focus on the surface structure, rather than on the underlying structure of the problem. For example, in one experiment,[4] subjects saw a problem like this one:

> Members of the West High School Band were hard at work practicing for the annual Homecoming Parade. First they tried marching in rows of 12, but Andrew was left by himself to bring up the rear. Then the director told the band members to march in columns of eight, but Andrew was still left to march alone. Even when the band marched in rows of three, Andrew was left out. Finally, in exasperation, Andrew told the band director that they should march in rows of five in order to have all the rows filled. He was right. Given that there were at least 45 musicians on the field but fewer than 200 musicians, how many students were there in the West High School Band?

Earlier in the experiment, subjects had read four problems along with detailed explanations of how to solve each one, ostensibly to rate them for the clarity of the writing. One of the four problems concerned the number of vegetables to buy for a garden, and it relied on the same type of solution necessary for the band problem—calculation of the least common multiple. Yet, few subjects—just 19 percent—saw that the band problem was similar and that they could use the garden problem solution. Why?

When a student reads a word problem, her mind interprets the problem in light of her prior knowledge, as happened when you read the two sentences about copyrights and China. The difficulty is that the knowledge that seems relevant relates to the surface structure—in this problem, the reader dredges up knowledge about bands, high school, musicians, and so forth. The student is unlikely to read the problem and think of it in terms of its deep structure—using the least common multiple. The surface structure of the problem is overt, but the deep structure of the problem is not. Thus, people fail to use the first problem to help them solve the second: In their minds, the first was about vegetables in a garden and the second was about rows of band marchers.

With Deep Knowledge, Thinking Can Penetrate Beyond Surface Structure

If knowledge of how to solve a problem never transferred to problems with new surface structures, schooling would be inefficient or even futile—but of course, such transfer does occur. When and why is complex,[5] but two factors are especially relevant for educators: familiarity with a problem's deep structure and the knowledge that one should look for a deep structure. I'll address each in turn.

When one is very familiar with a problem's deep-structure, knowledge about how to solve it transfers well. That familiarity can come from long-term, repeated experience with one problem, or with various manifestations of one type of problem (i.e., many problems that have different surface structures, but the same deep structure). After repeated exposure to either or both, the subject simply perceives the deep structure as part of the problem description. Here's an example:

> A treasure hunter is going to explore a cave up on a hill near a beach. He suspected there might be many paths inside the cave so he was afraid he might get lost. Obviously, he did not have a map of the cave; all he had with him were some common items such as a flashlight and a bag. What could he do to make sure he did not get lost trying to get back out of the cave later?

The solution is to carry some sand with you in the bag, and leave a trail as you go, so you can trace your path back when you're ready to leave the cave. About 75 percent of American college students thought of this solution—but only 25 percent of Chinese students solved it.[6] The experimenters suggested that Americans solved it because most grew up hearing the story of Hansel and Gretel, which includes the idea of leaving a trail as you travel to an unknown place in order to find your way back. The experimenters also gave subjects another puzzle based on a common Chinese folk tale, and the percentage of solvers from each culture reversed. (To read the puzzle based on the Chinese folk tale, and the tale itself, go to **www.aft.org/pubs-reports/american_educator/index.htm.**)

It takes a good deal of practice with a problem type before students know it well enough to immediately recognize its deep structure, irrespective of the surface structure, as Americans did for the Hansel and Gretel problem. American subjects didn't think of the problem in terms of sand, caves, and treasure; they thought of it in terms of finding something with which to leave a trail. The deep structure of the problem is so well represented in their memory, that they immediately saw that structure when they read the problem.

Looking for a Deep Structure Helps, but It Only Takes You So Far

Now let's turn to the second factor that aids in transfer despite distracting differences in surface structure—knowing to look for a deep structure. Consider what would happen if I said to a student working on the band problem, "this one is similar to the garden problem." The student would understand that the problems must share a deep structure and would try to figure out what it is. Students can do something similar without the hint. A student might think "I'm seeing this problem in a math class, so there must be a math formula that will solve this problem." Then he could scan his memory (or textbook) for candidates, and see if one of them helps. This is an example of what psychologists call metacognition, or regulating one's thoughts. In the introduction, I mentioned that you can teach students maxims about how they ought to think.

Critical Thinking Programs: Lots of Time, Modest Benefit

Since the ability to think critically is a primary goal of education, it's no surprise that people have tried to develop programs that could directly teach students to think critically without immersing them in any particular academic content. But the evidence shows that such programs primarily improve students' thinking with the sort of problems they practiced in the program—not with other types of problems. More generally, it's doubtful that a program that effectively teaches students to think critically in a variety of situations will ever be developed.

As the main article explains, the ability to think critically depends on having adequate content knowledge; you can't think critically about topics you know little about or solve problems that you don't know well enough to recognize and execute the type of solutions they call for.

Nonetheless, these programs do help us better understand what can be taught, so they are worth reviewing briefly.

A large number of programs[1] designed to make students better thinkers are available, and they have some features in common. They are premised on the idea that there is a set of critical thinking skills that can be applied and practiced across content domains. They are designed to supplement regular curricula, not to replace them, and so they are not tied to particular content areas such as language arts, science, or social studies. Many programs are intended to last about three years, with several hours of instruction (delivered in one or two lessons) per week. The programs vary in how they deliver this instruction and practice. Some use abstract problems such as finding patterns in meaningless figures (Reuven Feuerstein's Instrumental Enrichment), some use mystery stories (Martin Covington's Productive Thinking), some use group discussion of interesting problems that one might encounter in daily life (Edward de Bono's Cognitive Research Trust, or CoRT), and so on. However it is implemented, each program introduces students to examples of critical thinking and then requires that the students practice such thinking themselves.

How well do these programs work? Many researchers have tried to answer that question, but their studies tend to have methodological problems.[2] Four limitations of these studies are especially typical, and they make any effects suspect: 1) students are evaluated just once after the program, so it's not known whether any observed effects are enduring; 2) there is not a control group, leaving it unclear whether gains are due to the thinking program, to other aspects of schooling, or to experiences outside the classroom; 3) the control group does not have a comparison intervention, so any positive effects found may be due, for example, to the teacher's enthusiasm for something new, not the program itself; and 4) there is no measure of whether or not students can transfer their new thinking ability to materials that differ from those used in the program. In addition, only a small fraction of the studies have undergone peer review (meaning that they have been impartially evaluated by independent experts). Peer review is crucial because it is known that researchers unconsciously bias the design and analysis of their research to favor the conclusions they hope to see.[3]

Cognitive scientists refer to these maxims as metacognitive strategies. They are little chunks of knowledge—like "look for a problem's deep structure" or "consider both sides of an issue"—that students can learn and then use to steer their thoughts in more productive directions.

Helping students become better at regulating their thoughts was one of the goals of the critical thinking programs that were popular 20 years ago. As the sidebar below explains, these programs are not very effective. Their modest benefit is likely due to teaching students to effectively use metacognitive strategies. Students learn to avoid biases that most of us are prey to when we think, such as settling on the first conclusion that seems reasonable, only seeking evidence that confirms one's beliefs, ignoring countervailing evidence, overconfidence, and others.[7] Thus, a student who has been encouraged many times to see both sides of an issue, for example, is probably more likely to spontaneously think "I should look at both sides of this issue" when working on a problem.

Unfortunately, metacognitive strategies can only take you so far. Although they suggest what you ought to do, they don't provide the knowledge necessary to implement the strategy. For example, when experimenters told subjects working on the band problem that it was similar to the garden problem, more subjects solved the problem (35 percent compared to 19 percent without the hint), but most subjects, even when told what to do, weren't able to do it. Likewise, you may know that you ought not accept the first reasonable-sounding solution to a problem, but that doesn't mean you know how to come up with alterative solutions or weigh how reasonable each one is. That requires domain knowledge and practice in putting that knowledge to work.

Since critical thinking relies so heavily on domain

Studies of the Philosophy for Children program may be taken as typical. Two researchers[4] identified eight studies that evaluated academic outcomes and met minimal research-design criteria. (Of these eight, only one had been subjected to peer review.) Still, they concluded that three of the eight had identifiable problems that clouded the researchers' conclusions. Among the remaining five studies, three measured reading ability, and one of these reported a significant gain. Three studies measured reasoning ability, and two reported significant gains. And, two studies took more impressionistic measures of student's participation in class (e.g., generating ideas, providing reasons), and both reported a positive effect.

Despite the difficulties and general lack of rigor in evaluation, most researchers reviewing the literature conclude that some critical thinking programs do have some positive effect.[5] But these reviewers offer two important caveats. First, as with almost any educational endeavor, the success of the program depends on the skill of the teacher. Second, thinking programs look good when the outcome measure is quite similar to the material in the program. As one tests for transfer to more and more dissimilar material, the apparent effectiveness of the program rapidly drops.

> Knowing that one should think critically is not the same as being able to do so. That requires domain knowledge and practice.

Both the conclusion and the caveats make sense from the cognitive scientist's point of view. It is not surprising that the success of the program depends on the skill of the teacher. The developers of the programs cannot anticipate all of the ideas—right or wrong—that students will generate as they practice thinking critically, so it is up to the teacher to provide the all-important feedback to the students.

It is also reasonable that the programs should lead to gains in abilities that are measured with materials similar to those used in the program. The programs that include puzzles like those found on IQ tests, for instance, report gains in IQ scores. In an earlier column,* I described a bedrock principle of memory: You remember what you think about. The same goes for critical thinking: You learn to think critically in the ways in which you practice thinking critically. If you practice logic puzzles with an effective teacher, you are likely to get better at solving logic puzzles. But substantial improvement requires a great deal of practice. Unfortunately, because critical thinking curricula include many different types of problems, students typically don't get enough practice with any one type of problem. As explained in the main article, the modest benefits that these programs seem to produce are likely due to teaching students metacognitive strategies—like "look at both sides of an issue"—that cue them to try to think critically. But knowing that one should think critically is not the same as being able to do so. That requires domain knowledge and practice.

—D.W.

*See "Students Remember ... What They Think About" in the Summer 2003 issue of *American Educator*; online at **www.aft.org/pubs-reports/american_educator/summer2003/cogsci.html**.

(Endnotes on page 19)

Teaching students to think critically probably lies in large part in enabling them to deploy the right type of thinking at the right time.

knowledge, educators may wonder if thinking critically in a particular domain is easier to learn. The quick answer is yes, it's a *little* easier. To understand why, let's focus on one domain, science, and examine the development of scientific thinking.

Is Thinking Like a Scientist Easier?

Teaching science has been the focus of intensive study for decades, and the research can be usefully categorized into two strands. The first examines how children acquire scientific concepts; for example, how they come to forgo naive conceptions of motion and replace them with an understanding of physics. The second strand is what we would call thinking scientifically, that is, the mental procedures by which science is conducted: developing a model, deriving a hypothesis from the model, designing an experiment to test the hypothesis, gathering data from the experiment, interpreting the data in light of the model, and so forth.† Most researchers believe that scientific thinking is really a subset of reasoning that is not different in kind from other types of reasoning that children and adults do.[8] What makes it *scientific* thinking is knowing when to engage in such reasoning, and having accumulated enough relevant knowledge and spent enough time practicing to do so.

Recognizing *when* to engage in scientific reasoning is so important because the evidence shows that being able to reason is not enough; children and adults use *and* fail to use the proper reasoning processes on problems that seem similar. For example, consider a type of reasoning about cause and effect that is very important in science: conditional probabilities. If two things go together, it's possible that one causes the other. Suppose you start a new medicine and notice that you seem to be getting headaches more often than usual. You would infer that the medication influenced your chances of getting a headache. But it could also be that the medication increases your chances of getting a headache only in certain circumstances or conditions. In conditional probability, the relationship between two things (e.g., medication and headaches) is dependent on a third factor. For example, the medication might increase the probability of a headache *only* when you've had a cup of coffee. The relationship of the medication and headaches is conditional on the presence of coffee.

Understanding and using conditional probabilities is essential to scientific thinking because it is so important in reasoning about what causes what. But people's success in thinking this way depends on the particulars of how the question is presented. Studies show that adults sometimes use conditional probabilities successfully,[9] but fail to do so with many problems that call for it.[10] Even trained scientists are open to pitfalls in reasoning about conditional probabilities (as well as other types of reasoning). Physicians are known to discount or misinterpret new patient data that conflict with a diagnosis they have in mind,[11] and Ph.D.-level scientists are prey to faulty reasoning when faced with a problem embedded in an unfamiliar context.[12]

And yet, young children are sometimes able to reason about conditional probabilities. In one experiment,[13] the researchers showed 3-year-olds a box and told them it was a "blicket detector" that would play music if a blicket were placed on top. The child then saw one of the two sequences shown below in which blocks are placed on the blicket detector. At the end of the sequence, the child was asked whether each block was a blicket. In other words, the child was to use conditional reasoning to infer which block caused the music to play.

Note that the relationship between each individual block (yellow cube and blue cylinder) and the music is the same in sequences 1 and 2. In either sequence, the child sees the yellow cube associated with music three times, and the blue cylinder associated with the absence of music once and the presence of music twice. What differs between the first and second sequence is the relationship between the blue and yellow blocks, and therefore, the conditional probability of each block being a blicket. Three-year-olds understood the importance of conditional probabilities.

† These two strands are the most often studied, but these two approaches—content and process of science—are incomplete. Underemphasized in U.S. classrooms are the many methods of scientific study, and the role of theories and models in advancing scientific thought.

‡ Although this is not highly relevant for K-12 teachers, it is important to note that for people with extensive training, such as Ph.D.-level scientists, critical thinking does have some skill-like characteristics. In particular, they are better able to deploy critical reasoning with a wide variety of content, even that with which they are not very familiar. But, of course, this does not mean that they will never make mistakes.

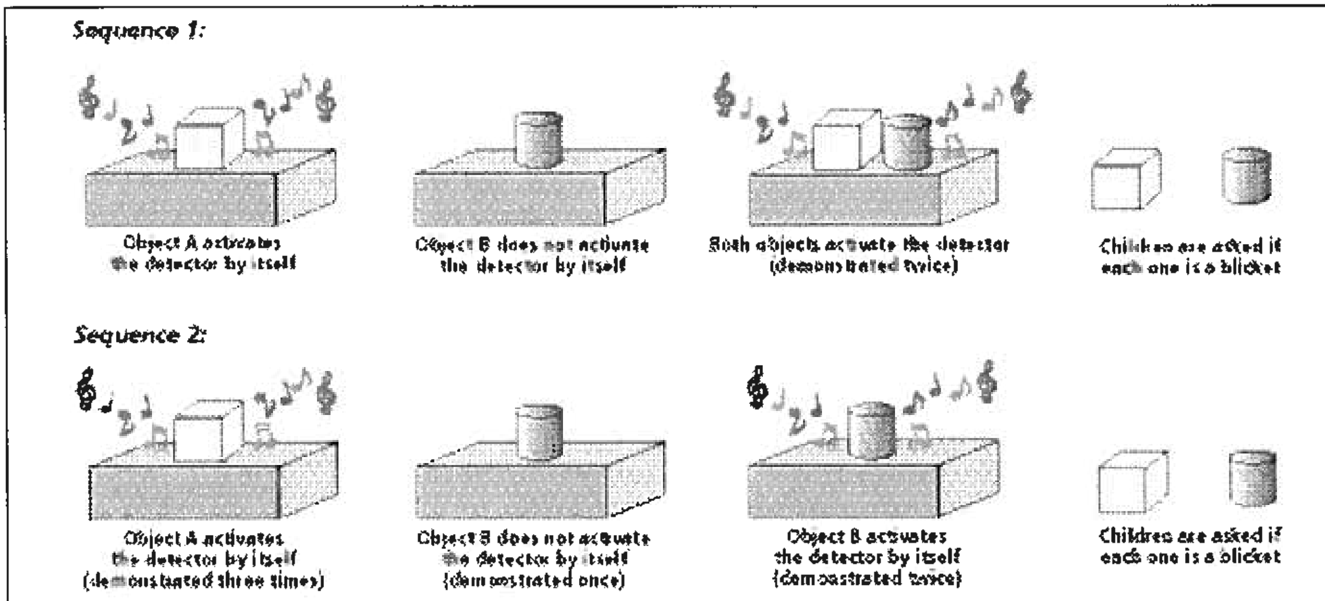
"Teaching content alone is not likely to lead to proficiency in science, nor is engaging in inquiry experiences devoid of meaningful science content."

—*National Research Council*

For sequence 1, they said the yellow cube was a blicket, but the blue cylinder was not; for sequence 2, they chose equally between the two blocks.

This body of studies has been summarized simply: Children are not as dumb as you might think, and adults (even trained scientists) are not as smart as you might think. What's going on? One issue is that the common conception of critical thinking or scientific thinking (or historical thinking) as a set of skills is not accurate. Critical thinking does not have certain characteristics normally associated with skills—in particular, being able to use that skill at any time. If I told you that I learned to read music, for example, you would expect, correctly, that I could use my new skill (i.e., read music) whenever I wanted. But critical thinking is very different. As we saw in the discussion of conditional probabilities, people can engage in some types of critical thinking without training, but even with extensive training, they will sometimes fail to think critically. This understanding that critical thinking is not a skill is vital.† It tells us that teaching students to think critically probably lies in small part in showing them new ways of thinking, and in large part in enabling them to deploy the right type of thinking at the right time.

Returning to our focus on science, we're ready to address a key question: Can students be taught when to engage in scientific thinking? Sort of. It is easier than trying to teach general critical thinking, but not as easy as we would like. Recall that when we were discussing problem solving, we found that students can learn metacognitive strategies that help them look past the surface structure of a problem and identify its deep structure, thereby getting them a step closer to figuring out a solution. Essentially the same thing can happen with scientific thinking. Students can learn certain metacognitive strategies that will cue them to think scientifically. But, as with problem solving, the metacognitive strategies only tell the students what they should do—they do not provide the knowledge that students need to actually do it. The good news is that within a content area like science, students have more context cues to help them figure out which metacognitive strategy to use, and teachers have a clearer idea of what



Source: Gopnik, A. and Schulz, L.E. (2004). "Mechanisms of theory formation in young children," *Trends in Cognitive Sciences, 8,* p 373, Elsevier.

domain knowledge they must teach to enable students to do what the strategy calls for.

For example, two researchers[14] taught second-, third-, and fourth-graders the scientific concept behind controlling variables; that is, of keeping everything in two comparison conditions the same, except for the one variable that is the focus of investigation. The experimenters gave explicit instruction about this strategy for conducting experiments and then had students practice with a set of materials (e.g., springs) to answer a specific question (e.g., which of these factors determine how far a spring will stretch: length, coil diameter, wire diameter, or weight?). The experimenters found that students not only understood the concept of controlling variables, they were able to apply it seven months later with different materials and a different experimenter, although the older children showed more robust transfer than the younger children. In this case, the students recognized that they were designing an experiment and that cued them to recall the metacognitive strategy, "When I design experiments, I should try to control variables." Of course, succeeding in controlling all of the relevant variables is another matter—that depends on knowing which variables may matter and how they could vary.

Why Scientific Thinking Depends on Scientific Knowledge

Experts in teaching science recommend that scientific reasoning be taught in the context of rich subject matter knowledge. A committee of prominent science educators brought together by the National Research Council[15] put it plainly: "Teaching content alone is not likely to lead to proficiency in science, nor is engaging in inquiry experiences devoid of meaningful science content."

The committee drew this conclusion based on evidence that background knowledge is necessary to engage in scientific thinking. For example, knowing that one needs a control group in an experiment is important. Like having two comparison conditions, having a control group in addition to an experimental group helps you focus on the variable you want to study. But knowing that you need a control group is not the same as being able to create one. Since it's not always possible to have two groups that are *exactly* alike, knowing which factors can vary between groups and which must not vary is one example of necessary background knowledge. In experiments measuring how quickly subjects can respond, for example, control groups must be matched for age, because age affects response speed, but they need not be perfectly matched for gender.

More formal experimental work verifies that background knowledge is necessary to reason scientifically. For example, consider devising a research hypothesis. One could generate multiple hypotheses for any given situation. Suppose you know that car A gets better gas mileage than car B and you'd like to know why. There are many differences between the cars, so which will you investigate first? Engine size? Tire pressure? A key determinant of the hypothesis you select is plausibility. You won't choose to investigate a difference between cars A and B that you think is unlikely to contribute to gas mileage (e.g., paint color), but if someone provides a reason to make this factor more plausible (e.g., the way your teenage son's driving habits changed after he painted his car red), you are more likely to say that this now-plausible factor should be investigated.[16] One's judgment about the plausibility of a factor being important is based on one's knowledge of the domain.

Other data indicate that familiarity with the domain makes it easier to juggle different factors simultaneously, which in turn allows you to construct experiments that simultaneously control for more factors. For example, in one experiment,[17] eighth-graders completed two tasks. In one, they were to manipulate conditions in a com-

Did Sherlock Holmes Take a Course in Critical Thinking?

No one better exemplifies the power of broad, deep knowledge in driving critical thinking than Sherlock Holmes. In his famous first encounter with Dr. Watson, Holmes greets him with this observation: "You have been in Afghanistan, I perceive." Watson is astonished—how could Holmes have known? Eventually Holmes explains his insight, which turns not on incredible intelligence or creativity or wild guessing, but on having relevant knowledge. Holmes is told that Watson is a doctor; everything else he deduces by drawing on his knowledge of, among other things, the military, geography, how injuries heal, and current events. Here's how Holmes explains his thought process:

> I knew you came from Afghanistan. From long habit the train of thoughts ran so swiftly through my mind, that I arrived at the conclusion without being conscious of intermediate steps. There were such steps, however. The train of reasoning ran, "Here is a gentleman of a medical type, but with the air of a military man. Clearly an army doctor, then. He has just come from the tropics, for his face is dark, and that is not the natural tint of his skin, for his wrists are fair. He has undergone hardship and sickness, as his haggard face says clearly. His left arm has been injured. He holds it in a stiff and unnatural manner. Where in the tropics could an English army doctor have seen much hardship and got his arm wounded? Clearly in Afghanistan." The whole train of thought did not occupy a second. I then remarked that you came from Afghanistan, and you were astonished.

—EDITORS

Source: *A Study in Scarlet* by Sir Arthur Conan Doyle.

Subjects who started with more and better integrated knowledge planned more informative experiments and made better use of experimental outcomes.

puter simulation to keep imaginary creatures alive. In the other, they were told that they had been hired by a swimming pool company to evaluate how the surface area of swimming pools was related to the cooling rate of its water. Students were more adept at designing experiments for the first task than the second, which the researchers interpreted as being due to students' familiarity with the relevant variables. Students are used to thinking about factors that might influence creatures' health (e.g., food, predators), but have less experience working with factors that might influence water temperature (e.g., volume, surface area). Hence, it is not the case that "controlling variables in an experiment" is a pure process that is not affected by subjects' knowledge of those variables.

Prior knowledge and beliefs not only influence which hypotheses one chooses to test, they influence how one interprets data from an experiment. In one experiment,[18] undergraduates were evaluated for their knowledge of electrical circuits. Then they participated in three weekly, 1.5-hour sessions during which they designed and conducted experiments using a computer simulation of circuitry, with the goal of learning how circuitry works. The results showed a strong relationship between subjects' initial knowledge and how much subjects learned in future sessions, in part due to how the subjects interpreted the data from the experiments they had conducted. Subjects who started with more and better integrated knowledge planned more informative experiments and made better use of experimental outcomes.

Other studies have found similar results, and have found that anomalous, or unexpected, outcomes may be particularly important in creating new knowledge—and particularly dependent upon prior knowledge.[19] Data that seem odd because they don't fit one's mental model of the phenomenon under investigation are highly informative. They tell you that your understanding is incomplete, and they guide the development of new hypotheses. But you could only recognize the outcome of an experiment as anomalous if you had some expectation of how it would turn out. And that expectation would be based on domain knowledge, as would your ability to create a new hypothesis that takes the anomalous outcome into account.

The idea that scientific thinking must be taught hand in hand with scientific content is further supported by research on scientific problem solving; that is, when students calculate an answer to a textbook-like problem, rather than design their own experiment. A meta-analysis[20] of 40 experiments investigating methods for teaching scientific problem solving showed that effective approaches were those that focused on building complex, integrated knowledge bases as part of problem solving, for example by including exercises like concept mapping. Ineffective approaches focused exclusively on the strategies to be used in problem solving while ignoring the knowledge necessary for the solution.

What do all these studies boil down to? First, critical thinking (as well as scientific thinking and other domain-based thinking) is not a skill. There is not a set of critical thinking skills that can be acquired and deployed regardless of context. Second, there are metacognitive strategies that, once learned, make critical thinking more likely. Third, the ability to think critically (to actually do what the metacognitive strategies call for) depends on domain knowledge and practice. For teachers, the situation is not hopeless, but no one should underestimate the difficulty of teaching students to think critically. ☐

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Teaching Critical Thinking

Teaching students to think critically is high on any teacher's to-do list. So what strategies are consistent with the research?

■ ***Special programs aren't worth it.*** In the sidebar on page 12, I've mentioned a few of the better known programs. Despite their widespread availability, the evidence that these programs succeed in teaching students to think critically, especially in novel situations, is very limited. The modest boost that such programs may provide should be viewed, as should all claims of educational effectiveness, in light of their opportunity costs. Every hour students spend on the program is an hour they won't be learning something else.

■ ***Thinking critically should be taught in the context of subject matter.*** The foregoing does not mean that teachers shouldn't teach students to think critically—it means that critical thinking shouldn't be taught on its own. People do not spontaneously examine assumptions that underlie their thinking, try to consider all sides of an issue, question what they know, etc. These things must be modeled for students, and students must be given opportunities to practice—preferably in the context of normal classroom activity. This is true not only for science (as discussed in the main article), but for other subject matter. For example, an important part of thinking like a historian is considering the source of a document—who wrote it, when, and why. But teaching students to ask that question, independent of subject matter knowledge, won't do much good. Knowing that a letter was written by a Confederate private to his wife in New Orleans just after the Battle of Vicksburg won't help the student interpret the letter unless he knows something of Civil War history.

■ ***Critical thinking is not just for advanced students.*** I have sometimes heard teachers and administrators suggest that critical thinking exercises make a good enrichment activity for the best students, but struggling students should just be expected to understand and master more basic material. This argument sells short the less advanced students and conflicts with what cognitive scientists know about thinking. Virtually everyone is capable of critical thinking and uses it all the time—and, as the conditional probabilities research demonstrated (see p. 15), has been capable of doing so since they were very young. The difficulty lies not in thinking critically, but in recognizing when to do so, and in knowing enough to do so successfully.

■ ***Student experiences offer entrée to complex concepts.*** Although critical thinking needs to be nested in subject matter, when students don't have much subject matter knowledge, introducing a concept by drawing on student experiences can help. For example, the importance of a source in evaluating a historical document is familiar to even young children; deepening their understanding is a matter of asking questions that they have the knowledge to grapple with. Elementary school teachers could ask: Would a letter to a newspaper editor that criticized the abolishment of recess be viewed differently if written by a school principal versus a third-grader? Various concepts that are central to scientific thinking can also be taught with examples that draw on students' everyday knowledge and experience. For example, "correlation does not imply causation" is often illustrated by the robust association between the consumption of ice cream and the number of crimes committed on a given day. With a little prodding, students soon realize that ice cream consumption doesn't cause crime, but high temperatures might cause increases in both.

Knowing that a letter was written by a Confederate private to his wife in New Orleans just after the Battle of Vicksburg won't help the student interpret the letter—unless he knows something of Civil War history.

■ ***To teach critical thinking strategies, make them explicit and practice them.*** Critical thinking strategies are abstractions. A plausible approach to teaching them is to make them explicit, and to proceed in stages. The first time (or several times) the concept is introduced, explain it with at least two different examples (possibly examples based on students' experiences, as discussed above), label it so as to identify it as a strategy that can be applied in various contexts, and show how it applies to the course content at hand. In future instances, try naming the appropriate critical thinking strategy to see if students remember it and can figure out how it applies to the material under discussion. With still more practice, students may see which strategy applies without a cue from you.

—D.W.

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