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# An Analysis of the 2005 National Technology Plan: Better for Business than for Children

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## Executive Summary

In January 2005, then-Secretary of Education Rod Paige submitted the Department of Education's revised National Education Technology Plan (NETP) to Congress in compliance with the No Child Left Behind Act of 2001 (NCLB).  The plan, titled *Toward a New Golden Age in American Education*, recommends seven "Action Steps" urging schools to strengthen leadership for technology, to consider innovative budgeting, to support e-learning and virtual schools, to encourage broadband access, to move toward digital content, and to integrate data systems.  NETP also urges improved "teacher training" to enhance teachers' ability to use technological products.

This report identifies, analyzes, and critiques assumptions underpinning NETP's recommendations.  Assumptions are crucial to any policy; invalid assumptions create an unreliable foundation for any plan.   In addition to identifying flaws in key assumptions, this analysis concurrently uncovers embedded advantages for business and privatization supporters.

This report examines four specific assumptions in terms of their roles as components of NCLB.  The first assumption is that education ought to be run more like business. This precept is based on the idea that test scores equate to a traditional business

"product," an equation that has been challenged by many critics.    The second is that more technology will reliably result in increased student learning.  This assumption lacks credible evidence and is undermined by recent large-scale research.  The third, that extensive technological infrastructure is already in place, rests on a report with questionable methodology and is contradicted by an arguably more credible report.  The fourth assumption, that students' advice to NETP planners was reliable, is found unwarranted because of severe methodological weaknesses, including the fact that children too young to read were asked for advice on such issues as budget priorities.

Following this extended critique of the plan's assumptions, a review of the proposed action steps within the context of groundwork laid by NCLB uncovers several ways government policy is opening new "markets" and providing other advantages for business and support for privatization.  The analysis concludes that NCLB and NETP provide more benefits for business than for children—especially poor children. Educators who are considering expanding technology in light of NETP recommendations should proceed with great caution, insisting on evidence to support claims of improved learning and considering other consequences of a shift to primarily online instruction.

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# Introduction

## *Overview of the National Education Technology Plan*

In January, 2005, then-Secretary of Education Rod Paige complied with requirements of the 2001 No Child Left Behind (NCLB) legislation by submitting the Department of Education's revised National Education Technology Plan (NETP) to Congress.  NETP's title— *Toward a New Golden Age in American Education—*indicates its authors' faith in technology and its power to transform education positively. According to the Department of Education's press release announcing publication of the NETP, increasing use of technology outside of schools has prompted increased use within them.   The plan authors attribute this change largely to increasing competition in the global economy and to students who have never known a world without the Internet.[1] The NETP home page[2] and its website segment "Student Voices"[3] stress that the plan used substantive input from students because they understand the technological needs of tomorrow's schools better than their teachers or administrators.

The heart of NETP lies in seven "action steps" or recommendations.[4]   Together, they yield the following picture of changes considered desirable:  Schools should become more data-driven (consistent with NCLB's emphasis on test scores and "accountability"),

and administrators and teachers should make decisions based on ever increasing amounts of data.[5] Thus, schools will need "tech-savvy" administrators who can partner with businesses, "empower" students in planning processes, and implement comprehensive data systems.[6] Such administrators are to consider "innovative" budgeting, looking specifically to realize "efficiencies" and "cost savings."[7] Teachers, too, are to use newly expanded data to "personalize instruction," and teacher education programs are to become accountable for producing new teachers skilled in using data to identify appropriate "interventions," or instructional strategies, for individual students. To be sure that new teachers have these skills, the "quality and consistency" of teacher education is to be improved through "measurement, accountability and increased technology resources" (extending NCLB's plan for K-12 education and its focus on standardized test scores to higher education and teacher education).[8]

Teachers as well as students are to engage in online learning[9]; schools are to move away from textbooks to digital content and to support the growth of "virtual" schools.[10] To enable such technological expansion, schools are to pursue broadband access.[11] Finally, administrators are to be sure that any technological products they purchase are certified to comply with the School Interoperability Framework (SIF), a set of standards that ensure data will transfer easily among schools, districts, and others.[12]

## *Overview of this analysis*

This report identifies, analyzes, and critiques several assumptions underpinning NETP's recommendations. Assumptions are crucial; invalid assumptions create an unreliable foundation for any plan. On the whole, the analysis examines the plan's

assumptions and uncovers several embedded advantages for business and privatization proponents.

Four specific assumptions are discussed, frequently in terms of the plan's role as a component of NCLB. The first assumption is that education ought to be run more like business; the second, that more technology will reliably result in increased student learning; the third, that extensive technological infrastructure is already in place; and the fourth, that students' advice to NETP planners was reliable. Finally, an extended discussion section finds NETP far more likely to benefit for-profit businesses and privatization efforts than to enhance the learning of children, especially poor children.

## Analysis of Assumptions

If the assumptions underpinning a policy are in error, then its recommendations are likely to be faulty—a criticism that is, in fact, often levied against NCLB. For example, many critics reject the assumptions that more testing will improve teacher and student performance, and that high-stakes test scores are reliable assessments; as a result, they find NCLB a fundamentally unsound strategy for improving student learning.[13] The soundness of NETP is similarly open to the same kind of criticism if its underlying assumptions are not reliable. This analysis of the plan, then, begins by detailing and analyzing four of its key explicit and implicit assumptions.

## *Assumption 1:  Education ought to be run more like business*

Introductory material in the plan criticizes schools for maintaining habits from earlier agricultural and industrial eras. It stresses the increased use of technology in the

business arena where "leading organizations" use technology for such tasks as streamlining transactions, expanding markets, and tailoring services and products to customer need. Implying that there is little or no difference between schools and profit-centered activities, the plan asserts, "The same transformation needs to occur within our schools." [14] That is, schools need to behave more like businesses, where computer generated reports are used to measure productivity and technology upgrades are necessary to stay ahead or keep up with competitors.[15]

Interestingly, similar calls for schools to be run more like businesses are also coming from the business segment itself. A key voice has been the influential Business Roundtable, an association of leaders of major corporations which together comprise nearly one-third the value of the U.S. stock market.[16] The organization, which did a great deal to promote NCLB,[17] issued a 2003 press release that hailed the publication of the initial list of schools needing improvement. Insisting that more testing and data is imperative, Chairman Tucci asserted, "You can't manage what you don't measure. . . . No executive can run a business without accurate, granular data that explains what's working and what's not. Our school systems should be no different."[18]

This kind of "granular data" comes from testing of all kinds—the high-stakes tests already in place for accountability provisions of NCLB, and an increase in other, preferably technological, assessments that NETP increasingly suggests schools need. In his remarks at the plan's launch, for example, former Secretary Paige noted his desire to have real time data, online assessment, and integrated data systems available to teachers.

NCLB laid the groundwork for the image of school-as-business with its emphasis on "accountability." Since every business sells *something*, a necessary precursor to

forcing schools to behave more like businesses was to identify an easily quantifiable

"product." The test scores mandated by NCLB accountability provisions provide this

product. According to the NCLB paradigm, if teachers teach well, then students

inevitably learn and the product of this process is high test scores. Thus, the scores are

considered data that measure student learning and, by implication, the "productivity," and

"efficiency" of school personnel. Conversely, if scores stubbornly stay low, then the

schools and personnel are at fault—and so NCLB outlines a series of escalating

punishments, including eventual state takeover and total school restructuring. Just as

workers on an assembly line or sales representatives in the field might be fired if their

output falls too low, teachers and administrators are to be punished by economic

sanctions and possible job loss. Officials have managed to make this model attractive to

parents by first making the undeniably valid claim that parents are entitled to receive

feedback on their children's learning, and then linking it to the specious claim that high-

stakes test scores equate to reliable summative assessment of that learning.

It is precisely in this definition of "test scores" as "product" that the assumption

that schools can and should operate like businesses breaks down. Educators have been

arguing since the debut of the legislation that a test score is not a comparable "product,"

and that mandated high stakes testing is not a reliable indicator of anything useful.[19] An

examination of the validity of test scores is beyond the scope of this report, but even a

simple outline of a main criticism indicates it is not reliable to assume that schools, like

business, should make decisions based on "granular data."

Essentially, test scores are contrived assessments that contrast with authentic

assessments. That is, tests are a unique, school-based activity, but test scores are

accepted as measurement of students' actual abilities outside the classroom. A major criticism of high stakes testing argues that test scores tell most about students' test-taking skills and least about their real world abilities. [20] A reading test, for example, may ask students to answer multiple-choice questions—something readers do not do in real world tasks. A child who answers every multiple-choice question on a test correctly may have learned how to take tests, but the test might not be a reliable indicator of how well that child can read independently. There is no way to know if the child understood the passage, or guessed well, or simply learned test taking strategies to eliminate incorrect answers.

This is the reason there SAT courses and other courses to prepare for standardized tests exist: to help students understand test-taking strategies. Chief among these is how to avoid selecting distracters, or answers that make a great deal of sense but that test makers decide are not quite the best answer for a specific question. Savvy test takers know that tests frequently and specifically ask for "the best answer," not a good answer; they are often frustrated by having to choose between two answers when both make sense.

In contrast, an authentic assessment of a student's reading ability might involve a teacher listening to a student read a story aloud. In this case, the assessment can be far more flexible and accurate; perhaps, for example, the child might say "woman" instead of "lady"—substituting a word with the same meaning for the word actually in the text. While in a test any apparent confusion like this might lead to an "error," a professional teacher listening for comprehension would know that the child has focused on meaning and has understood the text. Readers paraphrase in making meaning constantly, and

such a child would be demonstrating the habit of a skilled reader. For this reason and others, despite the apparent objectivity of test scores, authentic assessment is a more reliable indicator of student learning and a tool for school improvement.[21]

Still, many find the idea that schools should run more like businesses appealing because it suggests that schools will have to implement more rigorous requirements and that student achievement will surely improve. Certainly, everyone would like every education nickel to be spent wisely, and everyone would like children to learn as much as possible. But the school-as-business model is not an appropriate metaphor to move toward those goals: schools are *not* businesses. The goals of nurturing growth in children and increasing net profit are not analogous because learning cannot be measured in the same way that the number of widgets produced and sold can be counted. Children are not the equivalent of raw material being fed into a manufacturing process, and scoring well on a test is not the same as being able to perform in the real world, or of understanding connections between disciplines, or being capable of completing independent research, or constructing a personal argument, or displaying a host of other characteristics that together comprise *learning.*

## *Assumption 2:   Technology is good.  More and more technology will result in more and more good*

NETP's action steps/recommendations send the clear signal that the more technology in place, the better a school will be. Schools are to hire leaders well-versed in technology;  to increasingly support online learning activities (including both digital content and virtual schools); to expand and centralize computerized testing and data

keeping; and, to install broadband access to support these efforts. "More" is presented as a self-evident good.

However, NETP offers no evidence to support this direction. Despite the insistence on "science" that permeates so much NCLB rhetoric, there is no mention of scientific evidence that establishes a correlation between more technology and more student learning. Perhaps the plan's lack of references is not surprising, however, since technology's potential to increase student learning has not been persuasively demonstrated. In fact, a 2004 large-scale international study is discouraging. [22] The study analyzed results from achievement test administered in 2000 to 15-year-olds in 32 countries, including the United States, Mexico, Canada, most countries in Western Europe as well as some in Eastern Europe, Japan, and South Korea. Researchers from the University of Munich looked at reading and math assessment data, controlling for the impact of family and school characteristics. They found that once other factors were taken into consideration, the positive relationship between student achievement and computers at school was so slight as to be statistically insignificant, while achievement was affected significantly *negatively* by a computer in the home. NETP makes no mention of this major study, however.

While few such large scale studies have been conducted, studies that do exist generally cast significant doubt on the government's assumption that more technology will inevitably benefit students. An overview of relevant research compiled by *Education Week*'s Research Center uncovered no evidence to indicate that substantive Internet subsidies in California from 1996-2000 positively affected achievement there.[23] It also reported that while one study did find a strong correlation between specific

software and student achievement, [24] another found only a small positive affect. [25]  Even here, however, the supporting evidence is weak at best, with even the original researchers urging caution about the use of results.  In the study showing the strong correlation, for example, authors cautioned readers that only a few studies were included in the review and that several had significant methodological flaws; factors other than technology could not be eliminated as possible causes of positive results. [26]   Simply put, to date large-scale, sound studies have not demonstrated a significant positive correlation between technology use and student achievement (even if one accepts test scores as reliable indicators).  This is especially true in such areas as higher-order thinking, creativity, and research skills, which are particularly difficult to measure.  As Ringstaff and Kelley have warned, there is no "magic formula that educators and policymakers can use to determine if this 'return' is actually worth the 'investment.'"[27]

Thus, the research on the impact of technology in the learning process is neither sufficient nor even sufficiently encouraging to indicate that NETP planners adhered to the goal professed for other educators, to "routinely seek out the best available research and data before adopting programs or practices that will affect significant numbers of students."[28]  While NCLB exhorts educators at every level to do nothing that is not "science-based," NETP makes no effort to offer scientific support for its recommendation to saturate schools with expensive technologies.

Moreover, there is no attention to the fact that when technology does appear in classrooms, it can be used very differently—especially in different socioeconomic contexts.  Some researchers have found, for example, that while students in higher-income schools often use computers for "more sophisticated, intellectually complex

applications," students in lower-income schools use them instead for "repetitive practice."[29] Although NCLB claims that its intent is to be sure that poor children finally receive a comparable education, in fact the technology push may instead perpetuate or exacerbate existing inequalities. While it may be *possible* for technology to be used in delivering creative, higher-order learning experience, scant evidence suggests this is routinely the case in schools. In fact, the evidence suggests that technology, especially for poor children, is instead more likely to provide traditional skill-and-drill pedagogy.

## Assumption 3: Extensive technological infrastructure is already in place in schools

A third assumption, based on the findings of a much-vaunted 2003 U.S. Department of Education report to Congress, *Internet Access in U.S. Public Schools and Classrooms,*[30] is that schools largely have extensive technological capacity, but educators lag behind students in using what is readily available. The report claims that 99 percent of schools are connected to the Internet with a 5:1 student to computer ratio.[31] Based on these statistics, NETP claims that educational use of technology is nonetheless lacking—not because of access, but because of ill-equipped faculty: "Today's students, of almost any age, are far ahead of their teachers in computer literacy."[32]

The *Internet Access* report, however, does not sufficiently support the claims NETP blithely makes about student access. One of its endnotes acknowledges that "considerable skewness" in the 5:1 ratio exists among schools and that 11 percent of public schools had no instructional computers with Internet access as late as 1998.[33]

Additionally, one researcher has drawn a more finely grained picture of "skewness" by analyzing one of the report's tables,[34] demonstrating that a student who attends a school in which 75 percent of the student body is eligible for a free or subsidized lunch has a 1 in 5 (20%) chance of having no Internet access in any learning space.[35] Even in a school having "access" in every instructional room, there may be only one computer, used only by the teacher to report such data as attendance and grades. Or, "instructional area" might mean a single small and antiquated computer lab serving hundreds of students. Or, every classroom may have a computer—that doesn't work. Thus, the selective numbers NETP chooses to base its assumption on are misleading, at best. In fact, the single mention of "skewness" in a note obscures the fact that important access differences still exist among different groups of students—the situation commonly referred to as the "digital divide."

Yes, access for all students, and notably for African American and low-income children, has increased dramatically in recent years. However, a 2003 Corporation for Public Broadcasting (CPB) report, *Connected to the Future*,[36] paints a far more discouraging picture than the Department of Education report, noting that despite enormous gains, historical disparities between rich and poor "persist, sometimes to exceptional degrees."[37] The many statistics in the CPB report include that:

- Slightly less than a third of low-income, African American, and Hispanic children have access to the Internet at school.

- Low-income students' Internet access at school is significantly lower than high-income children's. Despite gains in access, at the time of the report low-

income children had not yet attained the degree of access that high income-

children had reached two years earlier.

- Children from high-income families are more than twice as likely to have
  home Internet access than children from low-income households.

- Caucasian children (64%) and children from high-income families (77%)
  enjoy the highest percentage of Internet access from any location.

- Fourty-four percent of low-income teenagers use the Internet at home.

- The majority of children ages 6 to 17 (69%) who access the Internet in school
  do so primarily in a computer lab.  Less than a third (29 percent) use the
  Internet in one classroom, and about a quarter of children (23 percent) report
  using the Internet in multiple classrooms.[38]

Internet access, in general, is  less available in classrooms than NETP suggests,
and significantly less accessible to low-income children and children of color.  These two
reports— the Department of Education's 2003 *Internet Access* report and the CPB's 2003
*Connected to the Future*—provide very different pictures of access.   A comparison of
their methodologies yields some possible reasons for the very different picture each
report provides.

The methodology section of *Internet Access* indicates that the report was
"designed to collect small amounts of issue-oriented data with minimal burden on
respondents and with a quick turnaround from data collection to reporting."[39]   Report
findings are based on 1,095 responses from school personnel in a sampling of public
schools that excluded "special education, vocational education, and alternative schools"

for unspecified reasons.[40]   Of the respondents, 35 percent were technology coordinators, 31 percent were principals, and the remaining 33 percent were "others."  Results were generalized based on public school data and extensive statistical procedures to account for a variety of potential weaknesses in the data.

Two factors are notable:  (1) the unexplained elimination of vocational and alternative schools as well as special education, all likely to enroll substantial populations of at-risk, special needs, and low-income students; and (2) the single survey respondent was asked to provide data on student Internet access outside the school, and it is unclear to what extent the respondent's perception of student access is accurate.  Since the survey, by design, attempted to make participation easy for respondents, it sought limited data.[41]

Estimates from *Connected to the Future*, on the other hand, are based on four surveys, including:  a telephone survey that reached "a national Random Digit Dial (RDD) stratified sample of 1,044 parents or guardians of children 2-17"; three online surveys, including one that reached more than 2,000 students age 6 to 17 and another that reached more than 1,300 of the same students in a follow-up survey.  After weighting and screening, a final sample of 996 students who completed both surveys emerged—only 99, or 9 percent, fewer than the *Internet* report.  In addition, all *Connected* surveys were balanced and weighted on several variables.[42]

The methodologies for the government's *Internet Access* report and for CPB's *Connected to the Future* report differ significantly.  *Internet Access* sought limited data and asked a school representative to report on student activity, including their out of school access; it also eliminated segments of the student population likely to contain

significant numbers of low-income, at-risk, and special needs students.  In contrast to the

government report, *Connected to the Future* collected data directly from

parents/guardians and students and used multiple surveys to collect extensive

information.  Thus, adults and students who know most about their own experiences

directly described them.   Because it was more ambitious and inclusive (not having

prescreened particular populations out of its sample), at the very least the *Connected*

report casts significant doubt about the accuracy of the vaunted 99 percent access and 5:1

computer ratio that NETP claims typical of current conditions in schools.   CPB evidence

suggests that instead, the technological climate is significantly less favorable—most

especially for low-income students and schools.


## Assumption 4:  Students are untapped experts on technology who ought to be engaged in planning policy; their advice makes NETP particularly credible

NETP looked to students, commonly referred to as "millenials," in designing its

recommendations; it urged schools to follow this example and empower students to help

with technology plans. Referring to students as "our ultimate constituents," the plan says

they must have a voice because they understand technology's "intricacies and

opportunities" better than "many of their elders, notably including a generation of

teachers and administrators . . . ."[43]

Consulting students when making educational policy is not, itself, a bad thing.   It

is sensible to ask students about their experiences with technology, as it is always

sensible to listen to students talk about all of their school experience; as noted above, no

one knows more about student experience than students themselves.   However, NETP

boasts that students had significant impact on its design—that student advice was used to shape specific recommendations.

That the students consulted are in fact more expert in technology than their elders and have provided the best possible advice to guide national policy, as NETP claims, is open question. Who exactly elicited student advice, and how? Which students were consulted, using what methodology and sampling? How representative are they? Were they asked for advice in areas where they were likely to be well-informed? Were they likely to have the analytical skills necessary to offer sound advice about systemic planning? The answers to such questions offer some insight into the likely reliability of recommendations.

## The NetDay Survey: Voices and Views of Today's Tech-Savvy Students

To begin, NETP makes much of the fact that the remarks of over 210,000 students were collected to help with planning—even though that figure comprises significantly less than 1% of the nation's total 48.2 million students and so represents a minute segment of the total student population.[44] NetDay,[45] a non-profit organization that promotes technology in schools, gathered these comments. Its board includes members with ties to major corporations, several with technology interests, and a former Director of Education Technology for the U.S. government who is "now a consultant to the educational technology industry and member of Boards of Directors for such groups."[46] NetDay's mission is to improve education for children; its board, however, does not have a representative from its "nonprofit and social sector partners" or from education or educational organizations. Similarly, the "NetDay Team" that executes the daily work of

the organization seems similarly comprised of members whose experience lies

extensively and primarily from the for-profit technology sector.

Why the federal government selected an organization that includes no educators

or trained educational researchers to be in charge of a research effort apparently so

integral to the planning of national policy is not clear. What is clear is that NetDay

applied a questionable methodology when it surveyed more than 200,000 students for the

NETP.

Subjects of this survey self-selected by either volunteering to participate, or being

volunteered by their teachers. The report's description of its subject selection and data

analysis makes clear that it used no scientific methodology to ensure reasonable

representation of the entire student population:

> The Speak Up Day survey data is based upon a self-selected, convenience
>
> sampling of students. . . . We did not pre-select students for participation in the
>
> surveys. We did not collect demographic data on any of the student participants
>
> beyond grade level and gender. However, we did collect school name and location
>
> and can track students' aggregated responses to a particular school. We have not
>
> completed any statistical significance testing on the data collected.[47]

While the report itself does not claim to be representative, the NETP web page claims

that the 200,000 students surveyed represented "a balanced mix of urban, rural, and

suburban schools, and from all ages and grade levels."[48] Because the report itself

explicitly says subjects were not pre-selected and no statistical analysis of significance

was completed, NETP's claim of balanced representation appears unfounded, even if it

included schools from a variety of locations. Moreover, since students responded to the

survey online (except the youngest students, for whom teachers conducted focus groups and then reported results online), all of the participating schools/students had readily available computer access. Not only did respondents self-select, but they also came from a population privileged by ready Internet access. Thus the needs of students who currently lack access and training are not represented in the results.

Survey materials clearly assume that respondents had extensive interaction with computers. For example, a survey for students grades four through12 did not ask *whether* students used computers, but "*How* do you use technology to help you with schoolwork?" and "*How* do you use technology outside of school?" (emphasis added). It also asked students in grades four through 12 to identify five technological challenges for schools as well as multiple solutions to the challenges. In evaluating solutions, students were asked to use such criteria as relevant cost and level of school control in relation to specific possibilities.[49]

Similarly, a lesson plan provided to teachers conducting a verbal survey with K-3 students begins with the teacher instructed to say "We know that you like using computers. This survey is about how you use computers and the Internet." Although some of them could not yet read, students in kindergarten through third grade were asked whether principals should prioritize hardware, speed of Internet connection, software, staff, or teacher training in their budgets (albeit in simpler terms); see Table 1 for this K-3 question.

**Table 1: Sample NetDay Question**

| 15. Pretend that you are the principal of your school and you have money to spend on technology.  What do you think your school should spend more money on first? | Students |
|---|---|
| Buy more computers and printers | |
| Make sure that the Internet is very fast | |
| Buy better software [games and programs] for students to use | |
| Hire people to make sure the computers work all the time | |
| Send teachers to training classes about how to use technology | |

Source:  NetDay. *Voices and views of today's tech-savvy students*.  Available at:
http://www.netday.org/downloads/lesson_plan_group_k_3.pdf

Asking 5-year-olds for advice on such complex management issues is inappropriate by any standard.  And ironically, in asking young children such questions, NetDay violates the school-as-business model NETP promotes elsewhere in the plan:  no CEO of a corporation would turn to 5-year-olds for advice on budgeting and staff development.  Yet, NETP boasts that it shaped national policy recommendations in response to student advice—even though that advice came from student "experts" as young as 5 or 6.

In addition, as briefly noted above, the fact that NetDay conducted online surveys means that it automatically eliminated students without ready access to technology.  Therefore, survey results do not reflect the experiences and needs of the entire student population.  Most obviously missing are those of the poorest students in the poorest schools, where the *Connected* report shows far less access than NETP claims.

**Student Voices**

The same focus on a sample of privileged students is evident in other NETP materials. For example, its Student Voices web page[50] features video projects completed by students at Forest Park High in Woodbridge, VA. The school appears affluent, with only 12.3 percent of its student population economically disadvantaged. It is, additionally, a magnet school specializing in information technology with a student to teacher ratio of 16:1.[51] At another featured district on the page, Poway Unified in San Diego County, CA, only 8.4 percent of students qualify for free or reduced lunches, compared to the state average of 48.5 percent; 67 percent of Poway's students are Caucasian, much higher than the state average of 34%.[52] Thus, "student voices" from these two prominently featured schools speak from an experience very different than that in typical Title I schools, where poverty is a daily issue and challenge for students and school personnel alike.

Given methodological issues, unsupported claims, over-representation of students with ready Internet access, and inappropriate questions being asked of children as young as five, the student advice NETP boasts of having followed seems more a reason to worry than an assurance of the plan's soundness.

# NETP and Support for Profit and Privatization

The weaknesses in NETP's key assumptions detailed above indicate that the plan's potential to enhance student learning is questionable. First, there is no consistent and persuasive body of evidence to support NETP's claims that increased technology will inevitably lead to increased learning or that it will reduce instructional costs.[53] Nor does

the plan discriminate among different classroom uses of technology that affect educational outcomes[54]; completing an online grammar worksheet, for example, is a qualitatively different activity than searching the web to find opposing viewpoints on an issue.  The plan's assumption that *if* technology is used *then* learning will improve is simplistic, and it sidesteps complex questions about implementation strategies and effects.  Moreover, the studies used to support elements of the plan have significant methodological flaws. Therefore, NETP is an unreliable roadmap to better schools and education.  It does seem, however, a much more reliable map to increased profit potential for business and support for privatization.

On the whole, NETP's action steps offer a series of market opportunities for business.  If administrators are to implement comprehensive data systems (Step 7), then someone must supply them.  If teachers, and students, are to take online courses (Step 4), then someone must supply them.  If digital textbooks and databases are to replace paper curricular materials (Step 6), then someone must supply them.  If broadband access is to expand (Step 5), then someone must supply it.  Every push to expand technology in schools expands the "market opportunity" for a wide range of businesses.

For many, the above seems reasonable and not particularly sinister.  After all, schools have always bought supplies from somewhere; what is so different about buying technological products rather than more traditional ones?  There are two significant differences.  The first is that the "market opportunities" being opened to business offer staggering new amounts of potential profits even though research has not shown that technology can and will deliver the educational benefits being promised.  The second is that these products and services do not simply enhance the classroom teaching/learning

process; they usurp and supplant it.   Proposed changes mean that computers, rather than teachers, may actually provide most instruction, turning teachers into primarily computer lab attendants.  If technology is implemented in this way—which NETP seems to envision , even as it calls for highly qualified teachers—the diminished role for teachers can potentially reduce labor costs, a boon to corporations interested in for-profit schooling.

## *Products and Profits*

NCLB's emphasis on high-stakes tests already has resulted in extensive new profits for test publishers.  Government estimates of costs to implement testing suggest a range of $1.9 billion to $5.3 billion between 2002 and 2008; however, when other costs associated with testing—including the kinds of practice tests and lessons promoted by NETP's emphasis on data—are included, comprehensive testing costs could be 8 to 15 times higher.[55]  This is no surprise to the business sector, which has shown interest in the education "market" for some years.   For example, in 1999, before NCLB was enacted, one business writer noted that overall potential profits in educational products and services—especially with technological opportunities—might be as high as $600 billion. This amount, the writer noted, exceeded the Defense Department's budget, and is largely concentrated in the K-12 area, which in 1998 had an estimated profit potential of $310 billion. [56]

NCLB has already channeled some of these potential profits to business.  In a survey of opportunities that includes billions of dollars already earmarked for mandated tutoring, a 2003 *Wall Street Journal* article—tellingly titled "Education Companies See

Dollars in Bush School-Boost Law"—expands on new markets and profits that NCLB has made available. These include $24.3 billion in the government's budget "for elementary and secondary education where businesses can compete for contracts."[57]

Several companies, for example, already offer products to provide the accountability data NCLB requires and the "granular data" that is supposed to help improve student performance. Such products provide mini-tests for frequent in-class use, which assess student progress and provide lessons targeting the student's diagnosed area of weakness. Included in this category are Princeton Review's web-based Homeroom program, which costs $3,500 per school year and is already in 3,000 schools, and Kaplan's Achievement Planner, which has helped double that company's revenues for its elementary and secondary products.

NETP offers direct support for such products even as it promotes digital curricula and points to new opportunities in the field of teacher education as well. While schools have always had to buy products, they have never been in a position to consume them at the level now being promoted. This is not a case of substituting one set of products for another; it is a case of schools being forced to spend billions of dollars on *new* products unnecessary before the passage of recent legislation imposing extensive new testing requirements. For precisely that reason, the National Education Association and several states are engaged in lawsuits against the federal government objecting to what amounts to billion-dollar funding shortfalls in mandated new spending. [58]

New profits on new products are, however, only one significant area that benefits business. A second crucial area offers an even more important benefit to for-profit schools and proponents of privatization.

## *Products and Teaching*

Just as NCLB has managed to impose a superficial definition of learning (learning = high test scores), it has concurrently imposed a superficial definition of teaching (teaching = enabling students to produce high test scores). Increasing implications for teachers are evident in products already being used and in NETP's recommendations for steadily increasing technology in classrooms.

It is significant that all of the products described in the *Wall Street Journal* article cited above are "teaching" products that go far beyond monitoring student progress with mini-tests: they provide specific lessons for students. One program compiles data on student performance, and provides "different lesson plans for [a teacher's] fast, slow and average learners"; another "individually helps [students] through each chapter using computer software."[59] The teacher is marginalized in these typical scenarios, with his or her primary function being to provide or assign a particular pre-fabricated lesson to a particular student based on such data as "mini-tests that look and read like the state exam." Thus, both assessment of student learning and appropriate instruction come from the vendor/product—not the teacher. As a result, increasing reliance on technology is accompanied by decreasing reliance on teacher judgment and skill.

Because of this shift of instruction away from the teacher to the technological product, teacher judgment and skill, like learning, are being redefined. NETP recommends that teacher education programs be held accountable for ensuring that new teachers know how to execute such "individualized" instruction—that is, that new teachers be prepared to use scripted products. The only thing left for the teacher to do – as is already true for the scripted reading programs NCLB has promoted[60] – is to follow

the instructions and plans provided in the commercial package. Being a "highly qualified teacher" in a technological classroom is thus rapidly becoming defined as being skilled in the use of technological products supplied by commercial providers.

This transition of teacher from skilled and autonomous professional to automaton programmed by technology—a bizarre contortion wherein instead of the teacher using the technological tool, the technological tool drives teacher "intervention"—is an essential step on the road to privatization and for-profit schooling. The same business writer who in 1999 was celebrating the potential billions of dollars in new profits for business was concurrently celebrating the potential of technology to phase professional— and tenured—teachers out of the educational process:

> Almost all of the new educational products and services now being marketed bear the stamp of technology. Such technology replaces teachers altogether or reduces their number, thus solving several critical weaknesses in traditional education. For instance, replacing teachers reduces the high cost of an excessively labor-intensive instructional process while still serving the same number of students. Then, too, it eliminates tenure, which unfortunately locks in instructors who do not have the training or knowledge to keep up with changing fields and new approaches.[61]

It's clear that from a business perspective, downsizing or eliminating the teaching force, especially a unionized and tenured teaching force, is a desirable eventuality, and that technology is a key tool for leveraging this change.

The reduction or even elimination of a professional teaching force would be a boon to business because existing educational management organizations (Edison, for

example) and other businesses currently trying to wrest a profit from managing schools face the significant challenge of lowering labor costs. Approximately 80 percent of a typical school budget is allocated for teacher salaries,[62] and strong unions have fiercely and effectively resisted downgrades in teacher compensation or any weakening of the tenure system. With labor costs out of their control, corporations can do little to realize the profit potential they see in the education market.

NETP, however, helps advance the transition of "teaching" activities from human professionals to "efficient" computer programs. This shift marginalizes teachers and makes teaching, which already has trouble recruiting talented professionals because of inadequate pay and poor conditions, an even less inviting career.[63] Any increase in the use of "teacher proof" strategies is sure to help drive talented professionals out of schools and to exacerbate teacher shortages. From a business perspective, however, this is an advantage, since serious teacher shortages provide a rationale for increasing reliance on technology and increasing ratios of students to "teacher." It is also likely to lead to reliance on a part-time and relatively inexpensive teaching force, especially for the virtual schools and online course already being promoted.

In fact, this scene has already played out in some of the most difficult areas of education where workers called "paraprofessionals" are already using the kinds of scripted materials NCLB and NETP are easing into all K-12 classrooms, increasingly to be delivered via technology. In many Title I schools struggling to fill vacancies, professional educators have long been replaced at far less cost by such paraprofessionals. Interestingly, paraprofessionals are largely people of color whose students are among the most poor and most needy children that American public schools serve. Over 450,000

paraprofessionals are already working in schools, often unsupervised and often in Title I programs in the areas of special and bilingual education. While they take on significant teaching responsibilities, they are paid only a fraction of a teacher's salary.[64]

The increased reliance on paraprofessionals has been discussed, reasonably, as indicating a positive trend, one that might eventually result in far greater numbers of qualified teachers of color.[65] However, several factors—including the cost of additional education and the fact that paraprofessionals usually need more education than new teachers changing careers—have impeded the goal of moving significant numbers of minority paraprofessionals into the teaching ranks.[66] A very different, and worrisome, potential outcome of increasing use of paraprofessionals seems more likely: that the model of paraprofessionals using scripted materials will be used as evidence that the teaching/learning process can get along just fine without professional educators—or at least, without so many of them, or without so many full time ones.

Evidence that this is a real possibility is readily evident. For example, a supporting document linked to the NETP recommendations explains that in e-learning, and so in virtual schools:

> Instruction can be provided by a subject matter expert, or a teacher guide, through collaborative exploration or largely through self-directed
>
> study. Instruction can also be facilitated by a "learning coach," often the role played by lab attendants in virtual high school classes and parents in K-8 settings, who provide the face-to-face counterpart for a virtual teacher.[67]

Despite extensive rhetoric about highly qualified teachers, then, other elements of the plan already suggest that with the advent of e-learning, traditional teachers can be replaced by any number of others—including lab attendants and parents themselves.

Any such step toward reducing labor costs is enormously important to for-profit schools. This movement toward increased use computerized instruction and away from professional educators working directly with children is not only a step in that direction—it is a giant leap toward it. And, other elements of the plan reinforce the shift.

For example, NETP recommends that schools incorporate integrated data systems and broadband access. An integrated system is computerized from start to finish, and it cuts across schools and districts and states and any other geographic boundary. The "interoperability" of systems NETP suggests does more than allow administrators to track progress in their own schools; it also provides a way to keep records on students who are widely dispersed in space and who need not come together physically. This infrastructure facilitates the "delivery" of products to a wide variety of "clients" and on the whole provides the framework for virtual schools—potentially the most profitable option of all, since virtual schools eliminate operating costs for physical school plants.

Such "virtual" education departs radically from the traditional education still enjoyed by privileged students, which involves well-supplied, safe, and comfortable classrooms where students engage in a variety of challenging and enjoyable learning activities guided by an expert teacher. The less privileged are to work in isolation on computers without teachers, and possibly without peers in a physical classroom. Especially for low-income students, this work is likely to consist of rote skill-and-drill programs similar to those paper and pencil exercises familiar to students for most of the

last century.  While a relatively few students of more privileged backgrounds may engage in creative projects, most students are likely to experience highly structured, rote activities, needing no greater support than a parent . . . or a lab technician.

What the NETP will most certainly do—as NCLB is already doing—is to create new "markets" for business and to enhance conditions for the privatization of public education by opening the door to reduced labor costs.  That such a change will improve learning for America's schoolchildren at large is a claim that remains unfounded.

# Recommendations

Because no research evidence supports the claim that more technology will surely lead to increased student learning, schools contemplating technology decisions should approach NETP's advice with great caution.  Costs for increasing reliance on technology will be substantive, and there is no evidence that the change will improve anything in the teaching/learning process—not even test scores, which many challenge as indicators of student learning in any event.  No claim about the efficacy of any product should be accepted without extensive, reliable research evidence supporting it, and unintended consequences—such as marginalizing teachers—should be considered when costs of implementation are weighed.  Moreover, considerable thought should be given as to whether comparable opportunities for higher-order thinking will be afforded via technology across various socioeconomic groups of students.

# APPENDIX A: NETP Action Steps

## 1. Strengthen Leadership

. . . develop a new generation of tech-savvy leaders at every level . . .   provide training in technology decision making and organizational change . . . develop partnerships between schools, higher education and the community . . . encourage creative technology partnerships with the business community . . . empower students' participation in the planning process.

## 2. Consider Innovative Budgeting

. . . consider a systemic restructuring of budgets to realize efficiencies, cost savings and reallocation. This can include reallocations in expenditures on textbooks, instructional supplies, space and computer labs.

## 3. Improve Teacher Training

. . . ensure that every teacher has the opportunity to take online learning courses . . . improve the quality and consistency of teacher education through measurement, accountability and increased technology resources . . . ensure that every teacher knows how to use data to personalize instruction. This is marked by the ability to interpret data to understand student progress and challenges, drive daily decisions and design instructional interventions to customize instruction for every student's unique needs.

## 4. Support e-Learning and Virtual Schools

. . . provide every student access to e-learning. . . . enable every teacher to participate in e-learning training . . . Encourage the use of e-learning options to meet *No Child Left Behind* requirements for highly qualified teachers, supplemental services and parental choice. . . . develop quality measures and accreditation standards for elearning that mirror those required for course credit.

## 5. Encourage Broadband Access

. . . thoroughly evaluate existing technology infrastructure and access to broadband to determine current capacities and explore ways to ensure its reliability . . . encourage that broadband is available all the way to the end-user for data management, online and technology-based assessments, e-learning, and accessing high-quality digital content . . . encourage the availability of adequate technical support to manage and maintain computer networks . . . .

## 6. Move Toward Digital Content

. . . ensure that teachers and students are adequately trained in the use of online content . . . encourage ubiquitous access to computers and connectivity for each student . . . consider the costs and benefits of online content, aligned with rigorous state academic standards, as part of a systemic approach to creating resources for students to customize learning to their individual needs.

## 7. Integrate Data Systems

. . . integrate data systems so that administrators and educators have the information they need to increase efficiency and improve student learning . . . use data from both administrative and instructional systems to understand relationships between decisions, allocation of resources and student achievement . . . ensure interoperability. For example, consider School Interoperability Framework (SIF) Compliance Certification as a requirement in all RFPs and purchasing decisions . . . use assessment results to inform and differentiate instruction for every child.

Source: National Education Technology Plan, http://www.nationaledtechplan.org

# Notes & References

[1] U.S. Department of Education. (2005, January 7). U.S. Department of Education releases national education technology plan, p 2. Retrieved April 17, 2006, from http://www.ed.gov/about/offices/list/os/technology/plan/2004/site/edlite-background.html

[2] Available from http://www.ed.gov/about/offices/list/os/technology/plan/2004/site/edlite-default.html

[3] See http://www.ed.gov/about/offices/list/os/technology/plan/2004/site/edlite-voices.html

[4] Each of these steps is detailed in a chart found in Appendix A.

[5] Step 7, Appendix A.

[6] Step 1, Appendix A.

[7] Step 2, Appendix A.

[8] Step 3, Appendix A.

[9] Step 4, Appendix A.

[10] Steps 6, 4, Appendix A.

[11] Step 5, Appendix A.

[12] Step 7, Appendix A.

[13] See, for example:

Lane, S. (2004). Validity of high-stakes assessment: Are students engaged in complex thinking? [Electronic version]. *Educational Measurement, Issues and Practice, 23*(3), 6. Retrieved January 26,2006, from ProQuest.

Lewis, A. C. (2002). A horse called NCLB [Electronic version]. *Phi Delta Kappan, 84*(3), 197. Retrieved January 28, 2006, from ProQuest.

Mathis, W. (2004, Winter). NCLB and high-stakes accountability: A cure? Or a symptom of the disease? *Educational Horizons.* Retrieved April 17, 2006 from ProQuest.

Smith, M. & Fey, M. (2000, Nov/Dec). Validity and accountability in high-stakes testing. Journal of Teacher Education, 51(5): 334-45.

[14] U.S. Department of Education. (2005). *National Education Technology Plan*, The Plan section, ¶ 3, 4. Retrieved April 17, 2006, from http://www.ed.gov/about/offices/list/os/technology/plan/2004/site/edlite-background.html

[15] U.S. Department of Education. (2005). National Education Technology Plan, The Plan section, 2. Retrieved January 30, 2005, from http://www.nationaledtechplan.org

[16] Business Round Table (n.d.). About us. Retrieved August 4, 2006, from http://www.businessroundtable.org//aboutUs/index.aspx

[17] See, for example, on the Business Round Table web site, Issues: NCLB, http://www.businessroundtable.org/taskForces/taskforce/issue.aspx?qs=6545BF159F849514481138A6DBE7A7A19BB6487BF6B38

[18] Business Round Table. (2003). The Business Roundtable releases poll that reveals parents and voters support No Child Left Behind reporting requirements, ¶ 2. Retrieved January 26, 2006, from http://www.businessroundtable.com/pdf/toolkit/resource/AYPpollpressrelease.pdf

[19] See, for example, Fair Test. (n.d.). The case against high-stakes testing. Retrieved February 9, 2005, from http://www.fairtest.org/arn/caseagainst.html

[20] See, for example, Hill, C. (2004). Failing to meet the standards: The English Language Arts Test for fourth graders in New York state [Electronic version]. *Teachers College Record* 106(6). Retrieved April 22, 2006, EBSCOhost Professional Development Collection.

[21] See, for example,

Bracey, G. (2000). *Thinking about tests and testing: A short primer in "assessment literacy"* [Electronic version]. Washington, D.C.: American Youth Policy Forum. Retrieved April 22, 2006, from http://www.aypf.org/publications/braceyrep.pdf

Darling Hammond,, L. (2004). Standards, accountability, and school reform [Electronic version]. *Teachers College Record* 106*(6)*, 1047-85. Retrieved April 17, 2006 from EBSCOhost Professional Development Collection.

[22] Trotter, A. (2004, December 8). International study questions computers' aid in learning [Electronic version]. *Education Week*, 24(15), 13. Retrieved February 21, 2005, from www.edweek.org

[23] edweek.org. (2005). *Technology in education*. Issues/Technology in Education, Impact section, ¶1-2. Retrieved February 21, 2005, from http://www.edweek.org/rc/issues/technology-in-education/

[24] Murphy, R., Penuel, W., Means, B., Korbak, C., & Whaley, A. (2001). E-Desk: A review of recent evidence on the effectiveness of discrete educational software [Electronic version]. Center for Technology in Learning. Retrieved February 21, 2005, from http://ctl.sri.com/publications/displayPublication.jsp?ID=204

[25] Waxman, H.C., Connell, M.L., Gray, J. (2002) *A quantitative synthesis of recent research on the effects of teaching and learning with technology on student outcomes.* Naperville, IL: Northwest Regional Educational Laboratory.

[26] Murphy, R., Penuel, W., Means, B., Korbak, C., & Whaley, A. (2001). E-Desk: *A review of recent evidence on the effectiveness of discrete educational software* [Electronic version]. Center for Technology in Learning, p. 2. Retrieved February 21, 2005, from http://ctl.sri.com/publications/displayPublication.jsp?ID=204

[27] Ringstaff, C. and Kelley, L. (2002). *The learning return on our educational technology investment: a review of findings from research.* San Francisco: WestEd.

[28] Institute of Education Sciences. (n.d.).Retrieved March 28, 2005, from http://www.ed.gov/about/offices/list/ies/index.html

[29] Becker, H. (2000). Who's wired and who's not: Children's access to and use of computer technology [Electronic version]. *The Future of Children*, 10(2), 44. Retrieved January 27, 2005, from ProQuest.

[30] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms: 1994-2002* [Electronic version]. Retrieved February 5, 2005, from http://nces.ed.gov/surveys/frss/publications/2004011/2.asp

[31] U.S. Department of Education. (2005). *National Education Technology Plan* [Electronic version], A Nation on the Move/Improvements Will Be Dramatic section, ¶ 1, 2. Retrieved January 30, 2005, from http://www.nationaledtechplan.org

[32] U.S. Department of Education. (2005). *National Education Technology Plan* [Electronic version], A Nation on the Move/Improvements Will Be Dramatic section, ¶ 1, 2. Retrieved January 30, 2005, from http://www.nationaledtechplan.org

[33] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms:  1994-2002* [Electronic version]. Retrieved February 5, 2005, from http://nces.ed.gov/surveys/frss/publications/2004011/2.asp

[34] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms:  1994-2002* [Electronic version]. Retrieved February 5, 2005, from http://nces.ed.gov/surveys/frss/publications/2004011/2.asp

[35] Beers, K. (2003). Equality and the digital divide [Electronic version]. *Voices From the Middle*, 11(3), 4-5. Retrieved February 21, 2005,  from ProQuest.

[36] Corporation for Public Broadcasting. (2003). *Connected to the future* [Electronic version]. Retrieved August 4, 2006 from http://www.cpb.org/stations/reports/connected/connected_report.pdf

[37] Corporation for Public Broadcasting. (2003). *Connected to the future* [Electronic version]. Retrieved August 4, 2006 from http://www.cpb.org/stations/reports/connected/connected_report.pdf

[38] Corporation for Public Broadcasting. (2003). *Connected to the future* [Electronic version]. Retrieved August 4, 2006 from http://www.cpb.org/stations/reports/connected/connected_report.pdf

[39] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms:  1994-2002* [Electronic version], Note 2.  Retrieved February 5, 2005, from http://nces.ed.gov/surveys/frss/publications/2004011/4.asp

[40] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms:  1994-2002* [Electronic version], Note 2. Retrieved February 5, 2005, from http://nces.ed.gov/surveys/frss/publications/2004011/4.asp

[41] U.S. Department of Education, & National Center for Education Statistics. (2003). *Internet access in U.S. public schools and classrooms:  1994-2002* [Electronic version], Appendix A, ¶ 1. Retrieved August 5, 2006, from http://nces.ed.gov/surveys/frss/publications/2004011/4.asp

[42] All statistics this paragraph come from the methodology section of p. 8,

Corporation for Public Broadcasting. (2003). *Connected to the future* [Electronic version]. Retrieved August 4, 2006 from http://www.cpb.org/stations/reports/connected/connected_report.pdf

[43] U.S. Department of Education. (2005). *National Education Technology Plan*, Student Voices section, 1. Retrieved January 30, 2005, from http://www.nationaledtechplan.org/

[44] Trotter, A. (2004, September 1). Public schools expect 48.2 million students [Electronic version]. *Education Week*, 24(1), 9. Retrieved February 26, 2005, from http://www.edweek.org/

[45] This organization is not to be confused with one with the same name, whose mission is promoting open source educational software in South Africa.

[46] NetDay. (2004). *Voices and views of today's tech-savvy students*. Retrieved April 5, 2005, from http://www.netday.org/heroes_roberts.htm

[47] NetDay. (2004). *Voices and views of today's tech-savvy students.* About the Data section, ¶ 5.  Retrieved April 5, 2005, from http://www.netday.org/speakupday2003_report.htm

[48] NetDay. (2004). *Voices and views of today's tech-savvy students.* Student Voices section, ¶ 2.  Retrieved April 5, 2005, from http://www.netday.org/speakupday2003_report.htm

[49] NetDay.  (2004).  *Voices and views of today's tech-savvy students.*  Downloads.  Retrieved March 22, 2006 from http://www.netday.org/downloads/lesson_plan_indiv_3_12.pdf

[50] U.S. Department of Education. (2005). *National Education Technology Plan* [Electronic version], Student Voices section.  Retrieved January 30, 2005, from http://www.nationaledtechplan.org./

[51] GreatSchools.net.  School overview:  Forest Park High School.  Retrieved March 22, 2006 from http://www.greatschools.net/modperl/browse_school/va/2551

[52] SchoolTree.org.  School information:  Poway High School.  Retrieved March 22, 2006 from http://california.schooltree.org/public/Poway-High-011478.html

[53] Trotter, A. (2004, December 8). International study questions computers' aid in learning [Electronic version]. *Education Week, 24*(15), 13. Retrieved February 21, 2005, from www.edweek.org/

edweek.org. (2005). *Technology in education*. Issues/Technology in Education, Impact section, 1-2. Retrieved February 21, 2005, from http://www.edweek.org/rc/issues/technology-in-education/;

Ringstaff, C. and Kelley, L. (2002).  *The learning return on our educational technology investment: a review of findings from research.*  San Francisco:  WestEd.

[54] For one example of complexities surrounding the question of whether technology improves learning, see

Owston, R.  (1997).  The World Wide Web: A Technology to Enhance Teaching and Learning? *Educational Researcher, 25*(2), pp. 27-33

[55] Miner, B. (2004/2005). Testing companies mine for gold [Electronic version]. *Rethinking Schools Online*, 19(2). Retrieved January 26, 2006 from http://www.rethinkingschools.org/archive/19_02/test192.shtml

Olson, D. (Writer) (2005, April 17). *Testing companies score big profits* [Radio Broadcast]. Minnesota Public Radio (Producer).

[56] Buchen, I. (1999). Business sees profits in education:  Challenging public schools [Electronic version]. *The Futurist*, 33(5), 38-44. Retrieved March 2, 2002, from ProQuest.

[57]  Kronholz, J. (2003, December 24). Education companies see dollars in Bush school-boost law [Electronic version]. *Wall Street Journal*, B1. Retrieved February 4, 2005, from ProQuest.

[58] National Education Association. (n.d.)  *Stand up for children:  Pontiac v. Spellings.*  Retrieved April 24, 2006, from http://www.nea.org/lawsuit/index.html

See also,

National Education Association. (n.d.)  *Growing chorus of voices calls for adequate funding of 'No Child Left Behind.'* retrieved April 27, 2006, from http://www.nea.org/lawsuit/chorus.html

[59] Kronholz, J. (2003, December 24). Education companies see dollars in Bush school-boost law [Electronic version]. *Wall Street Journal*, B1. Retrieved February 4, 2005, from ProQuest.

[60]  Meyer, R. (2003). Captives of the script:  Killing us softly with phonics [Electronic version]. *Rethinking Schools Online,* 17(4). Retrieved February 4, 2005, from http://www.rethinkingschools.org/archive/17_04/capt174.shtml

[61]  Buchen, I. (1999). Business sees profits in education:  Challenging public schools [Electronic version]. *The Futurist*, 33(5), 38-44. Retrieved March 2, 2002, from ProQuest

[62] Levin, H. (2001). Bear market [Electronic version]*. Education Next.* Retrieved April 5, 2004, from http://www.educationnext.org/2001sp/6levin.html

[63] Darling-Hammond, L., & Sykes, G. (2003). Wanted:  A national teacher supply policy for education: The right way to meet the "Highly Qualified Teacher" challenge [Electronic version]. Education Policy Analysis Archives, 11(3). Retrieved March 22, 2006, from http://epaa.asu.edu/epaa/v11n33/

[64] Haselkorn, D. (1996, August 7). Breaking the class ceiling [Electronic version]. *EdWeek.* Retrieved April 4, 2004, from http://www.edweek.org

[65] Haselkorn, D. (1996, August 7). Breaking the class ceiling [Electronic version]. *EdWeek.* Retrieved April 4, 2004, from http://www.edweek.org

[66] See, for example, Bhatt, S. (2004, November 8).  Teaching often out of reach for minority aids [Electronic version].  *Seattle Times.*  Retrieved April 27, 2006, from http://seattletimes.nwsource.com/html/education/2002084957_diversity08m.html

[67] Hassel, B., & Terrell, M. G. (2004). How can virtual schools be a vibrant part of meeting the choice provisions of the No Child Left Behind Act? [Electronic version]. U. S. Department of Education Secretary's No Child Left Behind Leadership Summit. Retrieved January 26, 2006, from http://www.cde.state.co.us/edtech/co_etil/docs/Hassel-Terrell-VirtualSchools.pdf