PROGRESS OF TECHNOLOGY IN THE SCHOOLS: REPORT ON 21 STATES

Executive Summary

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It is very important that policymakers seeking to develop and implement school technology know what has already been accomplished and what still needs to be done. Information is required at the school, district, and state level, but unfortunately the necessary data either do not exist or are incomplete, inaccurate, untimely, or not consistent over time and across states.

High quality data that are comparable from state to state will themselves stimulate progress in properly implementing and utilizing technology in America's classrooms. States that are shown to have made the most progress will strive to maintain their high rankings. States at the bottom will be able to use that fact to argue for policies that improve state education technology standards.

While measures to assess a student's technological fluency are not yet developed, it is no longer enough for educators to simply report to policymakers that the public investment in learning technology resulted in a better student-to-computer ratio or an increase in the number of classrooms wired. Policymakers want more than anecdotes; they need evidence that their districts and states are making progress in advancing technology in their schools. We have developed a framework to provide that. It is a set of indicators for policymakers to consider when assessing whether or not schools have established the "essential conditions" necessary to begin improving student learning through technology. The seven dimensions included in the framework are interdependent components of a system: Learners, Learning Environments, Professional Competency, System Capacity, Community Connections [formerly External Support], Technology Capacity, and Accountability.

In response to the lack of accurate and current state-by-state data on school technology, the Milken Exchange on Education Technology undertook a state-by-state survey of technology in the schools during the spring of 1998. Those responsible for school technology at the state level also felt that assessments of the status of technology were tied too much to measures of equipment, and did not consider other aspects of technology planning and advancement. Thus, questions were designed to fit into what at the time of the survey were the six dimensions for gauging progress of technology in the schools developed by the Milken Exchange[1]. These dimensions have been expanded to add "Accountability" since the survey was conducted.

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[1] Lemke, Cheryl and Edward C. Coughlin. *Technology in American Schools: Seven Dimensions for Gauging Progress.* Santa Monica, CA: Milken Family Foundation, 1998.

The Milken Exchange worked with state education technology directors who distributed the questionnaires to the technology coordinators (or similar individuals) in districts in their respective states and followed up to try to maximize the response rates. Twenty-eight states participated in the survey, and 21 of these achieved response rates of at least 40% of their districts. Although there were a number of reasons for non-participation, the most frequent one was timing of the Milken Exchange survey vis-à-vis other data collection activities in the state.

We have responses from over 1,990 districts out of approximately 3,668 that were sent surveys in the 21 participating states, and the state technology coordinators in each of the 21 states indicated that the respondents comprised a representative sample for their states. This report compares districts from individual states to an aggregation of all responding districts from the 21 states that achieved at least a 40 percent response rate. The overall response rate in the 21 states was 54.3%. The caution that we are not talking about a representative national sample must be kept in mind.

We present two different types of information in this report, both of which should be helpful for policy and planning in the states. First, there are many tables that simply describe the presence or absence of certain factors or conditions, or the magnitude, frequency, or intensity of various factors. Such measures establish baseline levels for each variable for each state in this, our first report. States need to know where they are now in order to get where they want to be in the future. In subsequent years, there should be substantial interest in changes (growth or decline) in these factors as states progress with their technology initiatives at different rates. These baseline data can serve other more proximate purposes as well. The tables present data on each state separately as well as combined data for all districts that responded from all states. An individual state can compare its own data to the overall statistics and to data from any other states it considers relevant in order to see how it ranks. Although the overall figure is not necessarily the ideal, policymakers may be stimulated to act if they see their state lagging in regard to factors they see as important. And where a state is ahead of others, it may strive to keep its advantage.

The second type of information in this report is evidence on relationships among the variables that we measure. The ultimate goal of research on education technology is to identify the existence and magnitude of its impact on student learning, attitudes, and behaviors. Thus, using cross-sectional data by district we attempt to identify factors related to changes in students. Also, we believe that teacher attitudes could be significant in determining how technology impacts students, so we try to identify correlates with positive teacher attitudes about technology.

The following are some highlights from the study:

- Although many states and districts are making progress in implementing their technology plans, none are far enough along yet to expect to see major changes in student achievement due to effective use of technology.

- Overall, District Technology Coordinators (DTCs) representing 68% of students say teachers in their districts view technology as a powerful tool for helping them improve student learning, rather than just another fad being mandated by those above them.

- On average, teachers received 12.8 hours of training in technology use last year. Those with more training were more skilled in using technology. Teachers in districts representing 53% of students received some type of incentives to get technology training, most frequently participation in special workshops, additional resources for their classrooms, or release time.

- DTCs representing 64% of students say their teachers enhance their curricula by integrating technology-based software into the teaching and learning process. The more teachers use technology in various ways in the classroom, the more they recognize it as a powerful tool. Classroom use is the most important way for teachers to become convinced of technology's value. Differences in the extent to which teachers in various districts use technology in the classroom can explain 18.3% of the differences in teacher attitudes toward technology in different districts. Those who make better use of it recognize its power more. Those who use it less are more likely to feel technology is just another fad being mandated from above.

- We also tried to explain teacher attitudes toward technology by total hours of technology training, the availability of incentives to get training, the cost per student per year of the district's technology plan and percent of the district plan that has been funded. These, along with the extent to which teachers use technology in their own practice, as distinguished from classroom use, explained less of the attitudinal differences–13.8% to be precise–than what was explained by measures of the use of technology in the classroom. Clearly, when teachers use technology in the classroom they develop more positive attitudes about it, and such use is the most important way to prove its value to teachers.

- Teachers used technology less frequently in their own practice outside the classroom than in classrooms. DTCs representing 38% of students reported that

their teachers use it for administrative or classroom management tasks; 31% to communicate with colleagues. Fewer used it to get training or to contact experts.

- Approximately 15% of classroom time is spent using computers or Internet technology. According to DTCs, 56% of their students frequently use computers in at least some of their regular classrooms, 54% of students frequently become independent learners because of technology, 48% of students develop on-line research expertise, and 44% of students interact/communicate more widely.

- DTCs reported that 61% of their students become more engaged learners due to technology, 46% of their students gain a deepened understanding of academic subjects, and 28% get better grades or test scores.

- One of the most valuable results of our survey was the identification of correlates of desired student outcomes. We were able to explain between 10% and 31% of the district-by-district variance in the frequency of occurrence of the outcomes, depending upon which outcome we look at. The measures of progress being made by school districts vis-à-vis technology are better able to explain more proximate student outcomes, such as engagement in learning and student understanding of academic subjects, than outcomes that are further from actual classroom experiences, like grades, test scores, attendance, or dropping out.

- Our study found that where DTCs indicated teachers had more technology training, where there were incentives for teachers to get more of such training, and where teachers had higher technology skills, and where students are reported to be using technology in at least some of their regular classrooms, have become more independent learners, and have developed on-line research expertise, and where teachers are reported to be providing inquiry-based learning projects, to be doing more individualized instruction, and to be integrating technology-based software into the teaching and learning process, they also indicated students were more engaged in learning due to technology and that student understanding of academic subjects has deepened due to technology in the classroom.

- There is a significant and positive relationship between percent of classroom time spent using computers and technology being used in assessment (i.e., when students have to know how to use it to be assessed) and both student engagement in learning and their deepening understanding of academic subjects. However, richer technology plans and more “stuff” do not seem to affect student outcomes.

- Different and wider student interaction with the help of technology appears to enhance engagement but not understanding of academic subjects. On the other hand, more mundane uses of technology, like drill and practice, or the enticement for students to do more homework, while not necessarily engaging, do help deepen understanding of academic subjects.

- Almost all districts have formal technology plans, which on average cover 4.1 years. Cost of these plans range from $53 per student per year in Hawaii to $227 in Delaware. On average, districts have funded 44% of the cost of their plans.

- Technology is funded primarily by state and local public funds, with some help from federal programs, parents, and school fundraisers. Little private money has been forthcoming. Roughly, 23% of districts have benefited from TLCF funds and 36% from other federal funds they used for technology. Districts expect E-Rate funds to cover 13% of their budgets.

- The student to computer ratio varies depending upon how that is defined. We consider all computers capable of accessing the Internet available for student use in classrooms, labs, or library media centers. The overall ratio is 36:1 with substantial variation among states. Our ratio is larger than others are because we restrict computers to those available for student use and to those that can access the Internet.

- About 6% of computers in schools are not used, mostly because they are outdated, but often also because teachers are not trained to use them.

- Districts representing 21% of students indicated that they frequently use technology in student assessment efforts.

- Almost all districts formally track what technology is available at their schools and where it is located. Three-quarters track teacher training. Only half track how teachers and students use the technology.

- The most frequently reported progress indicators are the number of classrooms wired, anecdotes about how teachers and students are using technology effectively, the student/computer ratio, and increased administrative efficiencies.

- Support for technology (in the sense of advocacy) is highest from superintendents, students, school boards, and principals, and lowest from community groups, foundations, local post-secondary institutions and teacher associations. There is a very strong relationship between support for technology from district

superintendents and teachers (and a slightly less strong one for principals) and making progress with a district's technology plan.

- There is little school-community communication using technology, with DTCs representing only 19% of students indicating that parents and teachers can communicate via email frequently.

Districts around the country clearly have made some progress toward fully implementing technology in their schools. In subsequent years, follow-up reports will enable those interested in school technology to see what additional advances have been achieved.

Finally, our analyses underline the value of the Milken Exchange's "Seven Dimensions" framework for understanding the dynamics and progress of technology in America's schools. We have seen how the learning environment impacts student outcomes. It is clear that support from district leadership is vital for progress to be made in implementing school technology. We have confirmed the importance of teacher professional development in providing them the skills necessary to succeed in using modern technology.

All of this depends upon the quality of the information available from which we can understand the state of technology in America's schools today. This study has demonstrated the difficulty in obtaining high quality data, for example the different conclusions that can be drawn depending upon one's definition and measurement of the student/computer ratio. But we are left optimistic about what we know, about where we are, and about the good things that will happen to students when we get where we want to be.

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