Education Data in 2025

Chester E. Finn, Jr.

Chester E. Finn, Jr. is president of the Thomas B. Fordham Institute

Please join me on a short, visionary tour of American K-12 education circa 2025 so that together we can glimpse the very different roles that data have come to play in this sphere and the dramatically changed ways that the collection, analysis, and dissemination of those data are being handled. We'll start with individual students and, like the data themselves, aggregate outward and upward to larger institutional units.

Perhaps the most profound change in education statistics since the late-medieval period around 2008 is that an individual's achievement and attainment records no longer sit within the boundaries of a given school or school system, confined there either in old-fashioned paper files that must be physically copied and shipped when a student changes schools, moves to a different city, or graduates and goes on to college, or in unique databases constrained by interoperability barriers that are just as daunting.

Now personal data are saved (with elaborate safeguards) in cyberspace and secure state databases, making it easy for them to accompany students from one education level to the next and from school to school, even district to district or state to state. Picture a fully portable information "backpack" akin to Margaret Raymond's proposal in this volume, featuring what data expert Glynn D. Ligon calls a "cumulative education transcript" that recaps

one's complete educational history and track record and, in Ligon's words, "encompasses anything and everything one might need to qualify for admission, be employed, be promoted, get a scholarship, participate in NCAA athletics, take the next higher course, satisfy a community service sentence, qualify for a tax deduction, etc."

This information accumulates over time and moves with the student—a virtual backpack. The portions that, in the interests of accuracy and integrity, are legitimately "controlled" by the state—e.g., grades, test scores, diplomas and such—cannot be altered by the individual (they're under seal, akin to "read only" files) but other parts can be updated, deleted, and edited by the individuals whose transcripts these are or (for minors) by their parents. The set-up affords students and parents the right periodically to review the state-controlled data for accuracy and to flag errors or problems. Still, the state "education data bank" is where those data are primarily lodged and anyone wanting to alter his/her own data must be able to justify the change.

The guidelines and ground rules for accessing data like grades and test scores vary according to who seeks such access for what purposes. One crucial factor is whether a person's information is identifiable or not. So long as it's not—the key here is a secure student ID number—the data can be aggregated, analyzed, and used in a host of ways at many different levels of the education system (and by outside researchers) without the individual's permission. Privacy rules have been modernized; just as we trust the IRS with our financial data, we need to be able to trust our child's present school or university with his/her academic data; but we also need to be confident (as with tax returns) that while nonidentifiable data can be shared widely, any data that can be tied directly to Johnny or Mary are shared only when strictly necessary.

Well safeguarded "unique student identifier" numbers (which could, but need not, be social security numbers) now make it possible both for one's data to be readily aggregated without revealing one's identity and also for analysts to do competent work investigating things like student learning gains in various schools and circumstances. Every state employs a data security expert whose assignment is to make sure that legitimate corrections and updates get incorporated and legitimate users can gain access according to the pertinent rules, but "leaks" don't happen. These folks have a national group that sets model rules and best practices under the aegis of the National Education

Information Strategy, chaired by the federal commissioner of education statistics (more on this later).

Charting Alexandra's Progress

All students carry PDAs (or cell phones) that communicate with tracking devices in the school, and Alexandra, a typical student, is no different. Using these devices as well as swipe-able ID cards, the activities that fill her day are entered into the school data system—and, when warranted, flashed to teachers and parents. For example, each day the system calculates how much time Alexandra spends sitting and listening to the teacher, meeting with the teacher in small groups, doing seat work, taking formative assessments using her PDA, reading independently, doing math problems at a computer, playing outside, etc. This information can be used by teachers and analysts to determine how Alexandra might better use her time and the school's learning resources.

All manner of assessments (formative, summative, informal) are completed electronically, many of them through adaptive online programs. The resulting information is automatically analyzed by special software to create Alexandra's very own education data dashboard, showing what she has mastered and what she still needs to work on. Most assessments are graded by computer, though teachers read essay questions themselves and occasionally offer a separate "hand-graded" score. Instant results are available—and the formal results, checked over by a data team, are available soon thereafter. Data are transmitted through special portals linking schools, districts and the state using standardized formats and interfaces so that individual results can be shared and readily aggregated.

Alexandra's cumulating education record is periodically "sifted" by an artificial intelligence software program to answer—especially for her parents, teachers, and counselors—such profound questions as whether she is on track to be ready for college when she completes high school. What are her academic strengths and weaknesses? What does the arc of her progress look like over time? Is it accelerating? Slowing down? How about compared with other kids? Any early warning signs of academic (or other) problems that may signal needed changes of direction, maybe even swift interventions? This kind of diagnostic work can be hugely informative to the adults concerned with Alexandra's—or Anika's or Alfredo's—educational progress and prospects. Kids can also monitor their own progress via age-appropriate online systems.

Alexandra's parents can log on at will to her virtual backpack's (password-protected) cumulative report card, which is updated continually as new information becomes available, not just with test results but also with sample work, attendance information and, when warranted, teacher comments. Weekly reports are emailed to parents, as are cumulative reports (by marking period, semester, year, etc.). In response, parents can communicate with teachers (and counselors, principals, etc.) by phone, by email—the modern 2025 version of it—or via social networking websites, complete with audio and visual as well as text communications. They can also use modern means to schedule old-fashioned face-to-face conferences if necessary and practical. But a "video-conference" or "computer chat" might be just as satisfactory and practically everybody now has such capacity at both home and work.

The painless, even organic capturing of so much student-level data, particularly in the realm of academic achievement, saves tons of time that used to be given over to test-administering, attendance-taking and report-writing. This has created additional time for teaching and learning and has freed teachers, counselors, and others from many hours of traditional paperwork. The use of artificial intelligence and student performance algorithms also saves much time formerly spent in staff meetings trying to make sense of youngsters' progress and needs and determining what to do for them. Though some educators are nervous at having so many "invisible eyes" monitoring their pupils' (and their own) performance, most are delighted to be liberated from so many non-instructional chores and non-teaching responsibilities.

Schools and Beyond

Education data serve many purposes and informing those who care about Alexandra is just one of them. Many people want to know about entire schools, too, so as to judge where to enroll their kids, where to seek (or shun) teaching jobs and what units in the systems that they lead are working well or poorly. Student achievement data are also vital for tracking and comparing the performance of schools (and their leaders), the efficacy of various programs and education strategies, the instructional prowess of teachers, and far more. Masked by those impermeable and anonymous ID numbers, information about individual student performance is aggregated across pupil populations at the classroom (and teacher), school, district, state and national levels and cumulated over time. "Change" data and value-added calculations are routine.

School executives and policymakers thereby find themselves with powerful diagnostic tools that signal what is and isn't working and what may need changing or intervening in, as well as potent accountability data.

Like "CompStat" in the New York City police department, the administrative data available to school principals, district superintendents, and state officials enable them to determine which institutions, programs, divisions and individuals are on track to attain their relevant targets and benchmarks and which warrant some form of redirection. True data-driven decision making is possible, after all, only when the requisite data are comprehensive, timely and trustworthy.

The public gets data, too, and can gauge the return on its education investments. Newspapers faithfully publish England-style "league tables" showing both raw scores and value-added results for every school. Not only is the academic performance of each school, district, and state rendered transparent in relation to fixed standards as well as "value added" and "change over time." It is also easily compared across jurisdictions, thanks to the internationally benchmarked yet voluntary national standards and tests that nearly every state has embraced. The same is true of a host of key "input" and "process" measures. Thus one can determine not just how a school is doing but also how much is being spent on it and, with the help of GreatSchools. net and kindred services, how satisfied its "clients" are with various aspects of it. One can find out not only how the district's academic achievement ranks against state standards, but also what the average cost (per teacher) of fringe benefits is compared with other districts; what the system spends on technology versus personnel; how the superintendent's salary compares with others in similar posts; and on and on. Much of this information is published annually, like the 990 forms filed each year by nonprofit organizations, but some of it is updated more frequently.

How Data Enters the System

Rich as the data supply is, schools don't often need to "input" data except via their routine tasks, by which the data automatically and unobtrusively enter the information system. For example, by swiping her ID card on the scanner when she enters school on Tuesday morning, Alexandra shows that she is in attendance that day—and schools worried about kids cutting classes could have them swipe again when they enter individual classrooms—or, even better, when they exit at the end of class. This attendance information

moves automatically and instantly to teachers, to the principal's office, to the district, and to the state unit responsible for education finance — since schools continue to receive portions of their state money on the basis of average daily attendance. (Note, though, that this arrangement is also well suited to a weighted student funding system whereby the money follows the kid to her actual school: if she changes schools, her card swipe shows her attending there rather than the previous school.) Parents or other adult caregivers worried about whether their kids are actually getting to school, whether they're going to class, even what they're eating for lunch, can arrange for instant email notification whenever their child swipes her card — including in the cafeteria checkout line. And ancillary service providers — the school nurse, say, or the afterschool program operator — would also know right away if Alexandra is in school that day. Yet nobody on the staff needs to "take attendance" or fill out a state reporting form.

Sure, pupil attendance is an easy example because it's normally a yes/no proposition. So is checking a book out of the library or logging onto the school's internet server or wi-fi system. But other information can also be entered with minimal effort. Consider a teacher's written report on the child's performance in class during the previous week or marking period. Yes, she'll still have to key in the words herself, but online questionnaire-type forms that suggest categories she may want to rate or comment on can save a lot of time and effort. And once that information is entered, it can flow automatically to parents and other teachers (as well as administrators, counselors, social workers, school psychologists, special ed directors, and such), and be retained in the youngster's permanent online record. If Alexandra has an Individualized Education Program (IEP) — either the "special ed" kind or the kind that increasing numbers of schools are tailoring for every pupil — the teacher report feeds right into the system so that Alexandra's progress can be tracked in relation to her IEP benchmarks.

Teachers and Principals

Teachers have enormous information resources regarding their pupils, the progress of their classes from week to week, the extent of interaction with parents, even their own performance this year in relation to last. Ms. Akins can see at a glance how Alexandra fared in prior grades — as well as annotations from previous teachers, counselors and administrators regarding any notable

"issues." She can see which kids are doing their homework, who is attending regularly—and who missed two weeks because of illness and therefore may need extra help. She can readily determine not just how each of her pupils performed on the previous Friday's end-of-week snapshot test, but also which children did and did not attain their own learning objectives.

Ms. Akins also enters information about the instructional methods and materials that she deployed, the concepts that she covered, and the activities she led. This is coupled with the assessment data to produce information about how each kid responded to each kind of classroom experience. Ms. Akins can thereby also gauge which lessons "worked" best. It's a simple matter to compare the progress of her fourth graders with those of her fellow fourth-grade teachers this year—and with last year's fourth graders. With the touch of a finger, she can also track her students' progress against the state's latest revision of its academic standards.

Teachers and principals alike are routinely trained—both pre-service and in-service—in data analysis and its applications, meaning both that they keep getting better at it and that the system employs ever-fewer old-fashioned, statistics-averse holdouts. (Incorporating data use prowess into personnel selection, promotion, and compensation decisions has accelerated this process.)

Ms. Akins is comfortable with information technology and electronic communication. She easily receives and responds to electronic messages from parents and the principal. And 24/7 internet access and a plethora of special teacher websites give her abundant resources for planning lessons and obtaining supplementary materials.

The online material includes a massive database of formative assessments linked to state academic standards and commonly used curricular materials. The arrival of national standards and tests has made it far easier to develop national repositories of lesson plans, curricular materials and end-of-week assessment items tied to those standards and tests. These include just about everything a teacher might need—from student readings, workbooks, assignment ideas, web links and mini-tests to audio and video snippets that can be used during class, lecture notes, sample research papers, book reviews and lab reports. For every standard or curriculum unit, multiple lesson plans are available to teachers. (Some people term this "open source curricula," not unlike Wikipedia.)

Since the online curriculum "vault" now includes thousands of videos of master teachers delivering top-notch lessons, and since interactive websites host innumerable discussion groups (most of them now enabling participants

to view as well as hear and read each other), increasing portions of students' days are given over to virtual education: watching lectures, participating in online discussions, making smart use of software programs, and emailing or conversing with distant experts. What looked back in 2008 like pie-in-the-sky prophesying by Harvard business professor Clayton M. Christensen in his book, *Disrupting Class*, has actually come to pass—and then some.

Teachers have grown accustomed to rating and commenting on materials in the online curriculum vault based on their own experiences with them. As those ratings multiply, other teachers can avail themselves of the "wisdom of crowds" when deciding which to use and how to use them. Many other items deployed in the school—textbooks, library books, handheld devices, school lunch vendors, etc.—are similarly rated by teachers, staff, principal and sometimes pupils, much as "TripAdvisor" rates hotels and Zagat rates restaurants, thus enabling anyone at any level of the education system to make better informed purchasing decisions.

For their part, principals keep electronic teacher files brimming with data (as well as eyewitness impressions, student and parent and peer ratings, etc.) on pedagogical strengths and weaknesses. Linked teacher and student databases are used to generate recommended professional development activities for each teacher based on the performance of her students and the ways that they have responded to different instructional techniques. Classroom sessions are periodically videotaped and the tapes shared with online instructional mentors—some of them ed school faculty members!—who offer quick feedback to beginning or struggling teachers.

Data files showing formative and summative test scores for individual students or entire classrooms are also shared electronically with specialized pupil achievement consultants, who can offer advice to teachers about what might work for a problem student or a difficult class (much as distant radiologists can today review x-rays online and offer expert advice to whomever is treating the patient on-site).

Schools regularly calculate gain scores for each kid and every state has a robust Tennessee-style master evaluation system that spits out data on the effectiveness of individual teachers, schools, and districts based on these value-added scores. Researchers have perfected these value-added models, including tweaking them to control for outside factors affecting achievement. The system also allows districts and schools to generate measures of the achievement gains

associated with particular textbooks, teaching units, professional development activities, etc.

Every principal has at his/her fingertips a full dashboard of the information essential to lead a successful "data-driven" school, information that's sortable by class and grade, by subject and teacher, by individual student and family. Some of this information is updated daily (e.g., attendance) or weekly (e.g., pupil and classroom progress). Included here are a number of multi-year and value-added measures, such that the principal can see almost at a glance the trajectory of an individual student's educational progress, of a teacher's performance, of how last year's fourth graders are faring in fifth grade, etc. Fiscal and resource information are just as accessible, which everyone finally recognizes is vital for the success of schools whose principals have been empowered with budget and personnel authority.

School leaders also have rich sources of input *and* process data, and these are often analyzed in relation to one another. It's possible to know what the afterschool tutoring program in your charter school costs; how many people (teachers, tutors, kids, families, etc.) are taking part in it and for how long; whether the students who need it most are participating; what students are achieving by way of added learning; whether the program is more cost effective than arranging for students to be tutored online; and how all that compares with other schools and averages. These data are also widely shared. Whether one is a school system employee, an enterprising journalist, an outside scholar, or an elected official, it's feasible to engage in productivity, efficiency and cost-benefit studies of different educational institutions, programs and activities. It's straightforward, for example, for a superintendent to determine how much his school system spends on, say, information technology; what that's buying for the system by way of services and outcomes; and how this compares with other districts, state averages and so forth.

Government

State education databases are now continuous from pre-K through higher education—and compatible from state to state (as are individual transcripts) so that students who move, or who accumulate credits in more than one jurisdiction, don't have to start over again. Interoperability is taken for granted from one district to the next, from state to state, and from one level of education to the next.

Data are easily and automatically aggregated "upward" from student to classroom to school to district to state to nation and, where appropriate, into international education databases such as those maintained by the Organization for Economic Co-operation and Development (OECD).

In Washington, the National Center for Education Statistics (NCES) has undergone a rebirth. Adequately funded for the first time in history and politically insulated from Washington cross-currents, it now has four major functions: (1) aggregating local/state data across dozens of categories into intelligible, reliable and up-to-the-minute national education information from pre-K through university; (2) linking the U.S. with international data systems and linking education with other, overlapping sectors and agencies; (3) conducting certain important nationwide studies such as longitudinal tracking of child and pupil cohorts; and (4) managing the National Assessment of Educational Progress (NAEP), under the National Assessment Governing Board's watchful policy eye. The NCES commissioner also presides over a vitally important data coordination and quality control council—every state has a representative here, as do key higher education and preschool units and major vendors—known as the National Education Information Strategy (NEIS, pronounced "nice"). NCES does not, however, evaluate programs, federal or otherwise. Its job is to ensure the existence of reliable data by which others can perform evaluations.

For their part, state education data agencies have evolved from fragile, staid, and understaffed units focused mainly on the mechanics of state funding schemes into the hosts and operators of modern management information systems as well as permanent repositories of individual achievement records for current and former students. Though some were slow to make the shift, the combination of Data Quality Campaign's nudging, federal dollars for upgrading, competitiveness among governors and chief state school officers, and savvy marketing and technical assistance by commercial vendors of data systems eventually caused every state to take the plunge—and keep plunging deeper. The aforementioned NEIS council keeps them coordinated and moving forward together, able (despite software and policy shifts) to communicate smoothly with each other and with NCES.

Besides all this public-sector activity dealing with education data, the private sector is a lively, robust industry of data management systems (working off common standards and interoperability requirements imposed by their government customers), testing programs, and pedagogical products. Smart

companies provide comprehensive curricular materials created with, among other things, smart data uses (and users) in mind. Other firms help districts and states with their information system and data management needs. As in any major industry, some succeed better than others, with quality, responsiveness, and efficiency (and, of course, economy) rising to the top as companies compete to be the industry standard.

The gains since 2008 have been dramatic and the improvements impressive, but the education data world isn't perfect and likely never can be. Needs, uses, and priorities change, as technology creates fresh opportunities, and as some people think up better ways of doing things even as others flummox and exploit the system. Even in 2025, some traditional teachers and administrators remain ill-at-ease with "data dashboards." Some lackluster principals and superintendents possess data that they're not smart or brave enough to convert into decision making, even as some teachers union locals still fret that their members shouldn't be judged by student performance.

For their part, too many parents seldom focus on their children's educational progress, and some simply never learn how to access or understand the information, even as others craftily seek to manipulate data to build a falsely rosy record for their kids. (Some have even been known to change their children's names—at least their middle names—to cut off the previous "cumulative report card" and start a new one.) Security systems work well but glitches arise when equipment malfunctions, when inaccurate data are initially entered, and when people forget their passwords or undergo the trauma of "identity theft." Civil liberties groups on the left, and libertarians on the right, fret that government agencies possess more individual information than is healthy for a free society. And while data systems have grown far better at tracking young people who change schools, genuine dropouts still tend to vanish from the system.

Insatiable researchers are never fully satisfied with the available data, of course, no matter how ample and versatile these may be, and the upward aggregation of data from local schools and states doesn't work for every purpose. NCES must still do occasional sample surveys and longitudinal studies to get specific information about the country that would be too burdensome to gather from the system as a whole. Researchers still carry out "randomized field trials" of various educational methods, materials, hypotheses, and interventions that cannot be easily evaluated using existing state databases.

Still and all, the progress in education data over the past two decades surpasses that made during the previous century. Considering the size and decentralized nature of U.S. education, the sluggishness with which it has reacted to many demands for reform, and the relatively low degree of political *oomph* behind such public-sector activities as data systems, the gains have been truly remarkable. The most obvious explanation seems to be that in education, as in so many spheres of modern life, millions of people in hundreds of different roles seem finally to have realized that the more you know about it, the better your odds of improving it. The great education reform bulldozer that has been inching across the United States since (at least) 1983 needed more than a simple speedometer—and at long last it's getting a full set of essential instruments.