Remembrance of Things Passed

By Michael Marder[1]

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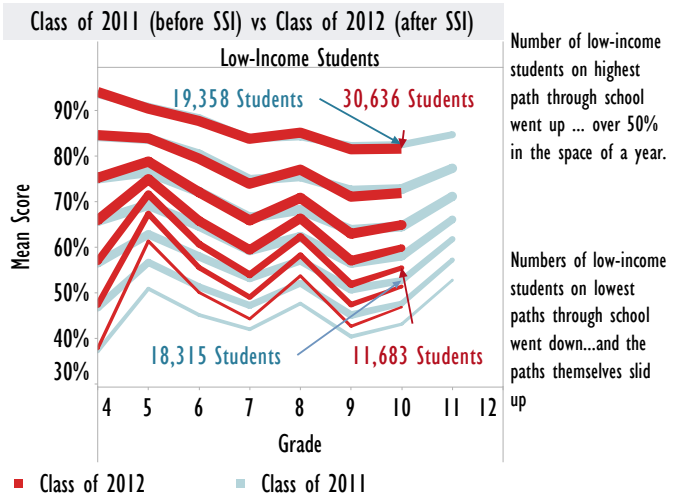
In the Spring of 2011 I printed out some pictures of the Texas educational system and stared at them with growing puzzlement. The pictures could only come from the slightly twisted mind of a physicist interested in schools. The idea was to treat students like atoms and make a fluid of them flowing through the space of grade and mathematics scores. Lines trace out the trajectories of students starting from different levels of achievment in elementary school.

What jumped out was a change between the Class of 2011 and Class of 2012. When the Class of 2012 got to 5th grade the scores leaped upwards and the number of students failing mathematics seemed almost to vanish. A similar but smaller jump upwards was visible at 8th grade. Once this new pattern showed up, it stayed for the next few years. Something had really changed. What was it?

It happened that day I was visiting the University of Texas at Austin Dana Center, which houses many of the architects of Texas educational reform of the past decades. So I started popping into offices and asking if anyone knew what was going on. They did. Immediately they started nodding and saying "That must be the SSI." I had no idea what this meant, so they explained. The Student Success Initiative (more precisely Accelerated Reading Instruction and Accelerated Mathematics Instruction) came from Senate Bill 4 passed by the Texas Legislature in 1999. The law had a grade advancement component. Once it kicked in, students had to pass reading and mathematics at grades 3, 5, and 8 or they could not go on to the next grade. That was a threatening move for students, so they got some help. They could take the exams in those grades up to three times in order to pass. Schools got money to help the students who failed, providing one-on-one or small group instruction. And the State paid for the development of instructional materials. Some folks at the Dana Center had been involved with the materials, and thought they had done a good job, helping kids really learn mathematics and not just scrape past the test by learning tricks.



Educational flow plots showing how students eligible for free and reduced lunch in Texas Classes of 2011 and 2012 performed on TAKS mathematics between 2003 and 2010. Lines trace out the trajectories through 11th grade of students who obtained the same mathematics score in 4th grade.

When did the law kick in? It did not happen all at once. It phased in one year at a time, starting with kindergarten in 1999-2000, kindergarten and first grade in 2000-2001, and so on. In short, the grade advancement and support turned on precisely so as to follow students in the Class of 2012 through school, affect the classes that followed them, and leave those before them alone. This was what had jumped out at me from the flow plots.

When I got back to the office I talked about what I had found with Tony Bendinelli, a graduate student in physics who has been collaborating on this project, helping particularly with the laborious task of obtaining data from the Texas Educational Research Center. One of my first thoughts was that of course if students get to take a test three times they will do better. But his first thought was different. He looked at me somewhat quizzically and said "So kids took a test and if they failed it they got extra help and the chance to take it again. I thought the name for that is *education*!"

We kept digging. The effects of SSI were not restricted to the grade levels with advancement policies, nor exclusively to students failing the exam. For example, in the Class of 2011, 20,000 low-income students scored above 90% on mathematics in 10th grade, while in the Class of 2012 the number rose to a bit over 30,000. Economically better-off students, those not eligible for free and reduced lunch, also benefited, although not by as much. Looked at in many ways SSI now appears a striking success.

This success was however not obvious and took a long time to establish. From the passage of SB4 in 1999 to the improvement of mathematics scores at fifth grade, six years had to pass. To see that the results persisted into tenth grade, eleven years had to pass. The State completed an evaluation report of SSI in 2009 that looked at overall numbers of struggling students in Texas, but without following any in a longitudinal fashion, concluded that the program had been completely ineffective, and

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soon after funding went away.

Texas has bragging rights to some significant educational accomplishments. On the 2011 National Assessment of Educational Progress, mathematics scores for Texas' low-income eighth graders are the highest in the country. The graduation rates for the Texas Class of 2011 were third highest in the nation among all the states and first or tied for first for White and African-American students. Unfortunately other Texas statistics are unimpressive. For example, Texas ranks 47th out of the 50 states in average SAT score. The strong accomplishments took decades to achieve and will be easier to diminish than improve.

As the Texas legislature convenes in the Spring 2013, education is sure to be one of the most hotly debated topics. What the legislature does will have great consequence. But those consequences are unlikely to be evident for a long time. In some cases, changes of significance for education are not difficult to detect. For example, as the spring semester commenced in 2011, I was overseeing 453 math and science majors enrolled in classes at UT Austin preparing to be mathematics and science teachers. Then began months of turmoil and press accounts about teacher layoffs. The number dropped to 376 the next fall then 338 in spring 2012 before stabilizing. The education workforce can respond to changes in policy or funding very quickly.

But not student achievement. Education is governed by a rule so simple that it is almost embarrassing to state, yet too important to ignore. It takes thirteen years for a student to move from kindergarten through grade twelve. Knowledge and skills build steadily over that whole time. When the members of the legislature look at where Texas schools are now, they will see the sum of decisions from many previous sessions, including House Bill 72 of 1984 that implemented reforms recommended by the Perot commission and Senate Bill 994 of 1987 that eliminated secondary education majors. A teacher who graduated from my program once said "No one goes into education to screw it up." That includes policy-makers. But as they move towards difficult decisions, I hope they look far and carefully enough into the past to understand what needs to be done for the future.

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The technical results discussed here have been published in Marder and Bendinelli, "Visualization of longitudinal student data" Physical Review Special Topics– Physics Education Research **8,** 020119 (2012), `http://prst-per.aps.org/pdf/PRSTPER/v8/i2/e020119`. The Texas Education Agency and the Dallas Educational Research Center provided the data we employed, but share no responsibility for the opinions we express.