# Would You Know a Great Teacher if You Saw One?

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**2021 Annual Conference for the Advancement of Science Teaching (CAST)**

**Presented by the Science Teachers Association of Texas (STAT)**

**Presentation for Opening Conference Session**

**November 11-13, 2021**

**100-Fort Worth Convention Center**

**Fort Worth, Texas 76102**

**Unpublished Document Completed January 25, 2025**

# Would You Know a Great Teacher if You Saw One?

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Of over 300 variables that affect student learning, the variability due to teacher efforts is the largest over which we have any control. The bottom line is that the teacher is the key to academic achievement and the best predictor of student achievement is a high-quality, effective teacher (Hattie, 2012; Johnson & Johnson, 2012; Strong, Gargani, & Haci, 2011). In 2011, Strong et al. conducted three extensive experiments in which qualified judges viewed film clips of teachers presenting lessons and then judged the teachers as either high-or -low performing. The judges' ratings in all the classes were then defined in reference to the teachers' previous-class achievement gains on standardized tests. The research findings showed the judges, no matter how experienced, were unable to identify successful teachers. Furthermore, the accuracy of the judges in identifying successful teachers was significantly lower than would have been produced by chance (flipping a coin).

Teachers' strategies cited as influencing judgments (*p.* 374) included assessing students' prior knowledge, moving around the classroom, using visuals and manipulatives, checking for student understanding, presenting concepts clearly, enabling students to generate ideas, differentiating instruction, active intervention with students, exhibiting equity and creating a stimulating classroom environment. While 45% of the evaluators mentioned the teachers' confidence, energy, or "presence", 10% valued a teacher with a sense of humor or an engaging personality. These evaluations seemed logical and many of these teaching strategies are used by most teachers. However, school research has found most of these teachers' behaviors were not related to student achievement. The authors will briefly review what the research literature has shown about student achievement.

The public schools are a fundamental element of our democratic society, and they have been the pathway to opportunity and a better life for generations of Americans. But at present, the American

public school system is in peril with Charter School Legislation. Since A Nation at Risk was published in 1983, most of the reform efforts have had no sustained track record of success. A notable exception has been the effective-schools movement. Ronald Edmonds' (1979) Correlates of student success launched the first generation of the effective schools' movement in the United States. His key principles (conditions or correlations) of effective schools were strong administrative leadership, high student expectations and a supportive school climate. Lawrence (Larry) Lezotte's (1991) second-generation correlations expanded Edmonds' research to include instructional leadership. The original focus on the curriculum was expanded to include higher-order thinking skills and problem-solving skills.

John Hattie (2012) next provided a way to quantify the effects of the first-and-second generation correlations of effective schools by using Z-form effect sizes (Z-scores of a standard normal distribution) and meta-analysis (the weighted average of the effect size of several studies combined). He listed 150 influences on student achievement (Appendix C: A List of Influences on Achievement, *pp*. 266-268). For a strategy to be considered worthwhile, it should show an improvement in student learning of at least an effect size (Z-score form) of +0.40. This represented advancing student achievement by one year or improving learning by 15% (*p*. 13). The authors have referred to Hattie's expanded research as the third-generation correlations of effective schools. His research was based on 15 years of research, more than 800 meta-analyses of 52,637 research studies, 146,142 effect sizes and about 240 million students. His six-major contributions to student learning, the percent increase in learning and the effect size (ES) of each were listed on page *14*: (**Table 2.1** Average effect for each of the major contributions to learning): student, home, school, teacher, curriculum and teaching. Using the data in **Table 2.1** and re-analyzing his *n* = 931 meta-analyses (Appendix B, *pp*. 212-265), our research agreed with what Hattie had published. In his **Table 2.1**, Hattie reported 913 meta-analyses; however, we counted 931. Hattie's number was likely a clerical typo.

We also conducted a first-order factor analysis of Hattie's **Table 2.1**, *p*.14 data. We conducted an initial principal-factor analysis (PAF) with a simple structure rotation (Gorsuch, 1983, *pp*. 188-190). Since the

factor correlations were less than 0.01, the authors conducted a principal-components analysis (PCA) and verified the findings with both a subjective test (Cattell, 1966) and parallel analysis (Horn, 1965). This expanded and broadened Hattie's 2012 research. We found three major components: the student and home together combined to account for 32% of the total variance; the teacher, curricula, and teaching combined to account for 33% of the total variance; and the school accounted for 19%. The total variance accounted for was over 80%. These findings showed the teacher was still the major contributor to student learning.

The application of the school research has improved student instruction, school curriculum, academic achievement and test-based accountability. However, research that has quantified what has worked best to increase student learning has been the most valuable. Over the past few years, the authors have successfully applied Hattie's research and documented the increases in achievement (Johnson & Johnson, 2020-21). For the previous school year, our student achievement was 62% greater than the level established by our district for 20% or more of teachers' yearly evaluation. Our key was to link research to classroom learning-and-teaching.

## Further Observations of Student Learning

Several years ago, my wife and I were speaking at a regional United States science conference. The keynote speaker was Harvard's Herbert Walberg. Up to that time, several of my teaching strategies were a lot like those mentioned at the first of this presentation. I first had very fine yearly evaluations; however, as I learned more about Z-scores, effect-size-benchmarks, high-impact teaching strategies and using effective schools research, I began changing the way I taught. As my student-achievement scores increased, my evaluation scores decreased. I was moving more from a focus on teaching (traditional professional development) to a focus on student learning. At times, the district provided teacher-and-department scores. In a report about achievement levels for the science department, my on-level classes, including special education students, outscored the whole science department: ($T$ (8) = 2.9, $p$ = .05, Glass's $\Delta$ = 1.25). Also, on the Texas' state-piloted STAAR test, I had more commended students in my

classes than any teacher teaching pre-AP or AP classes (Johnson & Johnson, 2020-21). I was using the research-based literature noted earlier in this presentation.

In another change, I reduced the time for content teaching and focused more on process instruction. At times, I also moved from process-to-application instruction. The latter was a teacher-directed class. The effective schools' literature had noted the difference in achievement by making these changes. Using the student-retention research, I usually taught the daily lesson in the students' age in minutes then helped the students with their daily assignments. I also let the students work in groups of one-to-three so they could work, learn and teach each other (Lasry, Mazur, & Watkins, 2008). Hattie (2012, Appendix C, *p*. 266) listed the effect size and increase in student learning as (ES = 0.59, +22%). This also gave each student a friend in class (relationship management). We found an acceptable grade range for any student in a self-selected group was within plus-or-minus one standard deviation of the class average (Crouch & Mazur, 2001). It takes time to learn new material, and it is unreasonable to assume students can learn the material once and recall it in few minutes. Learning takes time and practice. We generally recall 10% of what we hear, 25% of what we see and 50% of what we do. To test a single-response pattern for two comparisons, we used a chi-square test to compare retention times for content-to-process teaching and then process-to-application teaching. We first ran the content-to-process data. The chi-square score for the testing was: $X^2$ (1, $N$ = 750) = 634.80, $p \leq .001$. We next ran the process-to-application data. The chi-square findings were: $X^2$ (1, $N$ = 2162830) = 262710.01, $p \leq .001$. These results showed the changes from content-to-process-to-application confirmed the following student retention times: 30 hours (content), 30 days (process) and 30 years (application).

It seems to the authors that the reason student achievement has stayed about the same for the past half-century is that new research has not been widely disseminated to teachers or covered in professional training. In 2021, Texas lost several thousand teachers by retirement or resignation. Furthermore, about 20% of the new teachers hired in 2021 did not hold a teaching certificate. About 50% of teachers leave teaching in their first five years. They often said they were unprepared emotionally and psychologically

for what they faced in the classroom. In high school especially, those leaving said they didn't know how to manage their classrooms. Other teachers sought a promotion and left the classroom as soon as they could. Some became disconnected and simply performed their tasks. These teachers often had "curve sheets" for grading and did not work 40-50 hours a week. Last of all, the great teachers loved teaching and their students, and they stayed in the classroom. Hattie's research (2012) showed the greatest variance in school achievement was within the school itself. The new teachers will increase students' achievement by about one-half year. But for experienced teachers, the increase is three-and-a-half years.

## Other Great Researchers

Cornelius-White (2007) conducted one of the more important meta-analyses on student-centered relationships in teaching. His study sampled 355,325 students, 14,851 students and 2,439 schools. Overall, the effect size was +0.64 (+1.6 year) gain between person-centered teacher variables and student-cognitive outcomes +0.70 (+1.75 year) gain with affective or behavioral outcomes. The essence of the student-centered teacher was warmth, trust, empathy and positive relationships. The essence of positive relationships was the student seeing the warmth, feeling the encouragement and the teacher's high expectations and knowing the teacher understood (Hattie, 2012, *p.* 158). This will anchor and accelerate learning and help close the student-achievement divide.

Set academic priorities, and don't focus on Hattie's 81 low-impact strategies with effect sizes below +0.40. Some examples include the following: web-based learning (+0.18), charter schools (+0.20), special college programs (+0.18) and matching learning styles (+0.17). Teacher subject-matter knowledge (ES +0.09, +4 percent) was number 136 on Hattie's list of influences and among the smallest of all his 150 influences on achievement. The distinction was less about pedagogic content but more about how teachers organized and used content knowledge and how they taught based on their students' needs and their own goals. The great teachers had also maintained a passionate belief that all students could learn-and-meet whatever expectations the teacher had. Thus, stop overemphasizing ability and focus on student effort and progress. Begin with what the students know and can do. Hattie's research showed that Socio

Economic Status (SES) ranked number 45 on his list of 150 influences (2012, *p*. 267). In other words, 44 other influences had a greater influence on student achievement than SES. Schools cannot continue to blame students' home life, SES or motivation as an excuse for poor student progress.

Developing student expectations will increase their achievement in more than three years. Short assessments (ES + 1.84) will increase student achievement more than four years. The notion of rapid formative assessment (assessments conducted between two-or-five times a week) is very powerful as a form of feedback. Yeh (2011) compared the cost-effectiveness of 22 approaches to learning and found rapid formative assessment was the most cost-effective compared to all the following: comprehensive school reform, cross-age tutoring, increases in teacher education, teacher experience, teacher salaries, summer school, more rigorous math classes, value-added teacher assessment, class-size reduction, a ten percent increase in per pupil expenditure, full-day kindergarten, Head Start (preschool), high-standards exit exams, National Board for Professional Teaching Standards (NBTPS), higher teacher licensure test scores, high-quality preschool, an additional school year and voucher programs or charter schools. A 2022 Teacher Incentive Program in Texas allowed eligible classroom teachers with a National Board certificate to earn a recognized designation and generate allotment funds for their school, ranging from $3000-to-$9000 based on the district's location and level of socio-economic status.

## Collective Teacher Efficacy Research

Collective teacher efficacy (CTE), also referred to as collective efficacy, was identified by Hattie (2016) as the "new number one influence" related to student achievement. CTE has been defined as a faculty's collective belief in its ability to positively impact student learning and close the student-achievement gap. Hattie's new factor was based on the research of Rachel Eells (2011). She had found a very large teaching influence with a weighted-average effect size of *r*-mean 0.617 (outlier removed) and a 95% confidence interval of 0.571 to 0.659. The r-mean was then converted into a Cohen's $d = 1.57$. This was a very large effect size. In our own CTE analysis of Hattie's data (Appendix B, *pp*. 211-266), $n = 931$ meta-analyses and the published $n = 256+$ achievement influences, we found Hedges' $g = 1.62$ and an *r*-

mean value of 0.640. In our analysis of Hattie's 2012 data, the calculated effect-size mean values of his n = 931 meta-analyses for the four CTE dimensions follow: (school, 0.23000), (teacher, 0.46854), (curricula, 0.45191) and (teaching, 0.43005). The summed-mean value of 1.58 was very close to Eells' findings. The student-and-home effect-size mean values were not reported because they were not defined as components of CTE. Expect the reviewers of Eells' study to question the use of the Pearson product-moment correlations and the role socioeconomic status has played in explaining student achievement. Otherwise, her research has been well-received.

Northwest Evaluation Association's System Research

We next reviewed a Northwest Evaluation Association (NWEA) study by Hegedus (2018). The author studied the relationships between poverty and a school's academic performance (both student achievement and growth) and school-level poverty variables like free-and-reduced priced lunches (FRL). Half of a school's achievement could be accounted for by the percentage of low-income students. Furthermore, 60% of schools with the highest percentage of students from impoverished communities also had above-average levels of student growth. A slightly larger percentage of high-poverty schools were creating growth beyond the 82$^{nd}$ percentile compared to schools from wealthy communities. If schools were identified as "low performing" based on growth, their achievement levels varied greatly. This was another indication that achievement in schools did not provide meaningful information about students' actual learning in the same schools. About 80% of students' spring achievement was accounted for by fall achievement, but only about 14% of spring achievement was accounted for by fall-to-spring growth.

Since achievement was weighted heavily in many state reports, the current dynamics of our education accountability was biased against schools serving a significant population of low-income students and students of color. Educators, and the schools in which they serve, should have their success judged without an undue bias introduced because they work in the most challenging environments with the most historically marginalized populations (*pp*. 12-13).

In this section of the presentation, the authors have examined research related to student learning. We know there have always been forces opposing change: the barriers of the unknown, the wall of traditional limitations and the obstacles of personal excuses. It is also misfortunate that there has been no science of education and no practice of teaching. Perhaps our studies have helped in this regard. We don't know the impact of what has been touted as the failure of American schools; however, it has seemed that we have opened the doors of our profession to anyone. Furthermore, it seems many teachers have worked 50 hours a week or more and then should be grateful for what has equated to a family's bare-living wage. We have also illustrated several ways to incorporate evidence-based research into strategies affecting student learning. We have found many of the answers to teachers' needs for their students' achievement from our own statistical studies aligned with the research literature. Therefore, the authors will next examine the large impact of modern-school management on student achievement.

## The Impact of Modern-School Management on American Education

The rapid development of the United States from raw wilderness and frontier to the leading nation of the world is in-itself a marvel. The vast expansion of its population was made possible by the immigration of literally millions of peasants. At first glance, these immigrants, largely illiterate, would hardly seem to have been the material from which to build a complex society. However, the chief structural element which made possible this rapid development was the American public school system. In fact, the creed of the early 20th century was the democratic faith in the American common school (public school) inherited from Mann (the model of free-and-compulsory education directly imported from Prussia) but now applied to the problems of training the urban-and-rural citizenry for jobs, as well as for acculturating masses of immigrants. Schools were not only an expression of the American philosophy, but they were the most effective agent for its formulation and dissemination. Consequently, our educational system took the children of the immigrants, along with the children of the backwoods, and made them rapidly, often in only a generation-or-two, into fully American citizens and participants in an

industrial society. This success story made possible rapid-upward mobility and created our present business-oriented middle-class society (Callahan, 1962; Clabaugh & Brown, 2006).

## The Changing School Culture

Considering what American education has accomplished, one must acknowledge today the limitations-and-restrictions imposed on our public schools. Many do not see education as the silver bullet to erase poverty. They see a media which seems to devalue hard work and degrades the pleasure of learning and an electronic media which is "rewiring" the structure of students' brains. Students' writing-and-math skills are weaker today as schools are moving away from text and becoming more verbal and visual and at least 41 states do not require schools to teach cursive reading or writing. The issues and problems in education are large, and we cannot ignore these effects when talking about improving education. Schools must deal with students' problems like truancy, classroom tardies, fighting and drugs. Many students are from broken homes, and these students often have behavioral-and-emotional problems (discipline issues). Many schools have found that test scores in the 7$^{th}$ grade were identical to scores in the 9$^{th}$ grade (lost years). Students with emotional-or-behavioral disorders include: (a) an inability to learn that cannot be explained by intellectual, sensory or health issues; (b) an inability to build or maintain satisfactory interpersonal relationships with peers and teachers; (c) inappropriate types of behavior or feelings under normal circumstances; (d) a general pervasive mood of unhappiness or depression or (e) a tendency to develop physical symptoms or fears associated with personal or school problems [Code of Federal Regulations, Title 34, Section 300 7(c) (4) (*i*)]. Many of these problems of society have fallen on the public schools, and this is one reason the cost of the public schools in 2019-20 was $17,013 per student and $9,709 per student in the private K-12 schools. The average per student cost of public-school education is 58% more than for private schools.

Critics have labeled schools as "failure factories". However, they have offered little research showing the schools' solutions like vouchers, more scripted curriculum, testing and accountability schemes designed to weed out poor educators will work well or have worked. The question is how do schools deal

with these problems and how can schools' achievement be at the higher levels? First, much of the debate about public education has been offered by people who were not professional educators like school principals or superintendents. But in 2018, the Texas Education Agency (TEA) began calculating and reporting A-to-F grades for the public schools, charter networks and individual schools. Then in 2022, TEA began an update of the 2017 state accountability system. Texas' parents, educators, legislative staff and business leaders all provided input into the system. These systemic changes have all had a positive impact on Texas' education.

The news seems focused on too many negative stories since the media outlets exist first-and-foremost to earn money. The media also sells more copies by reporting negative contexts than reporting positive contexts. Reporting that "one-in-ten" students failed a school assessment test sells more copies than reporting that 90% passed an assessment exam (Milder & Braddock, 2012). What we know is that Covid severely damaged the public schools in Texas. With the Covid outbreak, nearly all public schools in the United States were closed by the end of March 2020. Some schools opened that fall while others did not fully open in-person learning until the fall of 2021. Furthermore, almost 43,000 teachers in Texas resigned-or-retired in 2021. An estimated 270,000 teachers and staff quit-or-retire across the country every year. Since the pandemic, the difference between pre- and post-Covid test score averages have declined by an average of 36% in reading and 18% in math. Since student achievement is a major criticism of Texas public education, the authors will next consider what can be done to increase school-student achievement. We will first begin with a discussion of industrial-age management in the public schools and then look at published research showing what has been done to increase student achievement.

## Industrial-Age Management in the Schools

The Industrial Revolution was a period of scientific-and-technological development from the late 18$^{th}$ and 19$^{th}$ centuries, and it largely transformed rural, agrarian societies into industrial societies. Goods that had once been crafted by manual labor began to be produced in mass quantities thanks to the introduction of new machines and techniques in textiles, iron making and other industries. The greatest changes of the

last century in politics, culture and the economy came from decentralized control and the freedom of individuals to make informed choices. As managers examined problems erupting in the production centers of society, they developed ideas about work-and-management. Topics of concern included division of labor, span of control, hierarchy, extrinsic rewards and formal rules. They argued if these scientific principles of planning, organizing, coordinating and controlling were applied to organizational settings, the results would be the efficient use of time, manpower and materials.

More often now than any time in the past, schools will not function at their maximum capacity using traditional-management methods like hierarchy, legalism and various psychological command-and-control techniques. Throughout the last century, the principles of classical management have shaped schools and other organizations worldwide. This is not to say that many of these command-and-control principles did not work; however, they were designed for a simpler world at the turn of the 20th century. Callahan (1962) and Clabaugh & Brown (2006) explained how an unprecedented flood of immigrants and the simultaneous mass movement of millions from the farms to the cities combined to create an unprecedented explosive growth of urban school populations and related costs. School administrators sacrificed educational goals to the demands of their business needs. For example, in a short time, the School District of Philadelphia built 44 new elementary and six new high schools. With this unprecedented growth in the 1900s, the schools became factories, and school administrators could have hardly avoided industrial-age management. For example, consider the United States in the summer of 1900.

The average life expectancy was 47 years of age. Only 14% of homes had bathtubs, and only 8% of homes had a telephone. A three-minute phone call from Denver to New York City was $11. There were 8000 cars in the United States on 144 miles of paved roads and the maximum speed limit in most cities was 10 miles per hour. The tallest structure in the world was the Eiffel Tower. The American flag had 45 stars: Arizona, Oklahoma, New Mexico, Hawaii and Alaska hadn't been admitted to the Union. The population of Las Vegas was 30. One-in-ten adults couldn't read or write and only 6% of the population

had graduated from high school. The school-factory model has remained dominant throughout the 20th century.

Most of the business-efficiency principles did not consider the human-relations aspects of work, students from broken homes, the social needs of community, organizational work culture, job satisfaction and dissatisfaction, failures in communication resulting from job isolation, the impact of technology, the changing education of employees or the global economic community. The daily world of schools has been clearly affected, guided and directed by the themes of classical management. Following are examples of the school- factory model that have been generated from the outdated industrial age: teaching loads of 150 or more students per day; classes of 30 or more students; isolated work with deficient time for teachers to plan together or share knowledge; few opportunities to get to know students; students challenged to learn in six, seven or eight 45-50 minute classes; little opportunity for students to be well-known by teachers; personal assistance from a counselor with a case load of 300 students; passive learning with lecture-and-seat work and large schools focusing more on controlling behavior than developing relationships and community.

Considering the business-management model, when Robert McNamara left his business position, he brought his business-management principles to the Pentagon. McNamara's career was brilliant before he served as Secretary of Defense under presidents Kennedy and Johnson. After Vietnam, McNamara spent much of his later life trying to understand what went wrong with the American war in Southeast Asia. He visited Vietnam and met with Vo Nguyen Giap, commander of the North Vietnamese forces. To understand more fully the 1962 missile crisis and find ways to avoid future nuclear confrontations, he traveled to Cuba and met with Fidel Castro. In 2005, McNamara returned to Harvard Business School and spoke with students on the topic of decision making. He stressed that rationality alone would not be expected to work by itself. He noted the final measure of management might be the willingness to examine one's own actions and seek a greater measure of wisdom (Rosenzweig, 2010, *pp.* 86-93).

McNamara's comments are certainly applicable to the mid-and-general management structures of the public schools.

A decade ago, l saw two things clearly. First, nearly all teachers entered the teaching profession with a sense of idealism-and-purpose. But as they confronted the realities and challenges of the school classrooms, they could choose from four roads: (1) quit (as almost 50% do within their first five years teaching); (2) become disconnected and simply perform the role of teaching; (3) work to become competent and seek promotion out of the classroom or (4) genuinely care for their students and experience the joy of teaching. The difference between an inspired teacher and a capable teacher is large (Hattie, 2012, *pp.* 33-35).

My second vision was to study the great-schools research and apply that literature in my classes. This led me to John Hattie's Visible Learning for Teachers (2012). At the time, this was the largest study of education in the history of the world (Johnson & Johnson, 2016). For example, Hattie's study of the effect of student homework involved 161 studies and more than 100,000 students. His research showed that homework increased student learning by about 11%; however, about a third of the students did not turn in homework. Perhaps they didn't know how to do the work, had no place to work at home or had an evening job. Why then would homework and daily work count 50% of a student's grade if homework only increased student learning by 11%? These are important questions to consider. Hattie's research brought principals'-and-teachers' questioning to a whole new level. His book was about using evidence to build-and-defend a model of teaching-and-learning. Hattie's Table 1 on the high-impact influences-and-strategies for student achievement were taken from his 2012 Appendix C, A list of influences on achievement. Hattie's initial "Visible Learning" (2009) focused on 138 influences, expanding to 150 in 2011 and then to 195 in 2015 (with the 250+ being a further update). The major differences between Hattie's 150, 195 and 250 lists reflected an ongoing process of refinement-and-research on student achievement (Killian, 2016). If educators are struggling, John Hattie's research and articles will be very helpful to teachers, department heads and school administrators. However, the school-as-a-factory model

prevailed in the public schools and has remained dominant into the 21st century. Many American public schools are failing, and teachers continue to struggle largely because American schools are organized according to a bureaucratic-business model. In 2021, over 11,000 students a day had dropped out of the public schools in the United States. Millions of Americans have questioned the viability of the public-school model, and many have noted that schools are being run like businesses producing a product. We will last look at the "backbone of education".

My Mother, My Teacher

The following story is written in memory of "My Mother, My Teacher". She believed that sometimes in life one was fortunate to be part of something great. That's why she was a teacher. Outside my home there rises a forest of towering pines. Beyond the pines is a lake bordered by willow-and-oak trees. Uncountable numbers of summer flowers have changed color, and their trembling leaves have turned from green to flashing yellow. They will soon fall to the earth, and another yearly cycle of life will have passed. The scattered seeds will lie dormant on the forest floor until the coming spring.

My mother was a Texas school teacher for 40 years. Although she was accepted to medical school as a young woman, she said her greater desire in life was to be a teacher. She always said teaching was one of the greatest professions in the world. When she taught, she provided stories with words students could relate to by connecting the stories to their personal lives and imaginations. When she saw hungry children, she organized help to provide meals. When she saw children without adequate clothing, she made sure the parents received the clothes they needed for their children.

She taught us that greatness was in developing our talents and abilities. She told us life made no guarantees we would be free of pain-or-suffering, but we should learn from our mistakes, always obey proper authority and respect our elders. She told us it was acceptable to be angry for the right reason. She also taught us how to talk with others: we should maintain eye contact, listen, tilt our heads to show interest and ask one-or-two questions. She said happiness depended on what we were, not where we lived or what we

possessed. She said the real joy of life was working, learning every day, reading, building relationships and caring for others. Her instruction was very insightful. She had three visions of the future.

My Mother's First Vision

Her first vision was her strong faith in the instrument of the common school (public school) which was inherited from Jefferson and Mann. She told us about teachers in one-room schools in Colonial America taking the children of the backwoods and in a few generations turning our primitive country into a great nation. She also told us about our first president, George Washington, and the terribly cold winter of 1777-1778 at Valley Forge. She explained in simple terms how General Washington's rag-tag army was able to defeat the most powerful military in the world. President Washington's picture hung prominently in our school. She said America was great because America was good. With about five percent of the world's population, America came to possess about a third of the world's energy resources and manufactured products and about a quarter of its raw materials.

She also foresaw the mission of public schools now applied to educating students for a rapidly- changing world. In 1895 at the age of nine, my grandfather came to Texas with a covered-wagon train from Tennessee. On April 9, 1865, his grandfather stood with General Robert E. Lee at Appomattox, Virginia with the surrender of the outnumbered Army of Northern Virginia. One of my grandfather's sons was my father, a professional Texas' school superintendent.

My Mother's Second Vision

My mother's second vision pertained to science. She said we would grow up in a world very different than we could imagine. At an early age, my parents bought us kids a telescope. We were thrilled to see Saturn in the northern night sky. With a simple cloud chamber, we were able to see subatomic alpha particles. This background let me to obtain my first university degree in science and my first patent in chemistry (U.S. Patent # 3,816,593).

Our country has achieved more in the past 100 years than in the previous 10,000 years. For example, the first atomic bomb was detonated only 80 years after the end of the American Civil War. The discovery of the planet Pluto wasn't until the year 1930 and Pluto still has not made a single revolution around the sun. The former

Senator Carl Hayden of Arizona said in his lifetime that he had watched men walk on the moon and had personally seen the campfires of Geronimo.

On December 17, 1903, Wilbur and Orville Wright succeeded in flying the first controlled flight of a power-driven, heavier-than-air "flying machine". As their plane lifted into the air, Wilbur flew their plane for 59 seconds over 852 feet. Sixty-one years later, on December 2, 1964, Lockheed's SR-71 "Blackbird" became the fastest manned aircraft ever flown. Pilots experienced the unusual sensation of seeing in broad daylight both the curvature of the earth and the stars. They could also see the shock waves forming around the aircraft as it broke the sound barrier. The aircraft still holds many speed, altitude and distance records for a manned aircraft.

The phone in our pockets has more than 100,000 times the processing power of Neil Armstrong's original Guidance Computer aboard the Apollo 11 moon mission and more than seven million times the memory. The 1971 microprocessor held about 2,000 transistors. In 2000, the number of transistors was greater than 39 billion. The population of the earth in 1800 was about a billion, in 1900 about 1.6 billion and today about 7.6 billion. By midcentury, the population of the earth is projected to be 9.8 billion. However, with very low water usage, vertical farming now holds great promise. Crop yields are projected to be 350 times greater than traditional farming and 100 times more efficient.

My Mother's Third Vision

My mother's last vision was about unimaginable technologies like AI and robotics. It took only nine months for TikTok to reach 100 million users. ChatGPT generates human-like text based on accessed data up to 2021. LINER, using the same language as ChatGPT, can retrieve information from the internet and decompose complex tasks into sub-tasks. It can also provide primary sources and delve deeper into topics as needed. Other AI tools include Midjourney, Synthesia and Eleven Labs. Socratic is a free AI source to help students with schoolwork.

Today, robots can wash dishes, mop floors, do laundry, mow the yard and clean the swimming pool. They are also performing more complex tasks in business and hospitals. Dozens of news sites online are written entirely by AI. Research varies, but some estimates conclude that AI could replace 85 million jobs by 2025. The industries affected by AI would be wide-ranging. Interestingly, AI was recently able to pass the bar exam

with similar scores to actual attorneys and answer health questions better than actual doctors. The recent advent of Salesforce's AI platform, Einstein, marked a paradigm shift in customer service. Today, it is churning out a staggering one trillion predictions weekly and revolutionizing customer service. In education, there is the potential to shape personalized learning,

engagement, data analysis, assisting students with special needs and assessing student performance. We are talking about machines with intelligence equal to humans and an aware consciousness. Seventy-five percent of federal buildings in Washington, D.C. are presently largely vacant because employees work from home. A similar situation like this could happen in education too because technologies like Generative AI will eventually be able, if desired, to craft personalized student education for every student in the United States. AI will be able to teach classes, assign work, grade all the students' assignments and post the grades for every student in the United States. We don't know the ultimate impact of AI and the robotics revolution on education. However, we do know that this technology will be able to revolutionize the entire education system of the United States. Whatever happens in the future, the public-school system as we know it today is changing, and research suggests it will continue to change.

Silence in the Land

After we learned my mother had terminal cancer, we saw her struggle to complete her 40th year of public-school teaching. She walked through the valley of the shadow-of-death and lived until the following autumn. We took my mother and my teacher to her grave in the blustery winds of November. The grass had withered. The flowers had fallen to the earth and crinkled brown leaves blew across the landscape. There was silence in the land as people from all walks-of-life shared our loss. At her funeral, people in Nocona, Texas stood in silent respect. Some sighed and other close friends wept as they stopped at the casket. The elderly told us they had known my mom from the time she was a young woman and that her father, working in the cotton gins of North Texas, had died of pneumonia. They told us my mom had always lived up to the standards of the education profession. She was a great educator: she loved both teaching and her students.

The leaves will soon again turn from brown-to-green to yellow. The stars in the night sky will continue rising four minutes earlier each day and the star Arcturus' dusk-to-dawn appearance in the night-time northern sky will

be a welcome sign of spring's returning to the Northern Hemisphere. With the new season, the green leaves and beautiful flowers of spring will again declare my mom's love of teaching, her love for all students and the wonderful opportunities education will bring to all.

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Table 1. High-Impact Influences on Student Achievement

| INFLUENCES | EFFECT SIZE | GAIN IN YEARS |
|---|---|---|
| STUDENT +15% (ES +0.39, +1.0 yr) | | |
| Student expectations (prior achievement) | +1.44 | +3.60 |
| Student Self efficacy | +0.92 | +2.30 |
| Student learning strategies | +0.86 | +2.15 |
| Seeking help from peers | +0.83 | +2.08 |
| Deliberate practice | +0.79 | +1.98 |
| HOME +12% (ES +0.31, +0.78 yr) | | |
| Socio-economic status | +0.52 | +1.30 |
| Home environment | +0.52 | +1.30 |
| Parental involvement | +0.50 | +1.25 |
| Homework | +0.29 | +0.72 |
| SCHOOL +9% (ES +0.23, +0.6 yr) | | |
| Collective teacher efficacy | +1.57 | +3.93 |
| Classroom behavior/management | +0.68 | +1.70 |
| Peer influencers | +0.53 | +1.32 |
| Classroom management | +0.52 | +1.30 |
| Principals school leaders | +0.32 | +0.80 |
| TEACHER +18% (ES +0.47, +1.2 yr) | | |
| Influencing learning (RtI Model) | +1.29 | +3.22 |
| Formative evaluation | +0.90 | +2.25 |
| Teacher credibility (for students) | +0.90 | +2.25 |
| Teacher-student relationships | +0.72 | +1.80 |
| CURRICULA +17% (ES +0.45, +1.1 yr) | | |
| Piagetian programs | +1.28 | +3.20 |
| Interventions/learning disabled | +0.77 | +1.92 |
| Vocabulary programs | +0.67 | +1.67 |
| Worked examples | +0.57 | +1.42 |
| TEACHING +17% (ES +0.43, +1.1 yr) | | |
| Rapid formative assessments (2-5/wk.) | +1.84 | +4.60 |
| Cognitive task analysis | +1.29 | +3.22 |
| Providing formative evaluation | +0.90 | +2.25 |
| Seeking help from peers | +0.83 | +2.08 |
| Classroom discussion | +0.82 | +2.05 |
| Deliberate practice/summarization | +0.79 | +1.98 |
| Feedback (provisions) | +0.75 | +1.88 |
| Teach learning strategies | +0.62 | +1.55 |
| Direct instruction | +0.60 | +1.50 |
| Cooperative learning | +0.59 | +1.48 |
| Worked examples | +0.58 | +1.45 |

Dear Dr. William,
STAT is thrilled to be able to showcase your expertise at CAST21 as we safely reunite in person in Fort Worth this November 11–13. Now more than ever it's time for inspiration, connection, and discovery with STAT!

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# What's the Latest on CAST21 and COVID?

STAT is continuing to thoughtfully move forward with plans to offer an in-person CAST21—in fact, registration/housing opened last week. Here's the latest on CAST and COVID:

- STAT will take all necessary precautions to produce a safe, responsible event, and CAST is being planned with the health and safety of attendees and our communities as the highest priority.
- The tools are in place to safely hold an event and manage the spread of COVID. Safety guidelines may include one or more of the following for all CAST participants: mask requirement, social distancing, capacity limits, vaccination proof, and/or negative test results.
- STAT will determine and publish final policies, procedures, and protocols no later than October 1, based on current data and the appropriate guidelines recommended by federal, state, and local entities.
- Stay tuned to the CAST21 COVID Safety page for updates.

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# What Are the Details for My Session(s)?

Details of your session(s) are noted below. Please note—every effort has been made to accommodate specific requests made for date and time, if applicable. Due to the size and scope of the CAST program, we are unable to accommodate changes to the day/time you have been assigned. All CAST sessions are scheduled either at the Fort Worth Convention Center or Omni Fort Worth Hotel.

| Date | Time | Session Code | Session Title | Location |
|---|---|---|---|---|
| 11/11/21 | 08:00 AM - 09:00 AM | 20162 | Would You Know a Great Teacher if You Saw One? | 100-Fort Worth Convention Center |