

# Artificial Intelligence – Integrating Machine Learning for Quality Outcomes with respect to Educational Sector

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## ABSTRACT

Artificial Intelligence is a way to deal with make a PC, a robot, or an item to think how shrewd human think. Artificial intelligence is an investigation of how human cerebrum think, learn, choose and work, when it attempts to tackle issues finally this research paper yields different clever programming frameworks for educational sector. The aim of AI is to improve computer functions which are related to human knowledge, for example, reasoning, learning, and problem-solving. The objectives of AI research are reasoning, knowledge representation, planning, learning, natural language processing, realization, and ability to move and manipulate objects and its impact in educational industry. There are long-term goals in the general intelligence sector as well.

**Keywords:** Artificial Intelligence, Intelligent Software, Reasoning, Problem Solving

## INTRODUCTION

**Artificial intelligence**—A computer system able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**Machine learning**— A Machine Learning framework ready to perform undertakings that typically require human knowledge, for example, visual observation, discourse acknowledgment, basic leadership, and interpretation between dialects.

Arthur Samuel said "Machine Learning is the capacity to learn without being unequivocally modified."

Machine learning is a technique for information examination that robotizes expository model building. Utilizing calculations that iteratively gain from information, machine learning enables PCs to discover shrouded bits of knowledge without being expressly customized where to look Machine learning works particularly well expectation and estimation when coming up next are valid:

- The sources of info are surely knew. (You have a truly smart thought of what is critical however not how to consolidate them.)

- The yield is surely knew. (You recognize what you are endeavoring to display.)
- Experience is accessible. (You have a lot of precedents to prepare the information.)

The pot of machine learning comprises of catching and keeping up a rich arrangement of information, and realizing the fortunate condition of information disclosure: the way toward parsing through the downpour of Big Data, recognizing important examples inside it, and changing it into an organized learning base for sometime later. For whatever length of time that the information streams, its application is perpetual, and we as of now observe it all over the place, from Facebook calculations to self-driving vehicles. Today, how about we analyze machine learning and its execution in the field of Education.

**Deep learning**—*From MIT News:* Modeled loosely on the human brain, a neural net consists of thousands or even millions of simple processing nodes that are densely interconnected. This is similar to synaptic connections of axons and dendrites.

**Image recognition**—Using machine and deep learning techniques to identify contents within an image.

**Architecture**—The scaffolding and blueprints of the algorithm model used to predict an outcome.

### **Eight Ways Machine Learning Will Improve Education**

Education is moving away from traditional rows of students looking at the same textbook while a teacher lectures from the front of the room. Today's classrooms are not simply evolving to use more technology and digital resources; they are also investing in machine learning.

#### **1. Support Teachers**

Machine learning is essentially mining data. The days when teachers had to rely on detailed gradebooks are gone. With machine learning, teachers have access to all their student's data in one place. In addition to carrying some of the administrative weight, machine learning also helps teachers improve their lessons by identifying where clusters of students are struggling.

#### **2. Predict Student Performance**

A major benefit of machine learning is its ability to predict student performance. By "learning" about each student, the technology can identify weaknesses and suggests ways to improve, such as additional practice tests.

### 3. Test Students

Machine learning can help move away from standardized testing according to Rose Luckin. She explains, “‘Stop and test’ assessments do not rigorously evaluate a student’s understanding of a topic. The artificial intelligence-based assessment provides constant feedback to teachers, students and parents about how the student learns, the support they need and the progress they are making towards their learning goals.”

### 4. Grade Students Fairly

Machine learning can also grade students fairly by removing human biases. While grading is now already being completed by AI for multiple choice exams, we are beginning to see machine learning also starting to assess writing with tools like Turn It In and Grammarly.

### 5. Provide Customized Learning

Machine learning also makes it possible to customize learning for each student in the classroom. Teachers will be able to use the data to see which students need additional assistance, and the technology can also suggest meaningful learning tools for each student.

### 6. Organize Content Effectively

Through identifying weaknesses, machine learning can organize content more effectively. For example, as students learn one skill, they move on to the next skill continually building upon knowledge.

### 7. Improve Retention

Machine learning, such as learning analytics, will also help improve retention rates. By identifying “at risk” students, schools can reach out to those students and get them the help they need to be successful.

### 8. Group Students and Teachers

Another way machine learning will improve education is by grouping students and teachers according to their needs and availability.

## How Is AI Used In Education -- Real World Examples of Today And A Peek Into The Future

While the discussion in regards to how much screen time is proper for kids seethes on among teachers, analysts, and guardians, it's another developing innovation as computerized reasoning and machine discovering that is starting to adjust instruction apparatuses and foundations and changing what the future may look like in training. It is normal that man-made consciousness in U.S. instruction will develop by 47.5% from 2017-2021 as per the Artificial Intelligence Market in the US Education Sector report. Despite the fact that most specialists trust the basic nearness of instructors is key, there will be numerous progressions to an educator's activity and to instructive accepted procedures.

### Educator and AI coordinated effort

Simulated intelligence has just been connected to instruction fundamentally in a few devices that assistance create aptitudes and testing frameworks. As AI instructive arrangements keep on developing, the expectation is that AI can help fill needs holes in learning and educating and enable schools and educators to accomplish like never before previously. Computer based intelligence can drive effectiveness, personalization and streamline administrator errands to permit educators the time and opportunity to give comprehension and flexibility—particularly human abilities where machines would battle. By utilizing the best properties of machines and instructors, the vision for AI in training is one where they cooperate for the best result for understudies. Since the understudies of today should work in a future where AI is the truth, it's imperative that our instructive establishments open understudies to and utilize the innovation.

### Separated and individualized learning

Modifying learning dependent on an individual understudy's specific needs has been a need for instructors for a considerable length of time, however AI will permit a dimension of separation that is unthinkable for educators who need to oversee 30 understudies in each class. There are a few organizations, for example, Content Technologies and Carnegie Learning presently creating insightful guidance structure and advanced stages that utilization AI to give getting the hang of, testing and input to understudies from pre-K to school level that gives them the difficulties they are prepared for, distinguishes holes in information and sidetracks to new subjects when proper. As AI gets more refined, a machine may be able to peruse the demeanor that passes on an understudy's face that shows they are attempting to get a handle regarding a matter and will alter an exercise to react to that. Customizing educational modules for each understudy's needs isn't practical today, however it will be for AI-fueled machines.

**General access for all understudies**

Man-made consciousness devices can help make worldwide classrooms accessible to all including the individuals who talk distinctive dialects or who may have visual or hearing hindrances. Introduction Translator is a free module for PowerPoint that makes captions progressively for what the educator is stating. This likewise opens up conceivable outcomes for understudies who probably won't have the capacity to go to class because of ailment or who require learning at an alternate dimension or on a specific subject that isn't accessible in their very own school. Man-made intelligence can enable separate to storehouses among schools and between customary review levels.

**Computerize administrator errands**

An instructor invests a colossal measure of energy reviewing homework and tests. Computer based intelligence can venture in and make speedy work out of these errands while in the meantime offering proposals for how to close the holes in learning. Despite the fact that machines would already be able to review numerous decision tests, they are near having the capacity to survey composed reactions too. As AI ventures in to mechanize administrator undertakings, it opens up more opportunity for instructors to go through with every understudy. There is much potential for AI to make more effective enlistment and confirmations forms.

**Man-made consciousness in the Classroom**

Instruction isn't invulnerable to the expanding impacts of innovation but following 10 years working in schools and the more extensive training part, I've never been more persuaded that educators are the most significant asset a school can have and the old terrify mongering that robots will supplant them couldn't possibly be more off-base. All things considered, innovation and AI will enable and empower schools and instructors to accomplish like never before previously and this is at the core of Microsoft's vision and is apparent through progressively keen applications intended to encourage teachers and understudies alike.

**Classroom Level Apps:**

Commonplace Office applications are currently 'super charged' by the intensity of the astute cloud, using Machine Learning (ML) to inject AI driven highlights into the items and help instructors enhance learning results. This is maybe most apparent in the zone of availability, where Microsoft attempts to guarantee each understudy approaches innovation in a way that will enable them to learn.

Introduction Translator is a free module for PowerPoint that makes ongoing captions of what the instructor is stating, showing them beneath the introduction. Besides, utilizing Azure Cognitive Services, AI-fueled discourse acknowledgment and interpretation enables understudies to hear or perused what is being said in their very own local dialect.

Indeed, even in classes where English is the main dialect being talked, hard of hearing or in need of a hearing aide understudies can pursue alongside the continuous interpretations, either on the instructor's showcase or by joining the discussion on their PDA. From the free application, understudies can make an interpretation of the discussion into more than 30 dialects and make inquiries by means of voice or console section, which are alternatively shown close by the educator's captions. Introduction Translator amplifies and strengthens key learning messages by exhibiting ideas both aurally and outwardly to understudies, and also giving an accessible composed transcript to amendment later.

For the outwardly debilitated, the free Seeing AI application likewise use the monstrous processing intensity of the Azure cloud to portray the world so anyone might hear to an understudy, just by taking a photograph with their cell phone. Seeing AI conveys the generally straightforward "read so anyone might hear" of content held before a cell phone camera, through to supporting an understudy by filtering money while paying with money and perusing scanner tags off items (with capable of being heard signals to encourage manage and adjust the camera). Grown to a great extent by a visually impaired representative at Microsoft, the application can even depict a scene if a photograph is accepted, for example, "I think it is a man bouncing noticeable all around completing a trap on a skateboard." For outwardly weakened understudies, having a scene in a classroom or play area freely portrayed to them is a freeing knowledge progressively conceivable through the intensity of AI.

It appears to be peculiar to propose that innovation alone can produce a more prominent feeling of consideration for understudies. However, much the same as Presentation Translator and the Seeing AI application can draw understudies into a discussion, AI controlled mechanical technology can do likewise for understudies who encounter long haul therapeutic unlucky deficiencies from their cohorts. Avatarion is a Swiss organization that manufactures robots associated with the Microsoft Azure IoT Hub that give missing youngsters a physical nearness in class, with full video and sound associations with their doctor's facility or home so they can keep on taking an interest in their learning. The tyke utilizes a tablet to control the robot's developments, discourse, send pictures to colleagues and answer inquiries by raising the robot's hand and talking through an associated amplifier and speaker. Cloud based AI screens the robot's execution consistently, sending important data back to the designers to guarantee it performs safely and reliably as it speaks to that evil tyke in the classroom.



Another mix of AI controlled applications that are making huge enhancement to proficiency levels for understudies: Microsoft Office Lens and the Immersive Reader in OneNote and Word. Office Lens is a free cell phone application that enables understudies or educators to take a photograph of content and send it to OneNote or Word where Optical Character Recognition (OCR) is performed by the Azure cloud meaning the content would now be able to be featured, have expanded dividing among words and syllables and read resoundingly utilizing the Immersive Reader incorporate ideal with center Office365 items. Free research completed in 2017 demonstrates that the utilization of Immersive Reader and Learning Tools can essentially enhance the perusing and composing dimensions of understudies and increment value to instructive assets for all understudies.

### SCHOOL WIDE AI INSIGHTS:

As the easy to-utilize applications above show, Microsoft does not anticipate that each educator will be an information researcher and AI is progressively conveyed straightforwardly through applications that can be utilized effectively by anybody. In any case, there is additionally a rich arrangement of devices in the Azure cloud that engineers can use to construct AI fueled applications for schools to saddle. Instruments, for example, the Office Graph API, Cognitive Services and Media Analytics can be joined with ML to give profound diagnostic bits of knowledge into understudy exhibitions and after that be outwardly shown utilizing Microsoft PowerBI dashboards.

The Tacoma Public School District used these for AI controlled examination and enhanced their understudy graduation rates from 55% to 82.6% through the span of six years. This was not, be that as it may, an activity in innovation in disconnection. Rather, the school set out to 'measure the entire youngster' and constructed the program in light of four objectives:

- 1.Helping understudies accomplish scholarly perfection;
- 2.Creating organizations between guardians, network, and staff in teaching youngsters;
- 3.Focusing on early evaluation and mediation to guarantee scholarly achievement; and
- 4.Creating and keeping up safe learning conditions.

By pooling all accessible institutional information on the understudies in the Azure cloud, alongside getting to extra information from government offices and even online life, the Tacoma Public

School District could utilize ML and AI to increase profound experiences into their understudies and recognize progressively any 'in danger' understudies who needed quick intercession and help.

## **An Elementary School Curriculum for the Future**

### **Module 1: Storytelling/Communications**

When I think about the skill that has served me best in life, it's been my ability to present my ideas in the most compelling fashion possible, to get others onboard, and support birth and growth in an innovative direction. In my adult life, as an entrepreneur and a CEO, it's been my ability to communicate clearly and tell compelling stories that has allowed me to create the future. I don't think this lesson can start too early in life. So imagine a module, year after year, where our kids learn the art and practice of formulating and pitching their ideas. The best of oration and storytelling. Perhaps children in this class would watch TED presentations, or maybe they'd put together their own TEDx for kids. Ultimately, it's about practice and getting comfortable with putting yourself and your ideas out there and overcoming any fears of public speaking.

### **Module 2: Passions**

A modern school should help our children find and explore their passion(s). Passion is the greatest gift of self-discovery. It is a source of interest and excitement, and is unique to each child.

The key to finding passion is exposure. Allowing kids to experience as many adventures, careers, and passionate adults as possible. Historically, this was limited by the reality of geography and cost, implemented by having local moms and dads presenting in class about their careers. "Hi, I'm Alan, Billy's dad, and I'm an accountant. Accountants are people who..."

But in a world of YouTube and virtual reality, the ability for our children to explore 500 different possible careers or passions during their K-6 education becomes not only possible but compelling. I imagine a module where children share their newest passion each month, sharing videos (or VR experiences) and explaining what they love and what they've learned.

### **Module 3: Curiosity & Experimentation**

Einstein famously said, "I have no special talent. I am only passionately curious." Curiosity is innate in children, and many times lost later in life. Arguably, it can be said that curiosity is responsible for all major scientific and technological advances; it's the desire of an individual to know the truth.

Coupled with curiosity is the process of experimentation and discovery. The process of asking questions, creating and testing a hypothesis, and repeated experimentation until the truth is found. As



I've studied the most successful entrepreneurs and entrepreneurial companies, from Google and Amazon to Uber, their success is significantly due to their relentless use of experimentation to define their products and services.

Here I imagine a module which instills in children the importance of curiosity and gives them permission to say, "I don't know, let's find out."

Further, a monthly module that teaches children how to design and execute valid and meaningful experiments. Imagine children who learn the skill of asking a question, proposing a hypothesis, designing an experiment, gathering the data, and then reaching a conclusion.

#### **Module 4: Persistence/Grit**

Doing anything big, bold, and significant in life is hard work. You can't just give up when the going gets rough. The mindset of persistence, of grit, is a learned behavior I believe can be taught at an early age, especially when it's tied to pursuing a child's passion.

I imagine a curriculum that, each week, studies the career of a great entrepreneur and highlights their story of persistence. It would highlight the individuals and companies that stuck with it, iterated, and ultimately succeeded.

Further, I imagine a module that combines persistence and experimentation in gameplay, such as that found in Dean Kamen's FIRST LEGO league, where 4th graders (and up) research a real-world problem such as food safety, recycling, energy, and so on, and are challenged to develop a solution. They also must design, build, and program a robot using LEGO MINDSTORMS®, then compete on a tabletop playing field.

#### **Module 5: Technology Exposure**

In a world of rapidly accelerating technology, understanding how technologies work, what they do, and their potential for benefiting society is, in my humble opinion, critical to a child's future. Technology and coding (more on this below) are the new "lingua franca" of tomorrow.

In this module, I imagine teaching (age appropriate) kids through play and demonstration. Giving them an overview of exponential technologies such as computation, sensors, networks, artificial intelligence, digital manufacturing, genetic engineering, augmented/virtual reality, and robotics, to name a few. This module is not about making a child an expert in any technology, it's more about giving them the language of these new tools, and conceptually an overview of how they might use such a technology

in the future. The goal here is to get them excited, give them demonstrations that make the concepts stick, and then to let their imaginations run.

## Module 6: Empathy

Empathy, defined as “the ability to understand and share the feelings of another,” has been recognized as one of the most critical skills for our children today. And while there has been much written, and great practices for instilling this at home and in school, today’s new tools accelerate this.

Virtual reality isn’t just about video games anymore. Artists, activists, and journalists now see the technology’s potential to be an empathy engine, one that can shine spotlights on everything from the Ebola epidemic to what it’s like to live in Gaza. And Jeremy Bailenson has been at the vanguard of investigating VR’s power for good.

For more than a decade, Bailenson’s lab at Stanford has been studying how VR can make us better people. Through the power of VR, volunteers at the lab have felt what it is like to be Superman (to see if it makes them more helpful), a cow (to reduce meat consumption), and even a coral (to learn about ocean acidification).

Silly as they might seem, these sorts of VR scenarios could be more effective than the traditional public service ad at making people behave. Afterwards, they waste less paper. They save more money for retirement. They’re nicer to the people around them. And this could have consequences in terms of how we teach and train everyone from cliquey teenagers to high court judges.

## Module 7: Ethics/Moral Dilemmas

Related to empathy, and equally important, is the goal of infusing kids with a moral compass. Over a year ago, I toured a special school created by Elon Musk (the Ad Astra school) for his five boys (age 9 to 14). One element that is persistent in that small school of under 40 kids is the conversation about ethics and morals, a conversation manifested by debating real-world scenarios that our kids may one day face.

Here’s an example of the sort of gameplay/roleplay that I heard about at Ad Astra, that might be implemented in a module on morals and ethics. Imagine a small town on a lake, in which the majority of the town is employed by a single factory. But that factory has been polluting the lake and killing all the life. What do you do? It’s posed that shutting down the factory would mean that everyone loses their jobs. On the other hand, keeping the factory open means the lake is destroyed and the lake dies. This

kind of regular and routine conversation/gameplay allows the children to see the world in a critically important fashion.

### **Module 8: The 3R Basics (Reading, wRiting & aRithmetic)**

There's no question that young children entering kindergarten need the basics of reading, writing, and math. The only question is what's the best way for them to get it? We all grew up in the classic mode of a teacher at the chalkboard, books, and homework at night. But I would argue that such teaching approaches are long outdated, now replaced with apps, gameplay, and the concept of the flip classroom.

Pioneered by high school teachers Jonathan Bergman and Aaron Sams in 2007, the flipped classroom reverses the sequence of events from that of the traditional classroom.

Students view lecture materials, usually in the form of video lectures, as homework prior to coming to class. In-class time is reserved for activities such as interactive discussions or collaborative work, all performed under the guidance of the teacher.

The benefits are clear:

1. Students can consume lectures at their own pace, viewing the video again and again until they get the concept, or fast-forwarding if the information is obvious.
2. The teacher is present while students apply new knowledge. Doing the homework into class time gives teachers insight into which concepts, if any, that their students are struggling with and helps them adjust the class accordingly.
3. The flipped classroom produces tangible results: 71 percent of teachers who flipped their classes noticed improved grades, and 80 percent reported improved student attitudes as a result.

### **Module 9: Creative Expression & Improvisation**

Every single one of us is creative. It's human nature to be creative... the thing is that we each might have different ways of expressing our creativity.

We must encourage kids to discover and to develop their creative outlets early. In this module, imagine showing kids the many different ways creativity is expressed, from art to engineering to music to math, and then guiding them as they choose the area (or areas) they are most interested in. Critically, teachers (or parents) can then develop unique lessons for each child based on their interests, thanks to open education resources like YouTube and the Khan Academy. If my child is interested in painting and

robots, a teacher or AI could scour the web and put together a custom lesson set from videos/articles where the best painters and roboticists in the world share their skills.

Adapting to change is critical for success, especially in our constantly changing world today. Improvisation is a skill that can be learned, and we need to be teaching it early.

In most collegiate “improv” classes, the core of great improvisation is the “Yes, and...” mindset. When acting out a scene, one actor might introduce a new character or idea, completely changing the context of the scene. It’s critical that the other actors in the scene say “Yes, and...” accept the new reality, then add something new of their own.

Imagine playing similar role-play games in elementary schools, where a teacher gives the students a scene/context and constantly changes variables, forcing them to adapt and play.

### **Module 10: Coding**

Computer science opens more doors for students than any other discipline in today’s world. Learning even the basics will help students in virtually any career, from architecture to zoology.

Coding is an important tool for computer science, in the way that arithmetic is a tool for doing mathematics and words are a tool for English. Coding creates software, but computer science is a broad field encompassing deep concepts that go well beyond coding.

Every 21st century student should also have a chance to learn about algorithms, how to make an app, or how the internet works. Computational thinking allows preschoolers to grasp concepts like algorithms, recursion and heuristics. Even if they don’t understand the terms, they’ll learn the basic concepts.

There are more than 500,000 open jobs in computing right now, representing the number one source of new wages in the US, and these jobs are projected to grow at twice the rate of all other jobs.

Coding is fun! Beyond the practical reasons for learning how to code, there’s the fact that creating a game or animation can be really fun for kids.

### **Module 11: Entrepreneurship & Sales**

At its core, entrepreneurship is about identifying a problem (an opportunity), developing a vision on how to solve it, and working with a team to turn that vision into reality. I mentioned Elon’s school,

Ad Astra: here, again, entrepreneurship is a core discipline where students create and actually sell products and services to each other and the school community.

You could recreate this basic exercise with a group of kids in lots of fun ways to teach them the basic lessons of entrepreneurship.

Related to entrepreneurship is sales. In my opinion, we need to be teaching sales to every child at an early age. Being able to “sell” an idea (again related to storytelling) has been a critical skill in my career, and it is a competency that many people simply never learned.

The lemonade stand has been a classic, though somewhat meager, lesson in sales from past generations, where a child sits on a street corner and tries to sell homemade lemonade for \$0.50 to people passing by. I’d suggest we step the game up and take a more active approach in gamifying sales, and maybe having the classroom create a Kickstarter, Indiegogo or GoFundMe campaign. The experience of creating a product or service and successfully selling it will create an indelible memory and give students the tools to change the world.

## Module 12: Language

A little over a year ago, I spent a week in China meeting with parents whose focus on kids’ education is extraordinary. One of the areas I found fascinating is how some of the most advanced parents are teaching their kids new languages: through games. On the tablet, the kids are allowed to play games, but only in French. A child’s desire to win fully engages them and drives their learning rapidly.

Beyond games, there’s virtual reality. We know that full immersion is what it takes to become fluent (at least later in life). A semester abroad in France or Italy, and you’ve got a great handle on the language and the culture. But what about for an eight-year-old?

Imagine a module where for an hour each day, the children spend their time walking around Italy in a VR world, hanging out with AI-driven game characters who teach them, engage them, and share the culture and the language in the most personalized and compelling fashion possible.

## Exponential Technologies for Our Classrooms

If you’ve attended Abundance 360 or Singularity University, or followed my blogs, you’ll probably agree with me that the way our children will learn is going to fundamentally transform over the next decade.

Here’s an overview of the top five technologies that will reshape the future of education:

**Tech 1: Virtual Reality (VR) can make learning truly immersive.** Research has shown that we remember 20 percent of what we hear, 30 percent of what we see, and up to 90 percent of what we do or simulate. Virtual reality yields the latter scenario impeccably. VR enables students to simulate flying through the bloodstream while learning about different cells they encounter, or travel to Mars to inspect the surface for life.

To make this a reality, Google Cardboard just launched its Pioneer Expeditions product. Under this program, thousands of schools around the world have gotten a kit containing everything a teacher needs to take his or her class on a virtual trip. While data on VR use in K-12 schools and colleges have yet to be gathered, the steady growth of the market is reflected in the surge of companies (including zSpace, Alchemy VR and Immersive VR Education) solely dedicated to providing schools with packaged education curriculum and content.

Add to VR a related technology called augmented reality (AR), and experiential education really comes alive. Imagine wearing an AR headset that is able to superimpose educational lessons on top of real-world experiences. Interested in botany? As you walk through a garden, the AR headset superimposes the name and details of every plant you see.

**Tech 2: 3D Printing is allowing students to bring their ideas to life.** Never mind the computer on every desktop (or a tablet for every student), that's a given. In the near future, teachers and students will want or have a 3D printer on the desk to help them learn core science, technology, engineering and mathematics (STEM) principles. Bre Pettis, of MakerBot Industries, in a grand but practical vision, sees a 3D printer on every school desk in America. "Imagine if you had a 3D printer instead of a LEGO set when you were a kid; what would life be like now?" asks Mr. Pettis. You could print your own mini-figures, your own blocks, and you could iterate on new designs as quickly as your imagination would allow. MakerBots are now in over 5,000 K-12 schools across the US.

Taking this one step further, you could imagine having a 3D file for most entries in Wikipedia, allowing you to print out and study an object you can only read about or visualize in VR.

**Tech 3: Sensors & Networks.** An explosion of sensors and networks are going to connect everyone at gigabit speeds, making access to rich video available at all times. At the same time, sensors continue to miniaturize and reduce in power, becoming embedded in everything. One benefit will be the connection of sensor data with machine learning and AI (below), such that knowledge of a child's attention drifting, or confusion, can be easily measured and communicated. The result would be a representation of the information through an alternate modality or at a different speed.



**Tech 4: Machine Learning is making learning adaptive and personalized.** No two students are identical—they have different modes of learning (by reading, seeing, hearing, doing), come from different educational backgrounds, and have different intellectual capabilities and attention spans. Advances in machine learning and the surging adaptive learning movement are seeking to solve this problem. Companies like Knewton and Dreambox have over 15 million students on their respective adaptive learning platforms. Soon, every education application will be adaptive, learning how to personalize the lesson for a specific student. There will be adaptive quizzing apps, flashcard apps, textbook apps, simulation apps and many more.

**Tech 5: Artificial Intelligence or “An AI Teaching Companion.”** Neil Stephenson’s book *The Diamond Age* presents a fascinating piece of educational technology called “A Young Lady’s Illustrated Primer.”

As described by Beat Schwendimann, “The primer is an interactive book that can answer a learner’s questions (spoken in natural language), teach through allegories that incorporate elements of the learner’s environment, and presents contextual just-in-time information.

“The primer includes sensors that monitor the learner’s actions and provide feedback. The learner is in a cognitive apprenticeship with the book: The primer models a certain skill (through allegorical fairy tale characters), which the learner then imitates in real life.

“The primer follows a learning progression with increasingly more complex tasks. The educational goals of the primer are humanist: To support the learner to become a strong and independently thinking person.”

The primer, an individualized AI teaching companion is the result of technological convergence and is beautifully described by YouTuber CGP Grey in his video: *Digital Aristotle: Thoughts on the Future of Education*.

Your AI companion will have unlimited access to information on the cloud and will deliver it at the optimal speed to each student in an engaging, fun way. This AI will demonetize and democratize education, be available to everyone for free (just like Google), and offering the best education to the wealthiest and poorest children on the planet equally.

This AI companion is not a tutor who spouts facts, figures and answers, but a player on the side of the student, there to help him or her learn, and in so doing, learn how to learn better. The AI is always alert, watching for signs of frustration and boredom that may precede quitting, for signs of curiosity or interest

that tend to indicate active exploration, and for signs of enjoyment and mastery, which might indicate a successful learning experience.

Ultimately, we're heading towards a vastly more educated world. We are truly living during the most exciting time to be alive.

### **Mindsets for the 21st Century**

Finally, it's important for me to discuss mindsets. How we think about the future colors how we learn and what we do. I've written extensively about the importance of an abundance and exponential mindset for entrepreneurs and CEOs. I also think that attention to mindset in our elementary schools, when a child is shaping the mental "operating system" for the rest of their life, is even more important.

As such, I would recommend that a school adopt a set of principles that teach and promote a number of mindsets in the fabric of their programs.

Many "mindsets" are important to promote. Here are a couple to consider:

#### **Nurturing Optimism & an Abundance Mindset:**

We live in an aggressive world, and children encounter a lot of strain to perform. When they miss the mark, they feel flattened. We as a whole bomb on occasion; that is a piece of life. In the event that we need to bring up "can-do" kids who can work through disappointment and turn out more grounded for it, it's insightful to sustain good faith. Idealistic children are all the more eager to go out on a limb, are better issue solvers, and experience positive connections. You can sustain idealism in your school by beginning every day by concentrating on appreciation (what every tyke is thankful for), or a "positive center" in which every understudy takes 30 seconds to discuss what they are most amped up for, or what ongoing occasion was emphatically impactful to them. (NOTE: I begin each gathering inside my Strike Force group with a positive core interest.) At long last, helping understudies comprehend (through information and diagrams) that the world is in certainty showing signs of improvement (see my first book: *Abundance: The Future is Better Than You Think*) will enable them to counter the constant stream of negative news coursing through our news media. At the point when kids feel positive about their capacities and amped up for the world, they will work harder and be more imaginative.

## TOLERANCE FOR FAILURE

Tolerating failure is a difficult lesson to learn and a difficult lesson to teach. But it is critically important to succeeding in life.

Astro Teller, who runs Google's innovation branch "X," talks a lot about encouraging failure. At X, they regularly try to "kill" their ideas. If they are successful in killing an idea, and thus "failing," they save lots of time, money and resources. The ideas they can't kill survive and develop into billion-dollar businesses. The key is that each time an idea is killed, Astro rewards the team, literally, with cash bonuses. Their failure is celebrated and they become a hero.

### Conclusion:

There are numerous variables that impact the improvement and selection of innovation and AI. Brad Smith, President and CLO of Microsoft, as of late composed a blog demonstrating the social changes that prompted ponies in the end being supplanted as the essential methods for transportation in New York City. Singular understudies, instructors, schools and even administrative offices will grasp innovation at various rates as they see the estimation of it for their networks.

The particular upsides and downsides of innovation in instruction have for quite some time been discussed, anyway I trust Artificial Intelligence gives the way to a stage change for the business. It isn't just 'digitisation' of existing assets or showing rehearses, rather it is including another layer of significant worth by conveying information driven bits of knowledge and apparatuses to empower access to discovering that essentially couldn't be accomplished without the intensity of the shrewd cloud. As this occurs, more understudies will be empowered and enabled to realize, who thus may proceed to be the makers of much more brilliant devices to help instruct the understudies of tomorrow.

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