

AI & PERSONALIZED LEARNING



Afomeya's Journey

BY MICHELLE ZIMMERMAN

This is a story of several generations. A grandmother, a father, a daughter. It spans time and place from Ethiopia to the United States. It's a story of a lineage from the generations that paved the way for Afomeya Hailu to experience a type of equity and access that the previous generations didn't have, and thanks to advancements in technology, there are new possibilities for people to highlight story, culture, tradition, and share important stories that anchor us to who we are and our humanity.

Afomeya Hailu is a 10th grade student. Her family is from Ethiopia. Her goal is to pursue a

career in the medical field by entering a dual enrollment program to complete her last two years of high school and her first two years of college at the same time through Running Start. Many locations around the United States have opportunities like this for students. She was recently nominated to attend the Congress of Future Medical Leaders. Afomeya is so much more than this. A brief profile is not enough to convey a full story and who each of the students in a school are as learners and individuals. Neither is assuming every learner enrolled in the same class is on the same level of experience or understanding. Within the past several months, I've had conversations with educators across the United States who assume

that all students enrolled in the same level of English Language Arts, World Language, or Math courses is a strong indicator that the majority (or even all) of the students are progressing at the same level, and that is why educators should keep the pace consistent for all learners. I'm taking a different approach to looking at how human-computer interaction can support equity and accessibility across a wide range of learning, from ethnography and humanities to mathematics. I'll begin with Humanities.

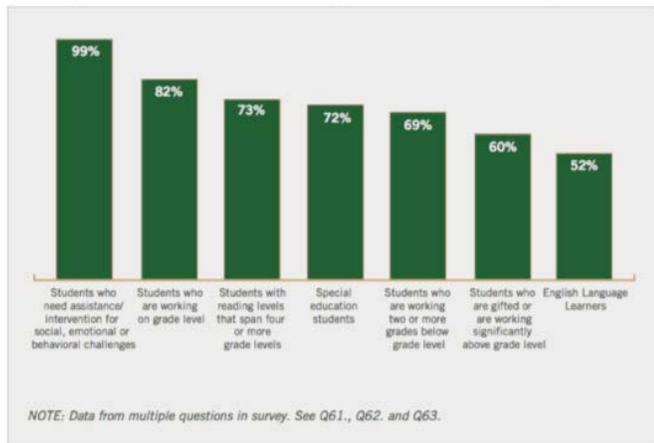
Scholastic has collected national data, surveying 20,000 educators (see more on the methodology here) about variation and classroom dynamics. 73% of educators surveyed reported that they had students in their class with reading levels that span four or more grade levels. 69% of educators surveyed identified students in their class who are working two or more grades below grade level, and 60% identified students who are gifted or working significantly above grade level. 52% have English Language Learners.

This data demonstrates that in a typical class-

CLASSROOM DYNAMICS ADD TO THE COMPLEXITY OF TEACHERS' DAY-TO-DAY MISSION

With a diverse student body, as defined by the seven metrics below, teachers are working with students of varied learning levels and characteristics. Nearly all teachers (99%) have students in their classrooms who need assistance/intervention for social, emotional or behavioral challenges and 73% report working in classrooms with student reading levels that span four or more grade levels.

Percentage of Teachers With Each Student Population in Their Classroom(s)



Base: Total Respondents. Details: page 23 in the full report. State data here.



room there is substantial variation and the discussion on equity and accessibility should be for all classrooms and all students.

EQUITY AND ACCESSIBILITY TAKE ON MANY FORMS IN EDUCATION

Beyond definitions and the ways schools address these topics, our concern should really be about finding strong matches in teaching and learning to reach the capabilities of each individual. When we do that, we have a better chance at helping them discern the right goals to set for themselves, supported by their own personal experiences.

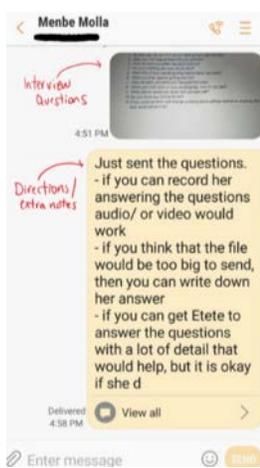
As young people go through various experiences and stages in life, we want them to know how to readjust their goals, set standards, and be able to navigate spaces in life that will be full of ambiguity, conflict and struggle. We want them to not only make it through those times, but to thrive and apply their learning to continually grow and know who they are as individuals. We want them to have the tools to support themselves as they go through life where technologies, jobs, relationships, and various types of access and accessibility shift all around them. Rather than give up, we want them to become resourceful and resilient in how they approach challenging or negative situations.

In helping young people develop skills that extend beyond the classroom, we want them to know how to direct their learning, access tools and resources to help and give them opportunities for personalized learning that also becomes very personal. Although definitions vary, personalized learning indicates that students engaging in this type of learning are not all doing the same thing at the same time.

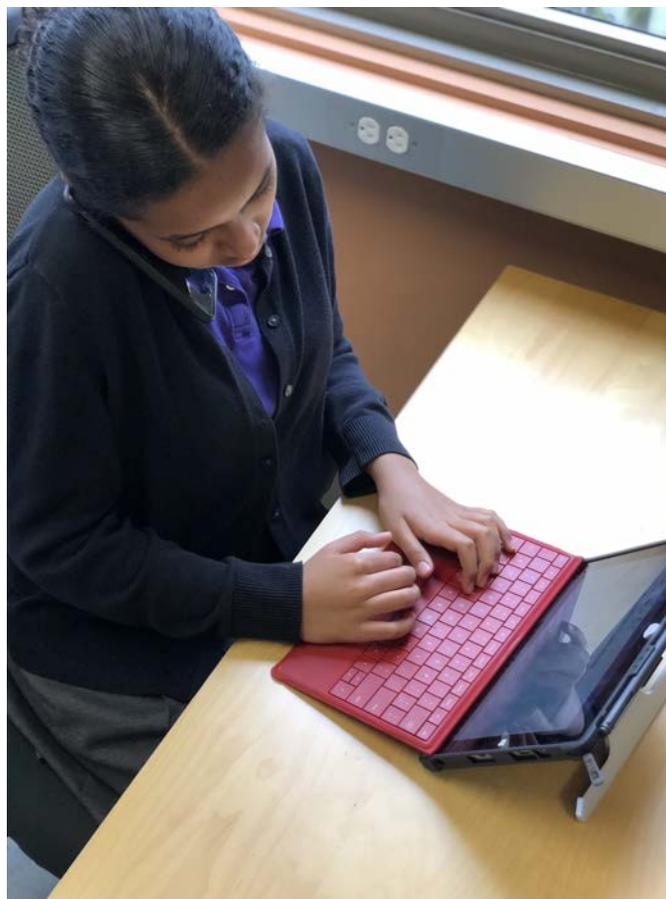
It's safe for educators to have all students engaging in content at the same pace. It feels concrete. However, it gives a false sense of security that all students are progressing at the same pace together. There are many well-meaning educators and education leaders who have been trained to think that for a typically developing classroom to be successful they should maintain the same pace for all learners.

PERSONALIZED LEARNING

Unlike more traditional approaches to education, personalized learning provides a chance to focus on a very human element of learning—the unique needs and differences of students as they explore the depths of their own curiosity. As we work to develop the capabilities in today's young people that will distinguish them from ever-smarter machines, personalized learning offers a pathway for allowing vital skills like creativity and critical thinking to flourish. At the same time, Artificial Intelligence is enabling greater levels of personalization than ever before, with tools that expand a teacher's capacity to allow



students to explore different avenues of inquiry, while gleaning valuable insights

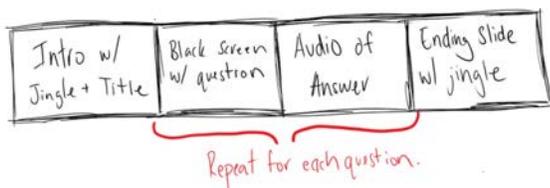


about how each young person learns. The photo above shows Afomeya using a Surface, equipped with digital ink, and her mobile device as she was interviewing her grandmother about their family's history for an Ethnography project in 9th grade.

She explained that since her grandmother lives in another state, it was hard to schedule an interview for the project as she needed her aunt to translate so they could understand each other. She sent her aunt questions in advance and while her aunt translated, Afomeya took notes. Through the process, she learned more about her family legacy and what her family experienced before arriving at the United States. A variety of tools supported Afomeya to help her achieve a

goal of learning more about ethnographies. Sway is a free tool that helped her communicate the story to a broader audience. You can see her final product here.

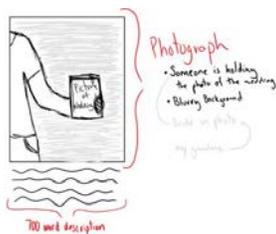
This ethnography assignment was a personalized, project-based learning experience anchored in Social Studies that turned into a video and includes multiple forms of media, the process and criteria for the project, as well as a way to share her learning with a broader audience beyond just submitting it to a teacher.



She used digital ink in OneNote to storyboard and sketch out concepts for her final layout, but machine learning assisted her in the design layout for her final presentation.

HUMANITY, CULTURE, AND STORYTELLING

This is an example of a project that places humanity, identity, culture, and storytelling as a main focus, while machine learning, a component of Artificial Intelligence, helps support in the layout and design of the final presentation, taking care of the animations in the digital artifact that can easily be shared.



In addition, the machine learning supports search features and identifies content that is tagged as Creative Commons, meaning that students can freely use, reproduce, or create knowledge with that media. Imagine Sway as

a stack of digital note cards that you can drop multiple forms of media from audio recordings and videos, to images and text, then rearrange those digital note cards, tap "play" and it takes all your content and presents it as a polished, presentable artifact at any point along the way.

ACCESSIBILITY & DIFFERENTIATED INSTRUCTION

For students who can benefit from additional language, reading, dictation, grammar and proofreading assistance, they can take this same project but lean into the support from accessibility tools. There is a course for educators called "Accessibility Tools: Meeting the Needs of Diverse Learners" that explores the features that are already built into Office 365 tools. These features use something called natural language processing and machine learning to support accessibility, and was originally created to support people with dyslexia and vision impairment.

There are so many applications for students who don't need that same kind of support but benefit from having their writing read out loud to assist in the revision process, dictation, and seeing the parts of speech highlighted in their writing.

You can learn more about accessibility tools in action, OneNote Immersive Reader, and see Karrick's story about his experience.

PERSONALIZED LEARNING SUPPORTED BY AI FOR MATH

Afomeya's personalized learning doesn't stop with the humanities. To have a stronger chance at being successful in the medical field, she needs to have a strong grasp of mathematics. If you have taught mathemat-

ics, you know you will never have a classroom of students in which all arrive with the same prior knowledge, ask the same questions, work at the same pace, or approach practicing and studying for math in the same way.

As an educator, if you are given freedom in how you choose to teach math, you may have several options to consider. One option could be to maintain consistency and cohesiveness by ensuring all students keep the same pace and progress through content together. Another option is to allow students to progress at their own pace. If you have ever tried this method, you know how difficult it can be—no, humanly impossible—to keep track of where everyone is at any given moment and assess sometimes drastically different content at the same time. Differentiated learning often involves bouncing between topics to answer questions and support student learning just in time for the next wave of questions.

Solutions now exist to support differentiated learning using the basic foundational components of AI. McGraw Hill Mathematics has an adaptive program called ALEKS. The next two images are screen shots of Afomeya's progress in Geometry for the first half of this school year. This dashboard helps identify areas that are solidly mastered and what areas she is still learning. ALEKS uses AI to help identify gaps in mathematics understanding and then helps redirect students to practice areas they need more support.



Afomeya Hailu in Teaching AI, 2018:

I was introduced to ALEKS when I was in seventh grade. When I first began using it, I was very skeptical about how it worked and the accuracy of the program. Before ALEKS, math class to me was a place where the teacher taught a lesson, and you completed an assignment. After using ALEKS for a few years now, my math classes have changed drastically. In addition to daily lessons and assignments from my teacher my math class involves working through my ALEKS course. ALEKS is an online math course that allows teachers to keep track of their students' progress in various math courses. You complete your math course at your own pace. This means in one school year you can complete multiple courses, or just one. At our school, we are required to complete at least one math course each year, and a minimum of 15 topics each week.

In each ALEKS math course, there are multiple sections, such as Linear Equations or Real Numbers. Each of these sections has multiple topics. You are given a lesson and two to three questions to answer for each topic. If you answer all the questions correctly, you pass the topic. After a certain number of topics and hours spent in an ALEKS course, each student is given a mandatory Knowledge Check. During a Knowledge Check, you are tested on the topics you have learned recently. Once you finish the test you might have to revisit a few topics based on whether you got the answers correct or not.

One thing I have found is if my daily lessons in class correspond with the topics I am learning in ALEKS I retain the information better.

Throughout the years, I have noticed that when ALEKS is used hand-in-hand with

in-class lessons and projects, it helps me understand everything more clearly. The in-class lessons help me understand the base components I need for my grade-level math, and ALEKS helps me move at my own pace in my personal math courses.

Times where I only have ALEKS are often spent completing topics but never remembering what I learned. When I only have in-class math lessons I find myself getting bored and restricted. When these two methods are put together, I have found that it is more effective for me. (Afomeya Hailu, in *Teaching AI*, 2018).

To learn more about ways Artificial Intelligence can support equity and accessibility and see more examples of Afomeya's work, along with her colleagues, read the new book, *Teaching AI: Exploring New Frontiers for Learning*. As part of my commitment to equity, student voice is woven through the book, as well as perspectives from educators from around the world.

Sharice Lee, Rhonwyn Fleming, Emelyn Sung, and Afomeya Hailu all contributed to the content of the book. They are all breaking the stereotypes for girls in STEM. They are all using AI to support their own goals for learning from forensics, to astrophysics, to film production and the medical field, each young woman has a story, a lineage, a history. Each is unique. Each is far more than a profile. Human-computer interaction, when done effectively, can help support human connection, progress, creativity, empathy, and identity. When not taken seriously and thought through, equity gaps could increase in the presence of AI. Accessibility tools allow learners to go far beyond what traditional education has afforded them the opportunity in the past.



Michelle Zimmerman, author of *Teaching AI: Exploring New Frontiers for Learning* received her PhD in Learning Sciences and Human Development from University of Washington, College of Education. She has spoken around the world including London's BETT and Croatia's CARNET. With 12 years of conducting original research at the intersection of technology and socio-cultural perspective, and implementing research into practice, she has also served on the University of Washington, College of Education Advisory Board, and adjunct at Concordia University. 18 years in the classroom (PreK -10th), her students gained international recognition through global school visits hosting Ministries of Education and Delegates at Renton Prep from China, Pakistan, Serbia, Australia, UK, Japan, Brazil, France, Germany, Taiwan, New Zealand, Wales, and Netherlands, and U.S.A among others. She is published in Springer's International Human-Computer Interaction Series and press such as *VentureBeat*, and *Forbes*. She has collaborated with industry leaders from Pixar to Lockheed Martin, Valve, and *Scientific American*. As a Microsoft Innovative Educator Expert, she's been selected three consecutive years as Microsoft MVP for global impact, has briefed Satya Nadella and his executive team, and was invited to contribute at a Microsoft Leadership Summit in Singapore in 2018 and Paris in 2019 and her leadership has led to her school, Renton Prep, being the first K-12 school in operation in the United States to be selected among 17 global schools to be identified as part of the Flagship Schools Program.