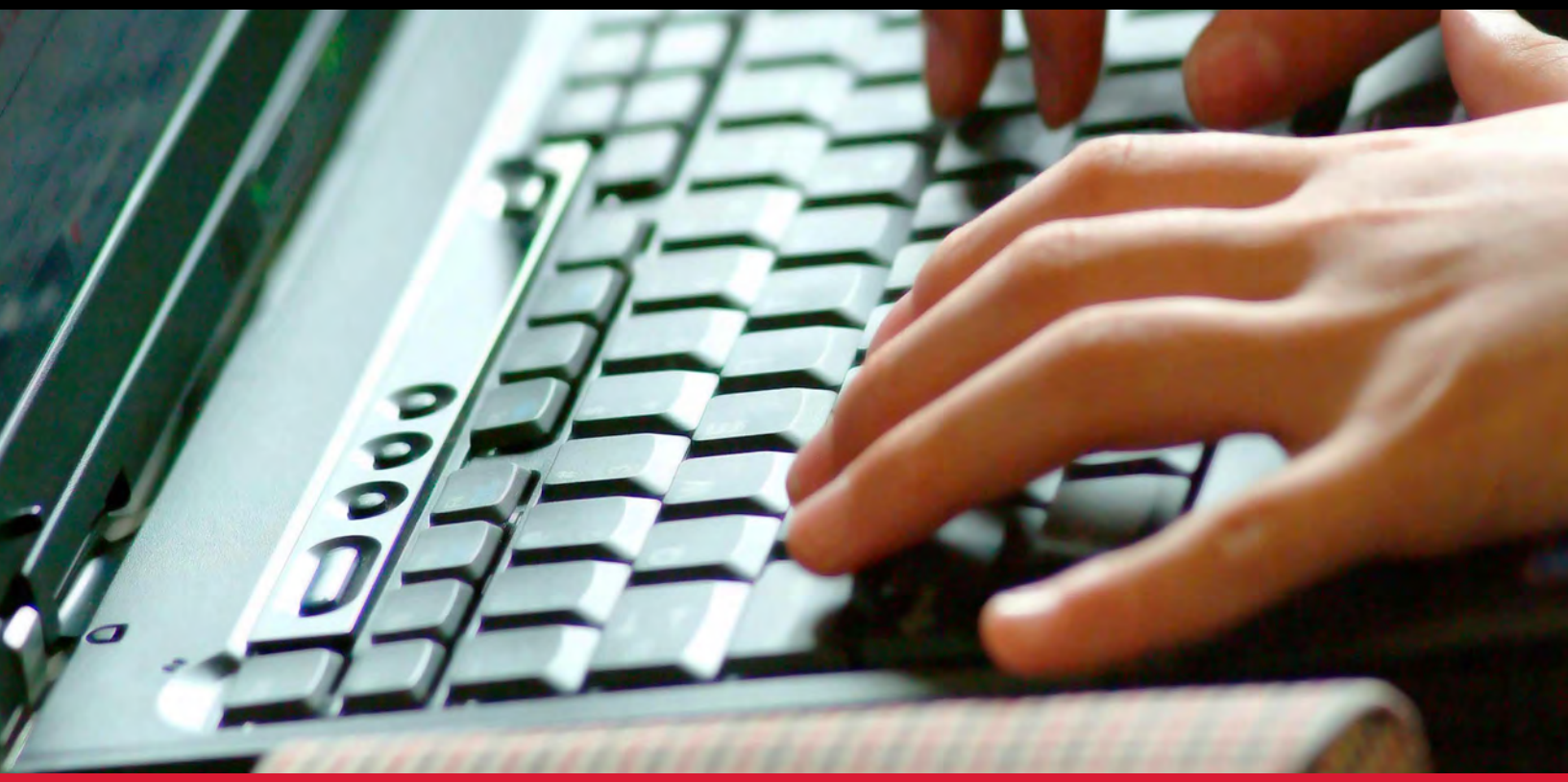
How Educators Use Technology and Data to Guide Teaching and Learning



Saint Mary's University OF MINNESOTA

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Education professionals already know that, like every other aspect of modern life, digital technology has transformed education. Those interested in earning advanced degrees in learning design and technology may already know that 92% of advanced placement teachers say the Internet is now the go-to method to find content and resources. However, according to the same study, this digital resource is a double-edged sword: More than 40% of those surveyed say the abundance of digital tools has forced them to work harder in order to remain effective.

Having a deep understanding of technology and knowing how to best incorporate it into teaching are requirements for educators seeking to excel in their professions.

Consider these other facts from a PBS LearningMedia 2013 survey of pre-K to 12th-grade teachers:

- Nearly half (48%) of teachers use technology to build online lesson plans.
- 45% say they use it to provide students access to web-based educational games or activities.
- Nearly as many (43%) say they employ online video, images, and articles in their work.
- 65% rely on technology for class demonstrations.
- 90% have access to at least one PC or laptop for their classroom.
- Six in 10 teachers use interactive Smart Boards or Smart Technology.
- More than one-third (35%) say they use a tablet or e-reader in their classrooms.

Today's educators must keep pace with increasingly tech-savvy students. A 2014 Pew report found about half of U.S. teens own smartphones and more than 80% use social networking sites. (This digital overload has made teaching even more challenging: The majority of teachers classify today's students as an "easily distracted generation with short attention spans.")

In order to enjoy continued success in the education field, it is essential that educators remain up to date on the latest digital trends and tools (as well as the role technology plays in the lives of their students). This guide offers teaching professionals an overview of how technology has transformed day-to-day teaching, how it has changed the learning landscape, and steps teaching professionals can take stay ahead of the curve.

Chapter 1: Teaching Methods

In the last 20 years, technology has reshaped the K-12 teaching environment. One subtle illustration of this transformation can be found by visiting Edutopia, an education-focused online resource first launched in 1991 for teachers. Search "topics" on the site, and visitors will find less than 50 articles on such traditional subjects such as "Instructional Coaching," "Libraries," and "Standardized Testing." But click on the phrase "Classroom Technology" and more than 1,000 articles appear.

In today's classroom, time-tested teaching methodologies such as lectures, homework, textbook assignments, and group projects still have their place, but now digital technology plays a role in each of these. Lectures, for instance, can still be lectures, but they can also be podcasts, online videos, and visually appealing Prezi presentations. Students can still sit in class and complete tasks – they can also complete lessons online using laptops, tablets, and phones. These are just a few examples of a larger trend: The "flipped" classroom, where instructors encourage students to use an array of digital resources to

gather foundational content and then use the classroom to share their findings.

Below are some of the most mainstream K-12 teaching methods – and how those methods have been enhanced through technological resources now available:

Differentiated learning – encourages instructors to tie academic goals directly to each students' interests and capacities. Many technological tools are available for teachers who want to keep to students engaged while personalizing instruction. For instance, free online resources offer interactive lessons, audio and visual tutorials, and multi-subject downloadable apps for students and instructors. These are some of the best online learning resources:

- PBSlearningmedia.org (multiple subjects)
- newseumed.org (media literacy)
- nsta.org (science)
- illuminations.nctm.org (math)

Individualized learning – calls for lesson plans to be calibrated to meet the student's individual pace. The end goal is the same for all students, but this approach focuses on "when" rather than "how." Technology is particularly effective in this approach because online technology meshes well with pacing and time management. In this case, online learning augments and reinforces classroom activities. Minnesota has several resources for individual learning plans:

- ReadySetGo (high school students earn tuition-free college credits while still in high school)
- Minneapolis Public Schools ILP (reading and writing resources)

Personalized learning – also known as personal learning plan (PLP), is a hands-on education technique tailored to the preferences and interests of various learners, as well as instruction that is paced to a student's unique needs. Amy Moynihan, Content Manager at Hanover Research, writes in teachthought.com that this approach in particular has benefited from the digital revolution. That's because digital resources such as cloud computing, mobile learning, advanced analytics, open content, and virtual laboratories have resulted in "flexibility in the personalization of learning, while also expanding learning capabilities beyond the classroom walls." The Minnesota Department of Education offers a toolkit to help educators form PLPs.

- Minnesota Department of Education Personal Learning Plans Toolkit

Technology is not only enhancing established approaches to teaching; it is also helping to incubate new ones. One prominent example of this is the **Teach to One** [JH8] method. Teach to One is almost entirely digitally based approach to teaching, where each student is given a new, customized syllabus every day. Most of the work is done online and when the day is complete, students complete 10-minute, online assessments documenting their progress.

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Chapter 2: Types of Technology

Teachers are using a wealth of technological tools in today's classrooms. New devices and apps are introduced almost daily, and they generally fall into four categories: smartphones, tablets, wearable technology, and laptops/netbooks.

Smart Phones

With about half of U.S. students now using smartphones (and with that number climbing), teachers are embracing the smartphone in the classroom. That's because the typical smart phone can support a multitude of apps, and the popularity of education-oriented apps has exploded recent years. Also, the price is right. Google, Apple, Microsoft, and other tech giants offer hundreds of free learning apps. In 2012, TechCrunch reported that 20 million students and teachers were using Google Apps for Education, and it estimates another 5 million new users will have downloaded the technology each year since.

Tablets

Like smart phones, the popularity of tablets such as iPads is booming. IDC Research reported on TheJournal.com that more than 3 million tablet users are students. Like smart phones, tablets can support numerous education apps. A tablet lends itself to learning better than a smartphone because their enlarged sizes make them easier to use, especially for younger children and students with special needs.

Wearable Tech

Wearable technology refers to clothing and fashion items that double as electronic devices because software and electronics are embedded into the products. This is a relatively new addition to the growing catalog of technological toys, and teachers are reporting success with using wearable tech items such as activity trackers in the classroom. Activity trackers measure user movement, so they can serve as interactive learning tools allowing students to document their own activities and analyze the data. Similarly, GoPro – wearable cameras – are catching on with kids as a creative way to document their day-to-day activities and create imaginative POV (point of view) projects.

Laptops and Notebooks

Pearson conducted polls in 2013 and 2014 to gauge usage of laptops in elementary, middle, and high schools and found that students reported using laptops more than smartphones, tablets, and other electronic devices.

Here is a look by device:

- Laptop, notebook, Chromebook: 71% in 2013 and 73% in 2014
- Smartphone: 50% in 2013 and 62% in 2014
- Tablet: 41% in 2013 53% in 2014

The use of laptops and notebooks in the classroom has educators divided. Some say they are distractions that detract from learning, while others say they enhance classroom learning. Psychological Science reports that researchers found that college students who took notes on laptops didn't do as well as students who took longhand notes. Laptops – and all technological devices – can hinder discussions while students multitask across multiple devices.

On the other hand, when used properly, technology can enhance teaching and learning in the classroom. Today's teachers and school administrators must find balance between multiple-screen technology and traditional face-to-face pedagogy, which will help students find that balance outside the classroom. The next section looks at how education administrators use technology to improve teaching and learning, enhance communication, and measure students' performance.

Chapter 3: How Education Administrators Can Leverage Technology

Just as teachers working in a classroom setting rely on technology in their day-to-day work – education administrators use a variety of technology to do their jobs.

In addition to mastering and understanding the technology that teachers and students use on a daily basis, there are also technologies that school administrators can turn to operate more productive and efficient learning environments. At a high level, these include:

- Apps that enable easy record keeping and note storage: Instapaper, CloudOn, and Evernote.
- Cloud-based storage sites that help school administrators safely store documents and collaborate on them with other administrators, teachers, and parents: Dropbox, Evernote, and Google Docs.
- Professional and learning networks where educators share webinars and other content: edWebtv.net.
- Student information systems, which allow educators to share information with each other, as well as with parents and students: Alma, Blackbaud, Parent Vue, and STARS. Education administrators will find hundreds of user-reviewed SIS platforms in this searchable database from Capterra.

School officials are also expected to have insight into social media sites such as Twitter, Facebook, and others, which they can use to share information with other teachers, students, and parents, as well as promote their schools and upcoming events.

NCLB, ESEA, and Technology

In 2002, the U.S. government authorized the No Child Left Behind Act, and the current administration has proposed an updated Elementary and Secondary Education Act, which will build on NCLB to expand equal education opportunities, expand early learning opportunities, improve teacher and administrator preparation, and invest in innovation. These federal mandates, and the state laws that enforce them, require education administrators to become well versed in data collection and analysis so they can qualify for federal funding.

Education administrators use technology to collect and analyze data documenting progress for students, classes, teachers, schools, and districts. They analyze data sets reflecting student and class assessments, results of instructional programs, demographics, attendance, and dropout trends. Minnesota's standardized test – the Minnesota Comprehensive Assessment (MCA) – measures student performance in reading, math, and science in public schools. School administrators must monitor how well their classrooms are doing and provide their faculty with resources to prepare students for the tests.

This level of understanding is essential. According to the American Association of School Administrators "In data-driven districts, superintendents work … with other administrators, teachers, principals and parents to ensure all children achieve. … Data provide quantifiable proof, taking the emotion and rancor out of what can be tough calls for superintendents and school boards … Data also provide the substance for meaningful, ongoing dialogue within the educational community."

The Institute of Education Sciences offers data tools that help educational administrators collect, compare, and analyze data into meaningful, actionable reports. They use spreadsheets like Excel and Google Sheets, as well as web-based data analytics tools. Here are some of the free ones recommended by online tech magazine ComputerWorld.com:

- **OpenRefine** (formerly Google Refine) – cleans messy data tables
- Google Fusion Tables – turn data into charts and maps
- Dataviz.org – convert data into maps and timelines
- Google Chart Tools – customizable chart templates
- TimeFlow – analyzes data that have time-based milestones
- Wordle – create word clouds from qualitative data

Education administrators share learning from data with curriculum designers, who improve curriculum and support teachers. The U.S. Bureau of Labor & Statistics predicts higher than average growth for instructional coordinators (which include curriculum designers) through 2022, and the next section will explore how curriculum designers leverage technology.

"Curriculum designers must consider the multiple ways teaching and learning take place in the classroom"

Chapter 4: How Curriculum Designers Can Leverage Technology

Curriculum designer is another advanced role for education professionals who want to impact teaching and learning on a wider scale and doesn't require much classroom time. The position requires an understanding of today's technology – and emerging technologies. And curriculum designers rely heavily on data analysis, which they use to predict needs as they design the next generations of teaching tools. Curriculum designers must consider several factors when designing curriculum:

- Teaching trends
- State and federal regulations
- Grade level
- Subject matter
- Learning objectives
- Visual elements that enhance learning
- Interactive elements that make learning fun
- Technology

Curriculum designers must consider the multiple ways teaching and learning take place in the classroom and incorporate these technological devices into their courses. An integrated curriculum might include these components:

- Written: Lesson plans, syllabus
- Taught: Instructional materials
- Supported: Textbooks, audiovisual, online, labs, hands-on tools, guides for real-world experiences (museums, science centers), homework
- Assessed: Quizzes, tests

Technology can play a role in every component of curriculum. Curriculum designers must consider the many types of technology tools that teachers use in lesson plans. In addition to the tools described in previous sections of this eBook, instructional designers look at ways teachers enhance classroom teaching:

- Secure social networks: Edmodo, OpenStudy
- Communication platforms to connect classrooms around the world: Skype, Google Chat, ePals
- Presentation platforms: Prezi, Pinterest, and Slideshare
- "Guest" presentations: YouTube, TED-ed

Technology and data are changing the way students learn, and teachers, principals, education administrators, and curriculum designers are challenged to stay on top of advances technology. Saint Mary's University of Minnesota offers two masters degrees that prepare educators for the future of education and technology: Master of Arts in Educational Leadership and Master of Education in Learning Design and Technology. Each degree program is essential for leaders in education to remain abreast of the newest technology and trends in teaching. With continued learning, educators are better equipped to raise the standard for student learning and design a curriculum that prepares students to become valuable members of the workforce and community. The next two sections briefly describe those programs, and explain how they impact the educational landscape of today's students.

Chapter 5: Master's Degree in Educational Leadership

Educational Leadership in K-12 systems takes many forms. In the early part of the 21st Century, fresh thinking and creative strategies require educational leaders to embrace technological tools and solutions. The roles where in which people with Master's in Educational Leadership might work:

- Teacher leader
- Public or private school principal*
- Administrator in private, parochial, or charter schools
- Dean of students
- Chief learning officer
- Superintendent, district or statewide*
- Designing curricula, state, regional or national level

Compensation for these areas of work depend on where you work. In general, education administrators earn a median of $90,000 while instructional developers earn a median of $60,000. If you're designing coursework for a private company, however, the salary is likely to be higher while benefits might be lower. (Salary information is taken from Bureau of Labor Statistics.)

A review of the courses needed to obtain a Master's in Educational Leadership include:

- Facilitation Through Communication
- Educational Research
- Adult Learning
- Promoting Change
- Curriculum and Instruction
- Multicultural Leadership and Team Building
- Ethics and Law

On the last point, since technology has had a greater presence in education, a number of ethical and legal issues have emerged. School leaders must stay up to date on legal and ethical policies that influence how teachers, students, and families share information. They must protect children from online predators, respect copyrights of other publishers, and secure sensitive and private information.

Chapter 6: Master of Education, Learning Design and Technology

Very few things light up a child's interest more than working, playing and learning via a screen. A Master of Education in Learning Design and Technology fosters technology integration in the classroom, library or similar environment. The roles in which people with Master of Education, Learning Design and Technology might work:

- Teacher*
- Curriculum Designer
- Curriculum Specialist
- Instructional Coach
- Technology Integrationist
- Superintendent or Assistant Superintendent of Instruction*

This degree is first and foremost designed to make great teachers even better. The program increases a teacher's knowledge and ability to build their students' comfort and safety levels with computers, digital devices, and other tools. Other career areas worth considering, however, might be working at online education forums for kids, such as Code Academy or Khan Academy, just to name two out of many.

The BLS Occupational Outlook Handbook puts median pay for instructional coordinators (which include curriculum designers) with master's degrees in the $60,000 range.

The Saint Mary's University of Minnesota courses are separated into Phases of Learning:

- Ignite – inspiring educators to become lifelong learners themselves
- Center – using technology and science
- Design – designing creative environments and mindsets to motivate learning
- Exchange – communicating through multi-media
- Initiate – evaluating trends, influencing policy, promoting educational equity

The goal of the Saint Mary's University coursework is to increase student engagement and understand how powerful technology can be in the teaching and learning process.

Take the Next Step

Digital technology has rewritten the rules for education professionals. No longer is it enough to simply have a passion to teach and help shape future generations. Now, to be effective in the field and to enjoy a rewarding career, it is equally important to be in tune with the ever-changing high-tech landscape. Professionals in the field must stay abreast of the latest technology to do their jobs better, and stay ahead of their students.

*This is not a licensure preparation program for K-12 administrative licensure. If you are looking to become a Principal, Director of Special Education, or Superintendent in Minnesota, the completion of an education-related master's program allows you to enter the Saint Mary's HYPERLINK "https://www.smumn.edu/academics/graduate/education/programs/ed.s.-in-educational-administration"Ed.S. in Educational Administration to complete coursework and field experience in preparation for licensure. If you are looking to become a K-12 public school administrator in another state, it is your responsibility to check with the administrative licensing body in your state for specific licensure preparation requirements.

Reference guide

http://www.pewinternet.org/2013/02/28/how-teachers-are-using-technology-at-home-and-in-their-classrooms/
http://www.slideshare.net/PewInternet/how-teens-do-research-act-college-planners-pdf
http://www.pbs.org/about/blogs/news/pbs-survey-finds-teachers-are-embracing-digital-resources-to-propel-student-learning/
http://www.edutopia.org/blogs/tag/classroom-technology
http://www.edutopia.org/article/mobile-learning-resources
http://educationnext.org/all-together-now/
http://www.dreambox.com/individualized-learning
http://www.hanoverresearch.com/impact/mcgraw-hill-and-hanover-find-40-year-over-year-increase-in-digital-studying-2/?i=k-12-education
http://www.teachthought.com/learning/the-changing-role-of-the-teacher-in-personalized-learning-environment/http://www.newclassrooms.org/reimagine.html
https://www.edsurge.com/news/2015-02-25-multiplying-the-teach-to-one-personalized-math-model-at-elizabeth-public-schools
http://www.nea.org/tools/56274.htm
http://techcrunch.com/2012/10/01/google-says-apps-for-education-now-has-more-than-20-million-users/
https://thejournal.com/articles/2014/08/25/how-5-inspiring-tablet-classrooms-are-changing-education.aspx
http://www.ed.gov/oii-news/use-technology-teaching-and-learning
http://www.edutopia.org/blog/personalized-learning-big-data-schools-matt-levinson
http://www.edutopia.org/article/making-student-data-part-conversation
http://www.forbes.com/sites/jordanshapiro/2013/08/13/this-guy-left-google-to-put-the-power-of-big-data-into-small-classrooms/
http://aasa.org/uploadedFiles/Policy_and_Advocacy/files/UsingDataToImproveSchools.pdf
http://www.eschoolnews.com/2014/02/26/education-technology-administrators-777/
https://www.pearsoned.com/wp-content/uploads/Pearson-Student-Mobile-Device-Survey-2013-National-Report-on-Grades-4-to-12-public-release.pdf
http://pss.sagepub.com/content/early/2014/04/22/0956797614524581
http://www.ed.gov/esea
http://www.pacer.org/mpc/pdf/MPC-69.pdf
http://www.bls.gov/ooh/education-training-and-library/instructional-coordinators.htm#tab-6
http://simplyeducate.me/2015/01/07/seven-school-curriculum-types-and-their-classroom-implications/