

Integration of Technology in Teaching and Learning

Comprehensive initiatives enhance student engagement and learning

As technology increasingly transforms our daily lives, educators too are seeking strategies and resources that leverage technology to improve student learning. Research demonstrates that high-quality professional development, digital standards-based content, and personalized learning plans can increase student achievement, engagement, and critical-thinking skills, and provide students with access to learning opportunities otherwise difficult to attain.¹

What Is the National Policy Context Shaping the Integration of Technology into Teaching and Learning?

The National Education Technology Plan 2010 (NETP) developed by the U.S. Department of Education Office of Educational Technology calls for a “revolutionary transformation” of our education system. This transformation includes the deployment of technology to engage students with rich learning experiences and conduct assessments that measure achievement comprehensively and authentically. Collaborative teaching and professional learning opportunities for educators are also called for by the plan. The NETP outlines goals and recommendations in the following domains: Learning, Assessment, Teaching, Infrastructure, and Productivity.²

What Are States Doing in Response?

In the Appalachian region, states are implementing an array of strategies to ensure technologies meaningfully support the education of their students.

- **Kentucky** has launched The Continuous Instructional Improvement Technology System (CIITS), a searchable online database of Kentucky academic standards and student learning targets aligned and linked to high-quality instructional resources. Designed to support implementation of the new Kentucky Core Academic Standards in mathematics and English/language arts, CIITS serves more than 40,000 teachers and administrators at 1,200 schools in all 174 school districts in Kentucky, and supports the instruction of more than 600,000 public school students.³
- **North Carolina**, as part of its State School Technology Plan, has committed to providing 1) a statewide shared services model including migration from an LEA–hosted to a cloud–hosted infrastructure; 2) universal access to personal teaching and learning devices for all school administrators, teachers, and students; 3) statewide access to digital teaching and learning resources, including digital textbooks; and 4) a statewide model of technology–enabled professional development.⁴
- **Tennessee**, using ARRA Title II-D monies, has awarded funding to districts to integrate technology into classrooms, increase student achievement, and ensure that students are technological literate by the time they complete 8th grade.⁵
- **Virginia** has five focus areas for educational technology between 2010 and 2015: 1) physical and virtual environments to support learning activities; 2) multiple strategies to engage students in learning through technology; 3) student understanding of how to choose and apply the most appropriate technology for communicating and problem solving; 4) authentic tools to extend student capabilities to perform functions that would be difficult, if not impossible, without technology; and 5) data use, including from real-time assessments, to inform instruction.
- **West Virginia** promotes technology integration through strategies such as 1) using 21st century digital resources to improve achievement of all students; 2) aiming to provide students with equitable access to virtual courses for a more complete, rigorous curriculum that otherwise would not be available, and 3) ensuring that counties and schools pursue strategic plans that address all federal technology compliances.⁶



What Is Educational Technology Integration?

The integration of technology in teaching and learning can take many forms, and, as such, there is no clear standard definition of technology integration in K-12 schools. To name a few, it may be understood as teachers' computer use in classrooms, or how teachers use technology to carry out familiar activities more effectively, or how teachers use technology to develop students' thinking skills. Despite the lack of a clear standard definition, a common thread is the use of computing devices (e.g., desktop computers, laptops, handheld computers, software, or Internet) for instructional purposes.

Hew, K. F. & Brush, T. (2007)
“Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research.”
Education Technology Research Development, 55, 223-252.

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What Remains To Be Done?

Although research shows technology can promote learning, many factors can threaten it. One study, analyzing the empirical literature on educational technology from 1995 to 2006,⁷ identified barriers to the use of technology in K-12 schools and strategies to overcome them. Similarly SEAs and LEAs assess potential barriers to the implementation of new technology efforts and ways to address these.

- **Potential Barriers:** 1) insufficient resources, including inadequate access to technology and planning time; 2) incomplete administrative support or school planning; 3) perceptions that technology is inconsistent with the traditional culture of the subject area; 4) negative teacher attitudes about technology; 5) lack of knowledge about and skills related to specific technologies, technology-supported pedagogy, and technology-related-classroom management; and 6) focus on using technology for computer-based testing rather than teaching and learning.
- **Strategies to Overcome Barriers:** 1) developing a shared vision and technology integration plan; 2) overcoming resources constraints by, for example, introducing technology into one or two subject areas at a time and creating a hybrid technology setup in classrooms that involves cheaper computer systems; 3) providing teachers with ongoing encouragement and professional development; and 4) aligning technologies to state curriculum standards (e.g., technology-supported project-based learning aligned with state learning objectives).

What the Research Says: Integrating Technology into Teaching and Learning

The Center for Applied Research in Educational Technology conducts reviews of research on instructional technology use. Findings from one such review include:⁸

- **Student Learning:** Technology has been found to improve student learning when it supports curriculum objectives being assessed, provides student performance feedback to both teacher and student, enables student collaboration, and extends the curriculum into efforts such as project-based learning.
- **Curriculum and Learning:** Alignment of project or lesson content with state content standards is an important first step. Additionally, allowing students to become familiar with instructional software before instruction improves conceptual understanding of content.
- **Online Teaching and Learning:** Content presented in an online format should be accurate and up-to-date, aligned with state curriculum standards, and appropriately structured with opportunities for collaboration and mixed approaches to assessment.
- **Professional Development:** Professional development in the use of educational technology can be enhanced through long-term learning, on-site guidance, practice, and continued feedback.
- **Assessment and Evaluation:** Automated digital scoring can aid in assessment of high-order thinking skills and open-ended responses.

¹ <http://www.setda.org/web/TAPP/home>

² <http://www.ed.gov/technology/netp-2010>

³ <http://www.education.ky.gov/KDE/Instructional+Resources/Curriculum+Documents+and+Resources/Continuous+Instructional+Improvement+Technology+System+%28CIITS%29+Public.htm>

⁴ http://it.ncwiseowl.org/accountability/north_carolina_educational_technology_plan/1113_sstp

⁵ <http://www.tn.gov/education/recovery.shtml>

⁶ <http://wvde.state.wv.us/technology/techplan/documents/WVStateEducationalTechnologyPlanRevisedJan2009.pdf>

⁷ Hew, K. F. & Brush, T. (2007). "Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research." *Education Technology Research Development*, 55, 223-252.

⁸ <http://caret.iste.org/index.cfm?fuseaction=topics>