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Connecting the Dots

Tying Technology to the Common Core Standards

Grades K-5

Math

Common Core Standard
Kindergarten, Math:
Analyze, compare, create and compose shapes. Model shapes in the world by building shapes from components and drawing shapes.

Classroom Scenario
Kindergarten, Math:
Students are asked to draw a house using different shapes.

Student Device Considerations
Kindergarten, Math:
- Tablet or touch screen netbook compatible with interactive whiteboard
- Extended battery life (at least 8 hours)
- Durable, spill-resistant device

Common Core Standard
Grade 3, Math:
Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects.

Classroom Scenario
Grade 3, Math:
Students are told they have one gallon of milk and must distribute equal glasses to all students in class. How much milk should each student get? Teacher uses interactive whiteboard to provide visual symbols of gallon of milk, students and glasses. Students work collaboratively to solve problem.

Student Device Considerations
Grade 3, Math:
- Tablet or touch screen netbook compatible with interactive whiteboard
- Extended battery life (at least 8 hours)

Common Core Standard
Grade 5, Math:
Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.

Classroom Scenario
Grade 5, Math:
Students are asked real-life questions and must come up with the answer. For example, "How much chocolate will each person get if 3 people share ½ lb of chocolate equally?" "How many 1/3-cup servings are in 2 cups of raisins?"

Student Device Considerations
Grade 5, Math:
- Tablet or touch screen netbook with USB port for graphing calculator
- Extended battery life (at least 8 hours)
- Graphing calculator with unit-to-computer USB cable
- Mathematical software (such as MathMedia)
- Web 2.0 tools

English Language Arts

Common Core Standard
Grade 1, Writing:
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

Classroom Scenario
Grade 1, Writing:
First-graders use word processing programs to type poems about themselves using the letters of their names to begin each line. Peer review is incorporated throughout the process. Each student reads another student's poem to the class. When finished, poems are posted on the class blog and printed.

Student Device Considerations
Grade 1, Writing:
- Durable, spill-resistant device
- Extended battery life (at least 8 hours)
- Integrated keyboard or keyboard as a peripheral
- Color and network print capable
- Word processing software (such as Microsoft Word 2010)

Common Core Standard
Grade 4, Speaking & Listening:
Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Classroom Scenario
Grade 4, Speaking & Listening:
Students visit a local historical site, taking pictures and video clips. Students can also interview tour guides or other individuals at a historical site on video or audio. When returning to class, students can build video/multi-media presentations and then present to other classrooms in school.

Student Device Considerations
Grade 4, Speaking & Listening:
- Tablet with camera or video capability
- Extended battery life (at least 8 hours)
- Headphones/earbuds for each student
- Touch apps (such as Adobe Photoshop Touch, Adobe Collage or Adobe Ideas)
- USB port if student is using digital camera or digital video camera
- Multi-media editing software
- PowerPoint 2010

Common Core Standard
Grade 5, Speaking & Listening:
Include multi-media components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Classroom Scenario
Grade 5, Speaking & Listening:
Students view classic works of art online and work to recreate their version of artwork using design software. On a social media/collaboration site, students join a group chat to discuss the history of the artwork and explain their interpretation to classmates. Students create an online art gallery and post images of their work.

Student Device Considerations
Grade 5, Speaking & Listening:
- Laptop with dedicated graphics card
- Extended battery life (at least 8 hours)
- Headphones/earbuds for each student
- Adobe Flash Compatible device
- Desktop publishing/design software (such as NewTek LightWave 3D or Adobe InDesign and Photoshop)
- Web 2.0 tools

Grades 6-12

Math

Common Core Standard
Grade 8, Geometry:
Understand congruence and similarity using physical models, transparencies or geometry software.

Classroom Scenario
Grade 8, Geometry:
Students must construct a 3-D model of a city that has at least 10 buildings. The buildings must include two similar figures, two congruent figures and two geometric transformations.

Student Device Considerations
Grade 8, Geometry:
- Laptop with 4GB RAM minimum and dedicated graphics card
- Extended battery life (at least 8 hours)
- Modeling software (such as AutoCAD)

Common Core Standard
High School, Modeling:
Modeling links classroom mathematics and statistics to everyday life, work and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better and to improve decisions. Quantities and their relationships in physical, economic, public policy, social and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences and comparing predictions with data.

Classroom Scenario
High School, Modeling:
Students estimate how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed.

Students plan a table tennis tournament for seven players at a club with four tables, where each player plays against each other.

Students design the layout of the stalls at a school fair so as to raise as much money as possible.

Student Device Considerations
High School, Modeling:
- Laptop with 4GB RAM minimum and dedicated graphics card
- Extended battery life (at least 8 hours)
- Modeling software (such as AutoCAD)

Common Core Standard
High School, Functions:
Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Classroom Scenario
High School, Functions:
Newton's law of cooling provides a model for cooling. It states that the temperature difference (Tdiff) between a hot object and its surroundings decreases exponentially with time. In the model T0 is the initial temperature difference, and k is a positive constant. Students use a temperature probe to collect data as the warmed probe cools. They then fit several mathematical models to the data. Students model cooling data with an exponential function. Students create a graph by moving back and forth in front of a motion detector device. They then describe their motion by writing down the function for the motion.

Student Device Considerations
High School, Functions:
- Tablet with a gyroscope and accelerometer, or laptop with USB port for required peripheral connections
- Extended battery life (at least 8 hours)
- Advanced graphing calculator with USB cable to connect into tablet or laptop
- Temperature probe (such as Vernier Stainless Steel Temperature Probe)
- Mathematical software
- Motion detector device (only needed for a laptop, not a tablet)

English Language Arts

Common Core Standard
Grade 6, Reading Literature:
Compare and contrast the experience of reading a story, drama or poem to listening to or viewing an audio, video or live version of the text, including contrasting what they "see" and "hear" when reading the text to what they perceive when they listen or watch.

Classroom Scenario
Grade 6, Reading Literature:
Students read "Pride and Prejudice" and later view the film in class. They then build multi-media presentations that highlight the differences between print and film.

Student Device Considerations
Grade 6, Reading Literature:
- Tablet with video camera and webcam for videoconferencing with another 6th-grade class (i.e. classroom in Hong Kong)
- Extended battery life (at least 8 hours)
- Video editing software like Windows Movie Maker or Avid FreeDV

Common Core Standard
Grades 9-10, Writing:
Use technology, including the Internet, to produce, publish and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Classroom Scenario
Grades 9-10, Writing:
Students are assigned a project to produce a video about the Salem Witch Trials. As a group, they interview historians, write the script and re-enact an event while filming. Students edit the video and then publish to the Web.

Student Device Considerations
Grades 9-10, Writing:
- Tablet with a rear-facing video camera or stand-alone digital camcorder for higher-end video production
- Extended battery life (at least 8 hours)
- If a digital camcorder is used, a laptop with a dedicated graphics card is recommended for video editing purposes
- Screen writing software like Magic Screen Writer
- Video editing software like Windows Movie Maker or Avid FreeDV

Common Core Standard
Grades 11-12, Reading Informational Text:
Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

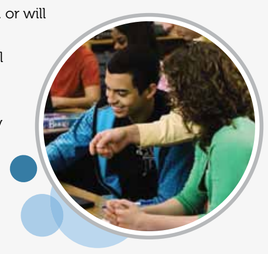
Classroom Scenario
Grades 11-12, Reading Informational Text:
Students are instructed to choose an environmental issue and conduct research on that issue by watching videos, searching for scholarly articles and listening to speakers. They then will develop a plan to solve the issue and present their solution at an environmental event at a local college campus.

Student Device Considerations
Grades 11-12, Reading Informational Text:
- Tablet or laptop
- Extended battery life (at least 8 hours)

Security Considerations

As students and educators become increasingly mobile and armed with numerous devices, leaders must implement effective solutions that keep resources secure as they open them up to greater access. School leaders not only face physical security threats, but now must increasingly contend with the possibility of data breaches, or cyber threats. They must secure highly sensitive student information and comply with federal laws that govern the handling of private data. Especially in grades K-12, it is important to protect students from harmful or inappropriate content online. Schools must consider how to balance access with privacy and answer questions like how they will manage security over wired and wireless networks for internal and external users.

Questions to consider:
- Will you be using single sign-on?
- Will you need remote wipe capabilities?
- Will you use device-level filtering, or will this be done via the network?
- How will you comply with federal laws such as the Children's Internet Protection Act (CIPA)?
- How will you track devices if they are lost or stolen?



Determining Student Devices

Questions to Ask

- What calculators/devices and graphing software might be used with the device and require additional USB ports?
- What display types might need to work with the device for classroom sharing (i.e., TVs, projectors, interactive whiteboards, tablets)?
- What screen size is required for the viewing of required texts?
- What operating system is required for support of other devices and software (i.e., operating systems such as Windows XP, Windows 7 and Mac OS X)?
- What software will be used on the student device? Is the software graphic-intensive? Is it touch-friendly? Is it Flash-based? Is it 3-D capable?
- What input devices might be used (i.e., video cameras, cameras, or output like a video telecaster)?
- What input might be needed to operate with software (i.e. specialized mouse, gaming device, specialized keyboards or audio input)?
- Will the device need to be interactive with musical instruments or robotics tools?
- Will the devices be used for content creation purposes like animation, graphing, coding or design work?
- Will the device need audio enhancement for learners with hearing disabilities?
- Will the device be used off campus? How durable does it need to be?
- What is the planned refresh cycle?

Mathematical Standards

Use appropriate tools strategically

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. Because of this, it is important to consider whether or not future student devices can interact with these already established, popular technologies in the classroom, such as the graphing calculator.

Is Your Infrastructure Ready?

Ensuring a campus' infrastructure is ready to support student devices is a critical part of the planning process. Here are some important considerations.

Bandwidth: Broadband access to the Internet and adequate wireless connectivity on campus should be ensured.

Security: This is a complex but essential issue in protecting confidential information about students and faculty, about communications, and about the integrity of the entire electronic system.

Robust managed wireless infrastructure: Central control and sufficient capacity are essential for all students and educators who want and need to be online at the same time.

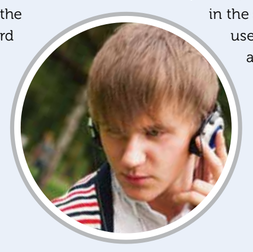
Standardized device configuration: All devices accessing the network must meet the same requirements for capacity and applications.

For most educational leaders, infrastructure decisions require expert knowledge which can come from internal and collaborative IT specialists, business partners or potential vendors. A clearly written advisory entitled, "Assessing technology readiness to support digital learning initiatives" is available from Dell at **http://i.dell.com/sites/content/business/solutions/power/en/Documents/ps1q11cl-20110197-anthony.pdf.**

Day in the Life: Myriad Uses of Technology in Today's Educational Environments

Sarah – Elementary Student

Sarah is an elementary school student in Florida whose 3rd-grade teacher allows one student a week to pick a new digital story to read. It is Sarah's turn this week and she picks a story about a tiger since this is her favorite animal. All of the students grab a gamer mouse from a bin and plug it into their tablet. They then log onto a cloud software service and view the interactive story on their tablets with headphones on. The teacher monitors the activity by remotely viewing students' screens to make sure they are on task. When students are finished with the story, the teacher plays the story on the interactive whiteboard for students to discuss. Sarah gets to lead the discussion and call on people with questions since she picked the story. At the end of the school day, Sarah packs away her tablet in a rubberized case and stores it in her backpack to bring home. Her teacher posts class assignments to the learning management system so Sarah's parents can help her with her homework that evening.



Joe – Middle School Student

Joe is a middle school student in Missouri. In his music class, he uses a keyboard plugged into a PC and manipulates the musical score and plays it back. All the students take turns at the keyboard and use headphones to listen to their work. Joe uses his smartphone to scan the class homework assignment on his way out the door — the teacher has printed a Quick Response (QR) code and taped it to the door. Later in the day, Joe has an English class where he uses a laptop cart. In his math class, he uses a calculator that is later plugged into a laptop to create graphs and complete his homework.

Jenna – High School Student

Jenna, a high school student at a public school in California, is in science class. She plugs her class-assigned laptop into a microscope and looks at bacteria, takes a screen shot, and then plugs it into the class projector and shows everyone in the class what she saw. Jenna then logs onto the learning management system to get her homework and print it out. She goes to her next class — a history class — and watches a video on her laptop. Her school has a wireless network strong enough to support wireless HD video streaming to optimize her viewing experience. Jenna takes notes about the video so she is ready to begin writing a paper due on the lesson when she gets home.

Technology Takes Learning to the Next Level at Kentucky High School

Chemistry students at LaRue County High School in Kentucky have been able to take learning to the next level as a result of a 1:1 laptop program. The students have lab equipment and sensors that hook up to their laptops and graph the data from labs in real time. This allows the students to analyze the data quickly and adjust the lab as needed so they can receive more accurate data. Before, students would have to manually enter the data into a spreadsheet at home or at a computer lab, which would introduce more error and take much longer to complete. Students also use PowerPoint to present to the honors chemistry class. They present about what they have learned and show slideshows to teach other students about the labs. Teachers undergo ongoing training and tweak practices based on feedback from students and what they learn in their professional learning sessions. The sophistication of the labs is much higher because the classes have the software tools available to analyze data that is collected. Students are more prepared for the future — whether it be for college or a career in a scientific field — with the hands-on experience they receive by utilizing technology.

Source: http://content.dell.com/us/en/corp/d/videos~en/Documents~2011-larue-chem-10009844.aspx.aspx

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