Updated
2025

THE USE OF INSTRUCTIONAL TECHNOLOGY

A Comprehensive Overview and Guide for the Mariemont City Schools

MARIEMONT City Schools

Work Smart. Create Experience. Embrace Growth.

MESSAGE FROM THE SUPERINTENDENT

It's an exciting time to be in education as both a teacher and a student! Information, resources and tools are readily available, more so than ever before, to amplify the learning experience. In the Mariemont City Schools, we are proud to offer a robust instructional technology program to support teachers and students in their teaching and learning.

Whether tablets, computers, 3D printers or virtual reality headsets, technology and the opportunities it creates in our classrooms are aplenty. Technology is also always evolving and changing – the types of equipment we use, the apps and software we deploy and the strategies and practices we implement to impact instruction. And it is within this landscape that the Mariemont City Schools' Instructional Technology Guide was developed.

In the pages that follow, you will develop a better understanding of our use of instructional technology that is grounded first and foremost in the work of Destination 2026, the strategic plan for the school district. It is from this plan that our instructional technology philosophy and core beliefs were created and then put into practice in our classrooms in a variety of purposeful and intentional ways.

I would like to thank the teachers, parents and community members who offered their input in the development of this comprehensive guide. As you read, I hope you share in my excitement for the many tools and opportunities we make available to our teachers and students to have a wonderful educational experience and be ready for tomorrow!

Steven Estepp
Superintendent, Mariemont City Schools

MARIEMONT CITY SCHOOL DISTRICT TECHNOLOGY ADVISORY COMMITTEE

An ongoing committee that meets to discuss the use of instructional technology in classrooms.

A collaboration of parents, staff, administrators and the Board of Education.

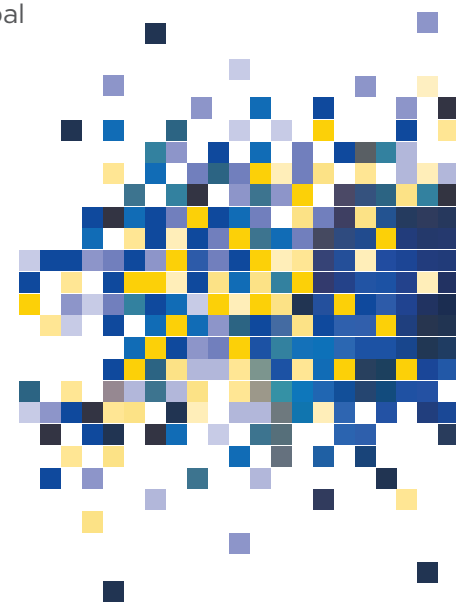
A commitment to research and best practice to ensure the needs of students are met in classrooms and beyond.

The Mariemont City School District technology guide is a living document that focuses on the instructional impact, needs, beliefs and processes surrounding the implementation of technology in our classrooms and beyond. This guide serves as a resource for staff, parents and community members.

The technology guide was developed in partnership with the school district's "Technology Advisory Committee." This committee, comprised of parents, staff, and Board of Education and administrative representatives, reviewed current practices, philosophy and research to develop the guide.

District Technology Advisory Committee

Steven Estepp, Superintendent
Shannon Kromer, Director of Teaching and Learning
Ericka Simmons, Mariemont Elementary Principal
Brent Wise, Director of Strategic Initiatives
Julie Parker, Third Grade Teacher
Brian Nichols, School Board Member/ Parent/Community Member
Todd Pease, Parent/Community Member
Amy Roe, Parent/Community Member
Mark Schlafman, Parent/Community Member
David Downs, Parent/Community Member
Kelley Ching, Parent/Community Member
Julie O'Hara, Parent/Community Member
Jackie O'Brien, Parent/Community Member



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DISTRICT VISION

Today's students are surrounded by resources and technology never imagined just a few years ago. As a result, they want to be engaged at deeper levels and participate in complex learning experiences.

Additionally, today's global society, sparked by rapid technological advances and innovation, is putting new demands on America's workforce. Students must possess new skills and knowledge to be successful in the future.

So, what does this mean for the Mariemont City School District? How do we prepare children in Mariemont for their futures that will likely look very different from today?

Instruction must be more **intentional** and **purposeful** than ever before. Schooling can no longer be looked at as an event; rather it must become an experience in which students are deeply **engaged**, find **passion,** and **experience** practice in their learning. Students must think **critically** and **creatively** across disciplines, **collaborate** to problem solve, understand the **global landscape** and their place in it, and use **technology** to amplify their learning.

In response to these ever-changing needs and demands, the Mariemont City School District launched Destination 2026 in 2014, the strategic plan to guide the instructional vision of the district, to explore the knowledge, skills and experiences students will need to compete globally and succeed consistently in tomorrow's world.

District Achievement Goal

Student success will increase through rigorous curriculum design, instructional best practices, meaningful programming, and purposeful environments that maximize learner autonomy and capacity to thrive.

DISTRICT OBJECTIVES

Student learning will be enhanced through diverse curricular options and enriching experiences that drive deeper understanding and skill development and support global competency.

Student learning will be maximized through the creation of purposeful, safe physical and virtual learning environments for students and staff that promote communication and collaboration.

Student learning will be enhanced through instruction and programming that are responsive to assessment results, designed to meet the individual needs of students, and cultivate drive and resiliency.

Student learning will be maximized through the implementation of innovative instructional practices that stimulate student interests and foster inspiration and passion.

THE LANDSCAPE

Without a doubt, today's students are learning in a time of exponential change. Jobs, retail, communication, business and education all are experiencing rapid change – thanks almost exclusively to technology – and there are no signs that things are going to slow down anytime soon.

"Change doesn't care if you're ready. Change outpaced humans sometime late in the last century. These are exponential times."

Whiplash: How to Survive Our Faster Future by Joi Ito & Jeff Howe

The latest research suggests that 47 percent of jobs in the United States are at risk of being taken over by algorithms in the next 20 years – and many of these are jobs once thought to be safe from the robot. Experts predict significant changes in the jobs' outlook in the coming years.

Source: *Homo Deus: A Brief History of Tomorrow* by Yuval Noah Harari

FASTEST GROWING AND DECLINING JOBS BY 2030

Top fastest growing jobs

1. Big data specialists
2. FinTech engineers
3. AI and machine learning specialists
4. Software and application developers
5. Security management specialists
6. Data warehousing specialists
7. Autonomous and electric vehicle specialists
8. UI and UX designers
9. Light truck or delivery services drivers
10. Internet of things specialists
11. Data analysts and scientists
12. Environmental engineers
13. Information security analysts
14. DevOps engineers
15. Renewable energy engineers

Top fastest declining jobs

1. Postal service clerks
2. Bank tellers and related cleks
3. Data entry clerks
4. Cashiers and ticket clerks
5. Security management specialists
6. Administrative assistants and executive secretaries
7. Printing and related trade workers
8. Material-recording and stock-keeping clerks
9. Transportation attendants and conductors
10. Door-to-door sales workers, news and street vendors, and related workers
11. Graphic designers
12. Claims adjusters, examiners and investigators
13. Legal officials
14. Legal secretaries
15. Telemarketers

Source: Future of Jobs Report 2025, World Economic Forum

Living with technology is not the same as using technology and using it effectively. The need to do so is real, as more and more companies identify the technologies they plan to adopt, and therefore workers will need to understand, in the near future.

TOP 10 fastest growing skills by 2030

1. AI and big data
2. Networks and cybersecurity
3. Technological literacy
4. Creative Thinking
5. Resilience, flexibility and agility
6. Curiosity and lifelong learning
7. Leadership and social influence
8. Talent management
9. Analytical thinking
10. Environmental stewardship

Source: *Future of Jobs Report 2025*, World Economic Forum

Needed skill sets in the workplace are also being reprioritized to manage the unprecedented change. The skills employers want highlight the need to give students opportunities to use technology in purposeful and intentional ways, but also illustrate why a balanced instructional approach is necessary for students to hone skills in which technology is not needed.

World Economic Forum TOP 10 JOB SKILLS

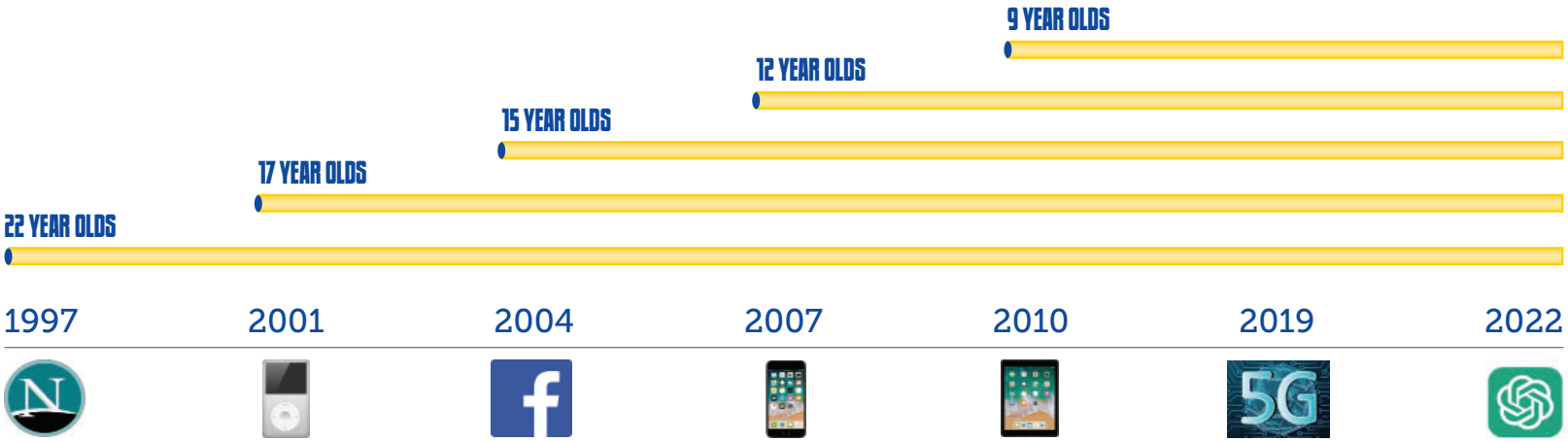
2025

1. Analytical thinking
2. Resilience, flexibility and agility
3. Leadership and social influence
4. Creative Thinking
5. Motivation and self-awareness
6. Technology literacy
7. Empathy and active listening
8. Curiosity and lifelong learning
9. Talent management
10. Service orientation and customer service

2020

1. Analytical thinking and innovation
2. Active learning and learning strategies
3. Creativity, originality, and initiative
4. Technology design and programming
5. Critical thinking and analysis
6. Complex problem-solving
7. Leadership and social influence
8. Emotional intelligence
9. Reasoning, problem solving
10. Systems analysis and evaluation

With this abundance of change comes great responsibility for our schools to prepare students for the world in which they do, and will, live and work. A simple look at the brief history and evolution of the internet, social media, computers and devices reminds us of just how quickly things have changed, and also that today's students do not know life without technology.



"The Third Wave of the internet will be defined not by the Internet of Things; it will be defined by the Internet of Everything. We are entering a new phase of technological evolution, a phase where the internet will be fully integrated into every part of our lives—how we learn, how we heal, how we manage our finances, how we get around, how we work, even what we eat. That's the Third Wave—and it's not just coming; it's here."

The Third Wave by Steve Case

How does our philosophy for the use of instructional technology align with the district's vision?

Today's students are digital natives. But this does not automatically translate to an ability to cultivate presentations, filter online text into fact or fiction, or engage in constructive ways online or with the technology they will need in their future careers.

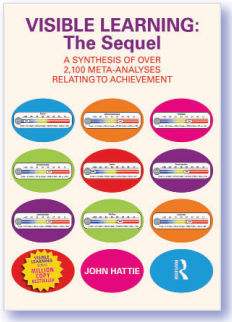
Students need instruction, training and practice to develop these technological competencies and resource abilities.

Students also need a balanced approach to instruction and learning that use both technology and non-technology resources to reach unique needs and interests. To this end, the Mariemont City School District technology philosophy is first aligned to support the student achievement goal and objectives defined in the district action plan. Then, instructional technology is deployed through the lens of four core beliefs.

THE 4 CORE BELIEFS FOR TECHNOLOGY IN THE MARIEMONT CITY SCHOOL DISTRICT

Our first core belief is that technology is a tool for instruction. Technology in Mariemont City Schools includes hardware from iPads to laptops, software subscriptions, district-approved apps and digital resources provided for specific content instruction. Technology is used to amplify learning in the classroom by the teacher, not as a replacement for the teacher. Its use is solely to support high quality instruction as described in the district's characteristics of the highly effective teacher and highly engaged student (see Appendix B for a complete list of characteristics).

It is widely recognized that instructional technology used as a tool to enhance high yield pedagogy has the power to reach more students by accommodating different learning styles, accelerating learning by delivering personalized instruction, increasing the amount of data and feedback available to learners and teachers about progress, and allowing students to access diverse learning materials both in and out of school. Furthermore, dozens of rigorous studies of educational technology indicated that, when instructional technology is used to individualize students' pace of learning, the results show enormous promise. We acknowledge that research is always evolving on the impact of technology in education. We are continually looking for opportunities to improve the implementation of technology in the district and are committed to monitoring this on a regular basis.



In 2009, Professor John Hattie published *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. This groundbreaking book combined the findings from 50,000 research studies involving more than 150 million students and built a story about the power of teachers and feedback. It constructed a model of learning and understanding by pointing out what works best in improving student learning outcomes. Since then, John Hattie has continued to collect and aggregate meta-analyses into the *Visible Learning* database.

His latest work, *Visible Learning: The Sequel* (2023), synthesizes over 2,100 meta-analyses, encompassing more than 130,000 studies and involving over 400 million students worldwide. This updated research shifts the focus from identifying what works to understanding what works best by emphasizing intentional alignment between learning strategies, teaching methods, and student success. The book also examines the role of educational technology, emphasizing its effectiveness when used to enhance peer discussions, reflective thinking, and timely feedback rather than merely substituting traditional tools. Hattie continues to advocate for evidence-based decision-making, stressing the importance of evaluating the impact of educational interventions to maximize student achievement.

(See Appendix A for *The Visible Learning Influence*)

130,000
Studies

This is the world's largest evidence base into what works best in schools to improve learning.

Over
400
Million Students

This research is the foundation for the *Characteristics of the Highly Effective Teacher* that serve as a benchmark for quality instruction in the Mariemont City School District.

The Highly Effective Teacher:

- creates LEARNING TARGETS for students that allow them to understand where they are going and how to get there.
- designs creative learning opportunities by applying his/her CONTENT KNOWLEDGE and KNOWLEDGE OF BEST PRACTICE in order to MOTIVATE and INSPIRE students.
- ensures and protects student understanding by MODELING strong and weak work for demonstrating mastery of the intended learning and encouraging RESILIENCY to reach that mastery.
- cultivates TRUST by working together with students to set challenging, yet appropriate, LEARNING GOALS.
- fosters productive and purposeful COLLABORATIVE LEARNING by showcasing and providing guidelines for RESPECT and TOLERANCE when working with others.
- gives frequent, ongoing, meaningful FEEDBACK to students and creates opportunities to receive feedback from students about the effectiveness of his/her instructional practice.
- supports students to have an accurate understanding of their own learning through the use of FORMATIVE and SUMMATIVE ASSESSMENTS as well as SELF-ASSESSMENTS.
- ADVOCATES for student success and NURTURES student well being.

When used to enhance high yield instructional pedagogy as described in the district's Characteristics of the Highly Effective Teacher, Hattie's meta-analysis of 23 technology influences in education found all of them to have positive impacts on learning.

The American Academy of Pediatrics is an organization of 67,000 pediatricians committed to the optimal physical,mental, and social health and well-being for all infants, children, adolescents, and young adults.

The Mariemont City School District does not have defined time limits for the use of technology in its classrooms. As professional educators, our teachers understand how to utilize the tools that are available to amplify learning and reach specific learning goals for students. During classroom visits and observations, building principals look for the use of a variety of instructional strategies and recognize that no single teaching tool should be used in excess. There are currently no research-based recommendations for "technology use" limits in the classroom setting. However, the school district has established guidelines for the instructional use of technology (see next page).

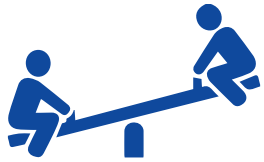
LATEST RESEARCH FROM THE AMERICAN ACADEMY OF PEDIATRICS

The Academy recommends that, for children 2 to 5 years of age, screen time should be limited to one hour per day.

The AAP does not provide a recommended amount of screen time for children ages 6 and older.

Parents should monitor screen time for the types of media consumed and model healthy screen use themselves.

Screens should not get in the way of a child's ability to get an adequate amount of sleep.



Screen time should also not take place of physical activity.

GUIDELINES FOR INSTRUCTION

Technology integration should be implemented through our **Characteristics of The Highly Effective Teacher and Highly Engaged Student**. The integration should enhance the characteristics. **For a full listing see Appendix B.*

Instruction using technology should be **ACTIVE** screen time not passive screen time.

EXAMPLE:

Active: *Collaborate with students on a project.*

Passive: *Watching videos without educational purpose.*

iPad use is not permitted during indoor/outdoor recess, lunch, and free time in grades K-8. iPads should not be used as an incentive to complete work early unless discussed with parents of a specific student.

Core instruction **does not require and/or need** the use of technology at all times. Rather, technology is only used when the teacher sees it as a more appropriate tool to amplify learning. Lessons including technology should be **a balance of screen time** and screen-free time.

When technology is being used, instruction in our classrooms should start and end with **apps, software, and resources** that **amplify learning** and are **approved by the district** curriculum and technology department. *For a full list of apps and software used, visit the district technology page.*

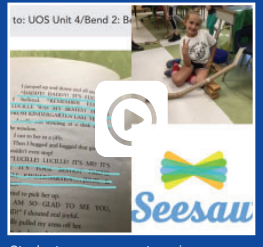
Our teachers use iPads as instructional tools to personalize learning and meet the unique needs of every student. Digital resources and real-time feedback help tailor lessons, ensuring students receive the support they need to grow.

**For full framework see Appendix C.*

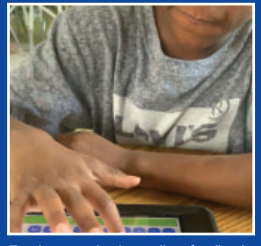
PRIMARY

The State of Ohio has suggested technology learning standards for implementation in its public schools. To the right are highlights and examples of how the Mariemont City School District implements these standards through purposeful technology use and instruction (for a complete list of standards, please see Appendix E). Specific activities, lessons and digital tools may vary by teacher, content area, and grade levels.

Instructional Technology Snapshot



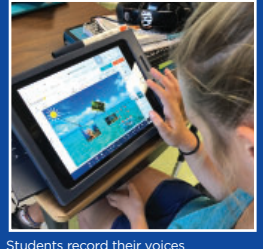
Students use seesaw to voice-over images and video to demonstrate their learning for teachers and parents.


Teachers receive immediate feedback by working with students in stations on math comprehension.

Students create digital books to demonstrate and share their learning.

Students use the iPad to complete a scavenger hunt around the school building, collecting facts about penguins to write a non-fiction book.

Kindergarten students use virtual reality to explore the depths of the ocean and visit with marine life.


Students record their voices explaining the water cycle while diagraming a digital image to submit to their teacher.

Students record videos of themselves answering a prompt to submit to their teacher.

OHIO'S LEARNING STANDARDS FOR TECHNOLOGY K-2

Identify and use appropriate digital learning tools and resources to accomplish a defined task.	**Use digital learning tools and resources to locate, evaluate and use information.**	**Use digital learning tools and resources to construct knowledge.**	**Use digital learning tools and resources to communicate and disseminate information to multiple audiences.**
Develop basic skills for using digital learning tools and resources to accomplish a defined task.	Develop basic skills for locating information using digital learning tools and resources.	Collect, record and organize observations and data during student explorations using digital learning tools and resources.	With guidance, select appropriate digital learning tools and resources to produce and publish information.
With guidance, identify a goal and determine how digital learning tools can help accomplish that goal.	Identify main ideas and details in information found with digital learning tools and resources.	With guidance, create artifacts using digital learning tools and resources to demonstrate knowledge.	With guidance, use digital learning tools to add audio and/or visual media to clarify information.

INTERMEDIATE

The State of Ohio has suggested technology learning standards for implementation in its public schools. To the right are highlights and examples of how the Mariemont City School District implements these standards through purposeful technology use and instruction (for a complete list of standards, please see Appendix E). Specific activities, lessons and digital tools may vary by teacher, content area, and grade levels.

Instructional Technology Snapshot

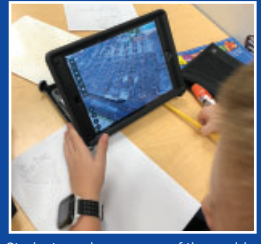
6th grade students create "how-to" videos for their younger classmates on the proper care of musical instruments.

Students video conference with experts in their fields (i.e. authors, scientists).

Students work together using research tools to solve problems and demonstrate learning.

Students print 3D designs after creating the prototype on the iPad.

Students use augmented reality apps to make static resources like a world map come to life right in front of their eyes.



Students explore corners of the world through augmented reality.

Students travel to Ancient Egypt to supplement social studies curriculum.

OHIO'S LEARNING STANDARDS FOR TECHNOLOGY 3-5

Identify and use appropriate digital learning tools and resources to accomplish a defined task.	**Use digital learning tools and resources to locate, evaluate and use information.**	**Use digital learning tools and resources to construct knowledge.**	**Use digital learning tools and resources to communicate and disseminate information to multiple audiences.**
With guidance, identify and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.	Use appropriate search techniques to locate needed information using digital learning tools and resources.	Interpret images, diagrams, maps, graphs, infographics, videos, animations, interactive, etc. in digital learning tools and resources to clarify and add to knowledge.	With guidance, select media formats appropriate to content and audience.
Explain the use of selected digital learning tools and resources to support productivity and learning.	Use multiple criteria developed with guidance to differentiate between relevant and irrelevant information found with digital learning tools and resources.	Create artifacts using digital learning tools and resources to demonstrate knowledge.	Produce and publish information appropriate for a target audience using digital learning tools and resources.

MIDDLE SCHOOL

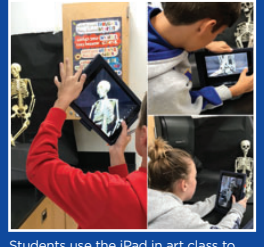
The State of Ohio has suggested technology learning standards for implementation in its public schools. To the right are highlights and examples of how the Mariemont City School District implements these standards through purposeful technology use and instruction (for a complete list of standards, please see Appendix E). Specific activities, lessons and digital tools may vary by teacher, content area, and grade levels.

Instructional Technology Snapshot

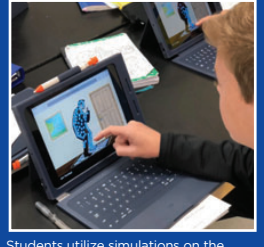
Students perform scientific labs on motion and gravity and utilize the iPads to analyze slow motion video and annotate charts and graphs.

Students create videos to reflect on the types of government and compare to our current government.

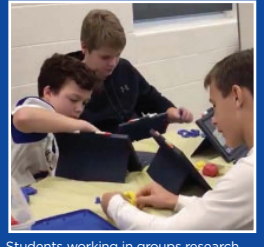
Students use digital tools during science lab to write directly on images and video.



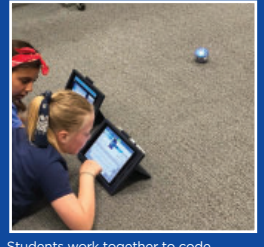
Students use the iPad in art class to capture their own perspectives in order to draw unique versions of images.



Students utilize simulations on the iPad to help understand abstract concepts such as static electricity.



Students working in groups research Roman architecture and recreate using clay.



Students work together to code robots to perform multi-step tasks.

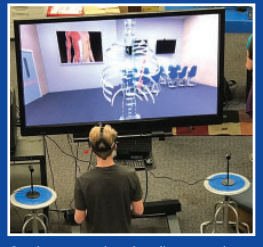
OHIO'S LEARNING STANDARDS FOR TECHNOLOGY 6-8

Identify and use appropriate digital learning tools and resources to accomplish a defined task.	**Use digital learning tools and resources to locate, evaluate and use information.**	**Use digital learning tools and resources to construct knowledge.**	**Use digital learning tools and resources to communicate and disseminate information to multiple audiences.**
Select and use digital learning tools or resources to support planning, implementing, and reflecting upon a defined task.	Use advanced search techniques to locate needed information using digital learning tools and resources.	Analyze and integrate textual, visual, and quantitative information (images, diagrams, maps, graphs, infographics, videos, animations, interactive, etc.) from multiple digital learning tools and resources.	Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information.
Evaluate the use of digital learning tools and resources to support learning and productivity.	Use multiple criteria to evaluate the validity of information found with digital learning tools and resources	Create artifacts using digital learning tools and resources to demonstrate knowledge.	Select and use a variety of media formats to communicate information to a target audience.

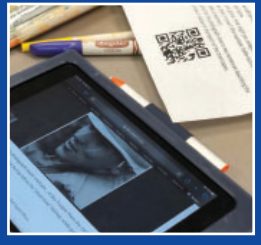
HIGH SCHOOL

The State of Ohio has suggested technology learning standards for implementation in its public schools. To the right are highlights and examples of how the Mariemont City School District implements these standards through purposeful technology use and instruction (for a complete list of standards, please see Appendix E). Specific activities, lessons and digital tools may vary by teacher, content area, and grade levels.

Instructional Technology Snapshot

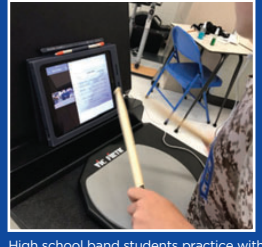


Students use virtual reality to explore the skeletal and nervous systems and travel through veins.



Students view primary sources then participate in class discussion and writing.

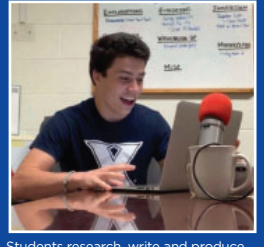
Students 3D Print for multiple content areas and for their own exploration.



High school band students practice with junior high band students virtually without losing instruction time for traveling.

AP language lit classes use the iPad Pro to write and publish their own books.

Students explore ancient parts of the world.



Students research, write and produce their own podcast episodes.

OHIO'S LEARNING STANDARDS FOR TECHNOLOGY 9-12

Identify and use appropriate digital learning tools and resources to accomplish a defined task.	**Use digital learning tools and resources to locate, evaluate and use information.**	**Use digital learning tools and resources to construct knowledge.**	**Use digital learning tools and resources to communicate and disseminate information to multiple audiences.**
Based on project-specific requirements, develop criteria to select digital learning tools and resources to support the concurrent management of multiple projects.	Use advanced search and filtering techniques to locate needed information using digital learning tools and resources.	Synthesize textual, visual, and quantitative research and data (images, diagrams, maps, graphs, infographics, videos, animations, interactive, etc.) from a variety of digital learning tools and resources.	Based on communication needs, develop, implement and evaluate a communication plan to disseminate information to multiple audiences.
Analyze and evaluate the ease of use and effectiveness of available features of selected digital learning tools and resources.	Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism when using the work of others as well as creating personal work.	Create artifacts using digital learning tools and resources to demonstrate knowledge.	Use digital learning tools to represent and model complex systems of information to a target audience.

ADAPTIVE LEARNING SOFTWARE

Adaptive Learning software tailors the learning experience to individual students in terms of both their strengths and weaknesses. This enables students to individually progress through material at a pace commensurate with their understanding and aptitude in a particular subject matter rather than a situation where some students are left behind while others are bored because the lessons are delivered in a one-size-fits-all format. The key to this individual education is the adaptive nature of the technology. In addition, such systems constantly provide teachers with realtime results for each student. This allows teachers to more frequently monitor how students are progressing and intervene when needed. It allows teachers to become more effective individual coaches for students.[1]

The following are examples of, but not limited to, adaptive software used in the Mariemont City School District.

MAP Growth is a computer adaptive assessment that students take two to three times per school year. The results provide teachers with information to help them deliver appropriate content for each student and determine each student's academic growth over time.

Lexia solutions are different from edtech games and test prep programs. They're founded upon a structured and systematic approach to literacy instruction that builds upon prior learning in a sequential manner—from simple to complex—ultimately improving each teacher's ability to deliver critical literacy concepts, strengthening the relationship with, and transitioning ownership of learning, to the student.

Teachers use the data from the ESGI assessment tool to differentiate instruction, inform parents, re-teach, show growth over time, and guide instruction.

[1]Fathers, F. and Clemens, J. The Fraser Institute. "Technology Might Revolutionize Education". n.d. Retrieved from https://www.fraserinstitute.org/article/technology-might-revolutionize-education

LITERACY/READING SOFTWARE

The International Literacy Association maintains that rich, digital resources have a place in early childhood literacy development. Careful, intentional, and developmentally appropriate use of digital texts and tools can build young children's language and literacy skills while providing young children with opportunities to deepen their understanding about the forms and functions of digital text in meaning making. Growing evidence suggests that meaningful use of high-quality digital resources is essential in preparing all young children for long-term academic success. For example, meaningful use of digital resources yielded significantly greater benefit to important literacy outcomes for young children than use of traditional resources only and diminished substantially the language and literacy differences between children from high- and low-poverty backgrounds.[1]

The following are examples of, but not limited to, literacy/reading software used in the Mariemont City School District.

Learning A-Z

Learning A-Z offers a variety of eLearning resources that students access online. Students are able to select books at their reading level without the potential for embarrassment. In addition, the website also provides an easy-to-navigate hub that teachers use to manage their students, create custom assignments and track individual and class-wide progress.

noredink

NoRedInk simplifies the process of building strong writers and critical thinkers in Grades 3–12. The platform equips teachers to deliver high-quality writing instruction by helping them engage students through writing cycles that incorporate modeling, scaffolding, practice, and feedback.

durable learning membean

Membean is a tool teachers use to help our students learn the meanings of words and how to use them. This is an essential skill for both reading comprehension and effective writing. This is a self-paced, leveled program, that enables students to expand their vocabulary.

[1]International Literacy Association. (2019). Digital resources in early childhood literacy development [Position statement and research brief]. Newark, DE: Author.

MATHEMATICS SOFTWARE

The National Council of Teachers of Mathematics believes strategic use of technology in the teaching and learning of mathematics is the use of digital and physical tools by students and teachers in thoughtfully designed ways and at carefully determined times to enhance how students and educators learn, experience, communicate, and do mathematics. Strategic uses support effective teaching practices and are consistent with research in teaching and learning. Strategic use applies to both content-specific and content-neutral technological tools and in both synchronous and asynchronous settings. Content-specific mathematics technologies include computer algebra systems, dynamic geometry environments, interactive applets, handheld computation, data collection, analysis devices, and computer-based applications. Content-neutral technologies include communication and collaboration tools, adaptive technologies, and Webbased digital media.[1]

The following are examples, but not limited to, math software used in the Mariemont City School District.

dreambox By Discovery Education

DreamBox Math (K-2) is an engaging and adaptive math program that integrates curriculum and continuous formative assessment to personalize instruction, develop conceptual understanding, build critical skills, and improve achievement for every student, regardless of where they are in their learning journey.

Freckle

Freckle is used to personalize math instruction. It covers K-9 Ohio Learning Standards. Students start off with a diagnostic, and after that, math algorithms present learners with problems at their own skill level from a 30,000 question bank.

IXL

IXL is personalized learning. With a comprehensive K–12 curriculum, individualized guidance and real-time analytics, IXL meets the unique needs of each learner.

[1]National Council of Teachers of Mathematics (2015). Strategic Use of Technology in Teaching and Learning Mathematics [Position statement and research brief]. https://www.nctm.org/uploadedFiles/Standards_and_Positions/Position_Statements/Strategic%20Use%20of%20Technology%20July%202015.pdf.

DIGITAL PORTFOLIO

A **digital portfolio** is a computer-based collection of **student work** over time. Portfolios make classroom learning more accessible to parents, administrators, and other district support staff because they provide a window into student learning. There are many advantages to using digital portfolios in the classroom:

1. **Additional options for expression** – By shifting to a digital environment, students now can utilize pictures, videos, audio recordings and other multimedia formats in their projects.
2. **Overcoming learning hurdles** – Students who struggle with performing under typical classroom direction or from a learning disability are able to access these other avenues of expression and learning. For example, a student struggling with writing and reading may find more value in a video or audio recording.
3. **Increased parental engagement** – Through a digital portfolio, parents can easily keep track of their child's work.
4. **Uncover Learning Styles** – It's no secret that students learn differently. With the implementation of digital portfolios, students can easily reflect on their body of work. Through this reflection, teachers have a much clearer window into the learning styles of their students.
5. **Develops necessary skills** – Digital portfolios provide a great opportunity for students to develop and practice oral and written communication on top of the digital skills acquired.
6. **Tracking and growth** – Students, teachers and parents can track progress and growth throughout their school years and have tangible projects and items to include in college and job applications.[1]

The following are examples of, but not limited to, digital portfolios used in the Mariemont City School District.

Seesaw
The Learning Journal

Seesaw is a platform for student engagement. Teachers can empower students to create, reflect, share and collaborate. Students "show what they know" using photos, videos, drawings, text, PDFs and links. It's simple to get student work in one place and share with families, and nothing is shared without teacher approval.

Google Drive is utilized for storage, organization and cloud access for various file formats. Students can maintain previous projects, submit work, collaborate with classmates and digitally organize years' worth of content.

Artsonia is the world's largest collection of student art, published by teachers and students from around the world. Parents and family can view the art online, leave comments and order keepsakes featuring the artwork.

[1]The National Integrated Cyber Education Research Center "Incorporating Digital Portfolios into your Classroom 2019". n.d. Retrieved from https://nicerc.org/2019/01/incorporating-digital-portfolios-into-your-classroom/

EDUCATIONAL SIMULATIONS/GAMES

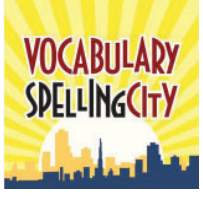
Giving students feedback in the classroom during the learning process has been proven to increase learning and improve student outcomes. When given correctly and timely, feedback guides students in their learning and gives them the direction they need to reach the target or goal of the lesson.[1]

"We found support for claims that well-designed games can motivate students to learn... and that game-based learning can actually get students interested in the subject matter," says Jan Plass, PhD, a professor in NYU's Steinhardt School of Culture, Education and Human Development.[2]

The following are examples of, but not limited to, digital games/simulations used in the Mariemont City School District.

Gizmos

Gizmos are math and science based simulation labs, games and interactive activities. Designed to help students understand abstract concepts by graphing, measuring and comparing in ways that are usually not possible. Gizmos bring math and science to life for students in the classrooms of today.



VocabularySpellingCity is a research-proven tool that helps teachers and parents meet the challenge of providing meaningful, intentional and extended vocabulary practice for students while improving fluency and retention.

Teachers use a variety of virtual reality simulations and games to immerse students into their learning. Visiting Chernobyl, seeing Normandy Beach on D-Day and dissecting the skeletal system are just a few examples.

[1]The Center for Innovation and Research in Teaching. "Effective Feedback in the Classroom". n. d. retrieved from https://cirt.gcu.edu/teaching3/tips/effectivefeed
[2]Novotney, A. American Psychological Society. "Gaming To Learn" 2015. Retrieved from https://www.apa.org/monitor/2015/04/gaming

CODING AND STEM (SCIENCE, TECHNOLOGY, ENGINEERING, MATH)

In an ever-changing, increasingly complex world, it's more important than ever that our nation's youth are prepared to bring knowledge and skills to solve problems, make sense of information, and know how to gather and evaluate evidence to make decisions. These are the kinds of skills that students develop in science, technology, engineering and math—disciplines collectively known as STEM. If we want a nation where our future leaders, neighbors and workers have the ability to understand and solve some of the complex challenges of today and tomorrow, and to meet the demands of the dynamic and evolving workforce, building students' skills, content knowledge and fluency in STEM fields is essential.[1]

The following are examples of, but not limited to, STEM based technology used in the Mariemont City School District.

Sphero Edu is a STEM based toolset that weaves hardware, software and community engagement to promote 21st century skills. Sphero Edu gives students practice in coding and nurtures students' creativity and ingenuity.

With Makers Empire, students learn how to use Design Thinking and 3D printing to identify needs and opportunities, and then to create, prototype, test and refine designs of solutions.

python™

Python coding is a foundational component of our computer science course progression, introducing students to programming through hands-on problem-solving and real-world applications. Students learn core coding concepts such as algorithms, data structures, and automation, developing critical thinking and computational skills.

[1]US Department of Education. "Science, Technology, Engineering, and Math". n.d. Retrieved from https://www.ed.gov/stem

AUGMENTED AND VIRTUAL REALITY TECHNOLOGY

As the technology behind virtual and augmented reality becomes more advanced, the possibilities of use expand in an exciting way. Now, virtual reality is becoming a realistic option for classrooms. With VR's capabilities, students can learn subjects in an immersive way like never before. But aside from the "cool" experiences, utilizing VR to learn can help students develop school-related skills, as well as skills that could benefit them throughout their lives.

"The way that we've set up the collaboration, people actually have a different sense of information and different abilities within the environment," Massachusetts Institute of Technology Dan Roy says. "So they actually have to work together, which encourages the people who maybe are familiar with school and with learning being more of an individual experience, it encourages them to take a step out of that and learn some of the collaboration skills will be critical of once they enter the workforce."[1]

StarLab is a portable planetarium that brings astronomy and earth science to life through immersive, 360-degree projections. It allows students to explore the night sky, constellations, planetary motion, and cultural astronomy in an engaging, hands-on way. With interactive lessons led by educators, StarLab creates a dynamic learning experience that deepens students' understanding of space and science concepts.

ClassVR is an immersive virtual reality platform designed for education, allowing students to explore interactive 3D environments that enhance learning across subjects. With preloaded educational experiences and teacher-controlled lessons, ClassVR brings abstract concepts to life, making learning more engaging and interactive.

MERGE enables active learning by enabling students to learn and create in entirely new ways while giving teachers simple AR/VR tools that increase student engagement, intellectual curiosity and classroom achievement. At the core is the MERGE Cube - a mixed reality school supply that extends learning beyond the limitations of device screens by giving students the ability to interact with virtual objects.

[1]Edtech Times. MIT's Dan Roy on Research Behind Virtual Reality in the Classroom. n. d. Retrieved from https://edtechtimes.com/2018/10/18/mits-dan-roy-on-the-research-behind-virtual-reality-in-the-classroom/

RESEARCH AND PRESENTATION TOOLS

For personal and professional success, effective presentation skills delivered in a confident manner are vital. That is why presentation skills need to be nurtured from a young age, before the student really has an awareness of being in the spotlight and possibly being faced with stage fright. Public speaking and presentation skills can be fostered to such an extent that it becomes a natural skill.[1]

Students utilize the app Keynote (google slides, powerpoint, prezi, and more) to produce classroom presentations. Students are taught the process for creating high quality technical presentations along with formulating an argument or informative speech.

NoodleTools gives students a systematic but flexible framework for navigating the tangled web of research. Students develop expert critical-thinking skills, gain confidence and replace patchwriting and plagiarism with synthesis. From a novice's research question to a graduate student's thesis, the three levels of NoodleTools provide a mental model for research and a common language across faculty and disciplines.

Canva is a versatile design platform used in our courses to enhance creativity and visual communication. Students use Canva to create presentations, graphics, infographics, and multimedia projects, developing essential design and digital literacy skills. With its user-friendly interface and vast library of templates, Canva empowers students to bring their ideas to life, supporting collaboration and real-world applications across various subjects.

[1] https://www.theedadvocate.org/helping-students-to-develop-presentation-skills/

2

Professional Development is Critical for Teachers

Teachers in the Mariemont City School District have been incorporating the use of student devices into their instruction since 2012. The Mariemont City School District believes comprehensive and ongoing professional development is critical to ensure instruction stays aligned to research and best practice.

Teachers receive ongoing professional development through our Mariemont Academy, guest speakers, apple certified trainers, digital coaching, on-demand badging opportunities and more. The Mariemont City School District utilizes the International Society of Technology Education standards as a guide for professional development provided to teachers.

International Society for Technology in Education

ISTE's vision is that all educators are empowered to harness technology to accelerate innovation in teaching and learning and inspire learners to reach their greatest potential.

ISTE inspires the creation of solutions and connections that improve opportunities for all learners by delivering practical guidance, evidence-based professional learning, virtual networks, thought provoking events, and the ISTE Standards.

The ISTE standards were developed by experts from all around the world and serve as a framework for the implementation of technology in schools world-wide.

There are five sets of ISTE Standards that work in concert to support students, educators and leaders with clear guidelines for the skills, knowledge and approaches they need to succeed in the digital age.

The ISTE Standards include:
ISTE Standards for Students (2016, 2007), ISTE Standards for Teachers, ISTE Standards for Education Leaders, ISTE Standards for Coaches, ISTE Standards for Computer Science Educators

Standards for Students

1. **Empowered Learner**
2. **Digital Citizen**
3. **Knowledge Constructor**
4. **Innovative Designer**
5. **Computational Thinker**
6. **Creative Communicator**
7. **Global Collaborator**

For a full listing and explanation of the standards please see Appendix D.

Standards for Educators

1. **Analyst**
2. **Learner**
3. **Leader**
4. **Citizen**
5. **Collaborator**
6. **Designer**
7. **Facilitator**

For a full listing and explanation of the standards please see Appendix D.

SUPPORT FOR OUR TEACHERS

Teachers participate in a minimum of 5 professional development days throughout the school year through the "Mariemont Academy." These days are structured with breakout sessions, keynote speakers and time for teachers to collaborate. Teachers have multiple academy days dedicated to best instructional practices with iPads in the classroom and how to use technology resources to amplify learning. This will be an ongoing avenue of support for our teachers.

Our teachers have access to a library of on-demand professional development videos and modules created by our own staff, ensuring continuous learning and growth. This resource allows educators to engage in relevant, high-quality training at their own pace, covering instructional strategies, technology integration, and best practices. By providing flexible, self-directed professional development, we empower teachers to refine their skills and enhance student learning anytime, anywhere.

Two of our elementary schools have been recognized as **Apple Distinguished Schools**, a designation that highlights our commitment to innovation, creativity, and personalized learning through technology. To further support our educators, we now have **five Apple Certified Learning Coaches** who provide hands-on training and guidance, helping staff integrate Apple tools effectively into instruction. This recognition and support system ensure that our teachers and students continue to thrive in a dynamic, technology-rich learning environment.

We have three digital coaches in the district that are professionally trained teachers that serve in a support role for our staff. The coaches set appointments with our teachers to plan, teach and reflect throughout the year. It is their job to facilitate the ISTE standards and skills that are age appropriate for the various grade levels they serve.

There are opportunities for our teachers to continuously learn on their own timeline through on-demand professional development opportunities such as Apple Badges, Apple Teacher, Google Certifications, SeeSaw Ambassador Program and many more. These online programs provide our teachers individualized learning opportunities to grow their skills and earn credits toward license renewal.

Growing Up Digital is Reality

3

The Mariemont City School District recognizes our students are growing up in a digital world with an unprecedented level of innovation happening at an unprecedented speed. We believe in supporting the development of skills to ensure our students are prepared to navigate their new world.

Our students take part in a comprehensive K-12 digital skills program aimed to hone students' ability to be successful in four main pillars: Digital Literacy, Digital Safety, Digital Balance, and Digital Identity.

STUDENT SUPPORT IN THE FOUR PILLARS

DIGITAL LITERACY

The ability to find, evaluate and synthesize information found on the internet is a critical skill our students must learn. Sources and information are easy to find online; however, evaluating their validity can be the difference between accurate and inaccurate.

DIGITAL BALANCE

As our world becomes more digital and the enticement of new technology increases, we must be even more aware of our limits. Assessing our digital use and developing a plan that works for each individual is critical to our students' well being.

DIGITAL SAFETY

The need to teach students how to protect their personal information, know who they are interacting with, and be able to navigate threats to their safety online are critical skills to practice.

DIGITAL IDENTITY

Digital identity, or often times referred to as a digital footprint, is what an individual online profile and network says about him/her. What one posts, "likes," and searches are all directly tied to the persona that is communicated to anyone on the world wide web.

PARENT SUPPORT IN THE FOUR PILLARS

The Mariemont City School District believes the most effective strategy for supporting our students is to partner with parents and community members. The Mariemont City School District strives to support this partnership in three ways:

Providing workshops and guest speakers in the areas of our four pillars.

*Visit our growing up digital page on the district website for current list of events

Providing resources for our parents to continue the discussion at home, including family contracts, tips, activities and more.

Keeping an open dialogue with our families and community members. Updating the technology plan by staying aware of the most recent research.

DISTRICT SAFEGUARDS IN PLACE

securly://

A cloud based **internet content filter** is on **every district iPad**. This means no matter where the iPad is, the internet content will be filtered. Blocked content is flagged by the school district and handled by administration.

Parents may sign up for a weekly report of what their child is searching or not gaining access to on district owned devices.

Students in grades **K-12 do not have access to a traditional App store**; therefore, they are only given access to district approved apps. Apps for social media, non-educational games, and/or online networking are prohibited.

We have a district process in place for staff and students to request apps that district curriculum and technology personnel approve or deny.

Youtube is blocked for grades K-4 entirely. For grades 5-12, YouTube is set to the strictest available filtering setting. Many teachers utilize YouTube to store personally created videos that are used for extension of the classroom learning.

The district monitors screen time and encourages parents to have dialogue with their teacher around the types of use if a concern is present. Due to apple's privacy policies, screen time cannot be monitored in mass, rather data must be collected from each individual iPad.

Beyond the Screens

4

Technology is so much more than a computer or tablet in the classroom. The Mariemont City School District strives to bring transformative experiences into our classrooms by using the latest educational technology. Virtual Reality headsets, Augmented Reality, 3D Printers, Robotics, Engineering and STEM classes and coding are all part of our educational technology program.

We are fortunate to have access to many of these resources at all grade levels along with the professionals who create ways to integrate these “new tools” into their lessons.

VARIETY OF TOOLS FOR THE JOB

TOOL/RESOURCE	GRADES USED	FUN FACT
Class VR	K-12	Allows students to explore places like Mars, diving deep into the ocean, or even traveling back in time to ancient civilizations.
StarLab	K-12	Transforms any classroom into an immersive 360-degree learning environment. Its versatility allows educators to explore a wide range of subjects—from astronomy and geology to meteorology and ancient civilizations.
Ozobots	K-6	No screens or programming experience required! By simply using markers to create different color sequences, students can make their Ozobot speed up, turn, spin, or even dance.
3D Printers	5-12	Students are creating prototypes of their inventions and are printing their imaginations in 3D.
Adobe Creative Suite	7-12	Students use Adobe Creative Suite to develop real-world digital skills in graphic design, video editing, and multimedia storytelling. They create professional-quality projects in art class.
Video Broadcasting WARRIORS Broadcast Network	K-12	Entirely student-run, giving students hands-on experience in live broadcasting, video production, and journalism. From morning announcements to sports coverage and special events.
Project Lead the Way PLTW	7-12	Nationally known program for developing engineering curriculum.
Elementary STEM STEM Science, Technology, Engineering, Mathematics	5-6	Mariemont STEM class that integrates many of the tools above.

ONE to ONE

Why One to One?

School districts across the country fall in one or more categories for how they handle the increasing need to have personal devices in classrooms: *1) BYOD or Bring Your Own Device; 2) Classroom Carts of devices; 3) Hybrid of the two; 4) One-to-One common device, one device per one student.* The Mariemont City School District is a one-to-one district that will provide a common device for all students K-12 by the 2022-2023 school year. But why?

1. EQUITY

A common device ensures that socioeconomic status does not determine the type of device students will bring to school.

2. SAFETY

A common device provides the ability for each teacher to monitor a students' device during class time along with the district's ability to filter content on all common devices.

3. SECURITY

A common device gives the ability for the district to control apps and software installed on devices and provide safe guards to viruses that could potentially be brought into our network.

4. LEARNING EXPERIENCE

A common device allows teachers to focus on instruction rather than troubleshooting multiple types of devices in a single classroom. Streamlining the types of resources needing to be purchased maximizes the budget and curriculum experience.

APPENDIX

APPENDIX A

Visible Learning ™ 250+ Influences on Student Achievement

STUDENT	ES
Prior knowledge and background	
Field independence	0.94
Non-standard dialect use	-0.29
Piagetian programs	1.28
Prior ability	0.98
Prior achievement	0.59
Relating creativity to achievement	0.35
Relating high school to university achievement	0.60
Relating high school achievement to career performance	0.38
Self-reported grades	1.33
Working memory strength	0.66
Beliefs, attitudes and dispositions	
Attitude to content domains	0.46
Concentration/persistence/ engagement	0.54
Grit/incremental vs. entity thinking	0.25
Mindfulness	0.28
Morning vs. evening	0.12
Perceived task value	0.46
Positive ethnic self-identity	0.12
Positive self-concept	0.47
Self-efficacy	0.71
Stereotype threat	-0.33
Student personality	0.30
Motivational approach, orientation	
Achieving motivation and approach	0.42
Boredom	-0.47
Deep motivation and approach	0.57
Depression	-0.26
Lack of stress	0.17
Mastery goals	0.06
Motivation	0.38
Performance goals	-0.01
Anxiety	-0.44
Surface motivation and approach	-0.14
Physical influences	
ADHD	-0.90
ADHD – treatment with drugs	0.32
Breastfeeding	0.04
Deafness	-0.61
Exercise/relaxation	0.21
Gender on achievement	0.08
Illness	-0.44
Lack of sleep	-0.05
Full compared to pre-term/low birth weight	0.57
Relative age within a class	0.45
Bullying	-0.20

CURRICULA	ES
Reading, writing and the arts	
Comprehensive instructional programs for teachers	0.72
Comprehension programs	0.55
Drama/arts programs	0.42
Exposure to reading	0.43
Music programs	0.30
Phonics instruction	0.60
Repeated reading programs	0.75
Reading Recovery	0.53
Sentence combining programs	0.15
Spelling programs	0.58
Visual-perception programs	0.55
Vocabulary programs	0.63
Whole language approach	0.06
Writing programs	0.46
Math and sciences	
Manipulative materials on math	0.30
Mathematics programs	0.59
Science programs	0.56
Use of calculators	0.27
Other curricula programs	
Bilingual programs	0.36
Career interventions	0.38
Chess instruction	0.34
Conceptual change programs	0.99
Creativity programs	0.64
Diversity courses	0.09
Extra-curricula programs	0.20
Integrated curricula programs	0.47
Juvenile delinquent programs	0.12
Motivation/character programs	0.35
Outdoor/adventure programs	0.43
Perceptual-motor programs	0.08
Play programs	0.50
Social skills programs	0.37
Tactile stimulation programs	0.58

HOME	ES
Family structure	
Adopted vs non-adopted care	0.25
Engaged vs disengaged fathers	0.21
Intact (two-parent) families	0.22
Other family structure	0.16
Home environment	
Corporal punishment in the home	-0.33
Early years' interventions	0.44
Home visiting	0.29
Moving between schools	-0.30
Parental autonomy support	0.12
Parental involvement	0.45
Parental military deployment	-0.16
Positive family/home dynamics	0.52
Television	-0.18
Family resources	
Family on welfare/state aid	-0.12
Non-immigrant background	0.01
Parental employment	0.03
Socio-economic status	0.52

SCHOOL	ES
Leadership	
Collective teacher efficacy	1.39
Principals/school leaders	0.37
School climate	0.43
School resourcing	
External accountability systems	0.20
Finances	0.21
Types of school	
Charter schools	0.04
Religious schools	0.24
Single-sex schools	0.08
Summer school	0.19
Summer vacation effect	0.02
School compositional effects	
College halls of residence	0.05
Desegregation	0.28
Diverse student body	0.10
Middle school internventions	0.18
Out-of-school curricula experiences	0.07
School choice programs	0.12
School size (600-900 students at secondary)	0.43
Other school factors	
Counseling effects	0.35
Modifying school calendars/ timetables	0.09
Pre-school programs	0.28
Suspension/expelling students	-0.20

The Visible Learning™ research synthesises findings from **1,600+** meta-analyses of **95,000+ studies involving 300** million students, into what works best in education.

Key for rating

- Potential to considerably accelerate student achievement
- Potential to accelerate student achievement
- Likely to have positive impact on student achievement
- Likely to have small positive impact on student achievement
- Likely to have a negative impact on student achievement

ES Effect size calculated using Cohen's *d*

CORWIN Visible Learning plus
visiblelearningplus.com
corwin.com/visiblelearning

Visible Learning™ 250+ Influences on Student Achievement

CLASSROOM	ES
Classroom composition effects	
Detracking	0.09
Mainstreaming/inclusion	0.25
Multi-grade/age classes	0.04
Open vs. traditional classrooms	0.01
Reducing class size	0.15
Retention (holding students back)	-0.32
Small group learning	0.47
Tracking/streaming	0.12
Within class grouping	0.18
School curricula for gifted students	
Ability grouping for gifted students	0.30
Acceleration programs	0.68
Enrichment programs	0.48
Classroom influences	
Background music	0.10
Behavioral intervention programs	0.62
Classroom management	0.35
Cognitive behavioral programs	0.29
Decreasing disruptive behavior	0.34
Mentoring	0.12
Positive peer influences	0.53
Strong classroom cohesion	0.53
Students feeling disliked	-0.19

TEACHER	ES
Teacher attributes	
Average teacher effects	0.32
Teacher clarity	0.75
Teacher credibility	1.09
Teacher estimates of achievement	1.29
Teacher expectations	0.43
Teacher personality attributes	0.24
Teacher performance pay	0.05
Teacher verbal ability	0.22
Teacher-student interactions	
Student rating of quality of teaching	0.45
Teachers not labeling students	0.44
Teacher-student relationships	0.48
Teacher education	
Initial teacher training programs	0.10
Micro-teaching/video review of lessons	0.88
Professional development programs	0.37
Teacher subject matter knowledge	0.23

STUDENT LEARNING STRATEGIES	ES
Strategies emphasizing student meta-cognitive/ self-regulated learning	
Elaboration and organization	0.75
Elaborative interrogation	0.56
Evaluation and reflection	0.75
Meta-cognitive strategies	0.55
Help seeking	0.72
Self-regulation strategies	0.52
Self-verbalization and self-questioning	0.59
Strategy monitoring	0.58
Transfer strategies	0.86
Student-focused interventions	
Aptitude/treatment interactions	0.11
Individualized instruction	0.23
Matching style of learning	0.32
Student-centered teaching	0.36
Student control over learning	0.02
Strategies emphasizing student perspectives in learning	
Peer tutoring	0.51
Volunteer tutors	0.51
Learning strategies	
Deliberate practice	0.79
Effort	0.77
Imagery	0.51
Interleaved practice	0.47
Mnemonics	0.80
Note taking	0.51
Outlining and transforming	0.66
Practice testing	0.46
Record keeping	0.52
Rehearsal and memorization	0.73
Spaced vs. mass practice	0.65
Strategy to integrate with prior knowledge	0.93
Study skills	0.45
Summarization	0.74
Teaching test taking and coaching	0.30
Time on task	0.44
Underlining and highlighting	0.44

TEACHING STRATEGIES	ES
Strategies emphasizing learning intentions	
Appropriately challenging goals	0.59
Behavioral organizers	0.42
Clear goal intentions	0.51
Cognitive task analysis	1.29
Concept mapping	0.64
Goal commitment	0.40
Learning goals vs. no goals	0.51
Learning hierarchies-based approach	0.19
Planning and prediction	0.76
Setting standards for self-judgement	0.75
Strategies emphasizing success criteria	
Mastery learning	0.61
Worked examples	0.37
Strategies emphasizing feedback	
Classroom discussion	0.82
Different types of testing	0.12
Feedback	0.66
Formative evaluation	0.34
Questioning	0.48
Response to intervention	1.09
Teaching/instructional strategies	
Adjunct aids	0.35
Collaborative learning	0.34
Competitive vs. individualistic learning	0.24
Cooperative learning	0.40
Cooperative vs. competitive learning	0.53
Cooperative vs. individualistic learning	0.55
Direct instruction	0.59
Discovery-based teaching	0.21
Explicit teaching strategies	0.57
Humor	0.04
Inductive teaching	0.44
Inquiry-based teaching	0.46
Jigsaw method	1.20
Philosophy in schools	0.43
Problem-based learning	0.35
Problem-solving teaching	0.67
Reciprocal teaching	0.74
Scaffolding	0.58
Teaching communication skills and strategies	0.43

TECHNOLOGY, SCHOOL, & OUT-OF-SCHOOL STRATEGIES	ES
Implementations using technologies	
Clickers	0.22
Gaming/simulations	0.34
Information communications technology (ICT)	0.48
Intelligent tutoring systems	0.51
Interactive video methods	0.54
Mobile phones	0.43
One-on-one laptops	0.16
Online and digital tools	0.26
Programmed instruction	0.23
Technology in distance education	0.01
Technology in mathematics	0.33
Technology in other subjects	0.55
Technology in reading/literacy	0.29
Technology in science	0.23
Technology in small groups	0.21
Technology in writing	0.42
Technology with college students	0.42
Technology with elementary students	0.44
Technology with high school students	0.30
Technology with learning needs students	0.57
Use of PowerPoint	0.26
Visual/audio-visual methods	0.22
Web-based learning	0.33
Implementations using out-of-school learning	
After-school programs	0.40
Distance education	0.14
Home-school programs	0.16
Homework	0.29
Service learning	0.58
Implementations that emphasize school-wide teaching strategies	
Co- or team teaching	0.19
Interventions for students with learning needs	0.77
Student support programs – college	0.21
Teaching creative thinking	0.37
Whole-school improvement programs	0.28

Key for rating

- Potential to considerably accelerate student achievement
- *Potential to accelerate* student achievement
- Likely to have positive impact on student achievement
- Likely to have small positive impact on student achievement
- Likely to have a negative impact on student achievement

ES Effect size calculated using Cohen's *d*

The Visible Learning™ research synthesises findings from **1,600+** meta-analyses of **95,000+** studies involving **300** million students, into what works best in education.

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APPENDIX B

Mariemont City Schools Characteristics of the Highly Effective Teacher and Highly Engaged Student

(Including Technology implementation questions and examples)

The ENGAGED student . . .

...is CURIOUS, CREATIVE, and demonstrates PASSION through his/her learning and experiences.

- Works independently within and outside of classroom time (learning does not stop when bell rings) and creates something with his/her knowledge that he/she is willing to share.
- Seeks relevance and makes connections to the learning (personal connections, connections to real-world current issues, connections to other academic subjects).
- Seeks/demonstrates understanding rather than the "right answer".
- Challenges preconceived notions and ideas and seeks alternative approaches to learning.

Technology Instruction Asks: "How can this tool/device inspire curiosity, creativity, and passion?"

Example:

- Students use various apps/programs to create digital storytelling products using multimedia. (i.e. iMovie, Clips, Book Creator, Garage Band, Stop Motion)
- Using the Everyone Can Create Curriculum provided to staff for creative, inspiring ways to use the built in apps and tools.

...demonstrates SELF-AWARENESS, INDEPENDENCE, and OWNERSHIP of his/her learning.

- Clearly communicates and demonstrates what he/she does and does not know and works to develop weaknesses and hone strengths.
- Uses various methods for self-evaluation and reflection (rubrics, graphing, checklists, narratives, conferencing) and makes adjustments to learning as needed.
- Leads and collaborates with peers to demonstrate and enhance learning.
- Manages time and tasks appropriately.

Technology Instruction Asks: "How can this tool/device give a student ownership of his or her learning?"

Example:

- Apps such as Seesaw provide students a space to demon strate their understanding and a place to reflect on their work over a course of time.
- The use of Gizmos (Math and Science simulations) allows for students to strengthen skills in areas of need through self-evaluation.

...values RELATIONSHIPS and understands the importance of meaningful COMMUNICATION and COLLABORATION.

- Actively engages with peers with respect and kindness.
- Appreciates and accommodates the different learning styles and abilities of peers when collaborating.
- Provides honest and constructive feedback to peers to help facilitate learning.
- Contributes to team tasks in a meaningful manner to accomplish a larger goal.

Technology Instruction Asks: "How can this tool/device help a student to communicate and collaborate?"

Example:

- Using online applications such as Padlet or Google Classroom, students can participate in online discussion from anywhere/anytime.
- These applications can provide a space for students to collaborate on one shared file and peer edit without having to be in the same place at the same time.

...takes responsible academic RISKS and possesses RESILIENCE.

- Accepts criticism and applies feedback to learning without taking it personally.
- Embraces failure as a part of the learning process and does not hesitate to "do over".
- Challenges him/herself, the status quo and previously held beliefs and assumptions by asking thoughtful questions and offering different perspectives.
- Does not hesitate to go first, take the lead, try something new/different.

Technology Instruction Asks: "How can this tool/device allow a student to take safe risks and learn from failure?"

Example:

- Through the use of Apple Classroom a teacher can monitor student progress as it happens and provide feedback to the student without turning in for a grade or sharing with their classmates.
- STEM classes encourage resilience. When students are coding, for example, there is a lot of trial and error. Students must re-evaluate their work and try again.

...is GLOBALLY COMPETENT and understands other perspectives and cultures.

- Displays empathy for differences among others by questioning in a positive manner, communicating in multiple ways, and making personal connections.
- Seeks to involve and be involved with the community and the world through experiences in and out of the classroom and in and out of Mariemont.
- Is curious about the world and how he/she fits in and strives to maintain awareness of universal aspects of human nature by making connections and looking deeper through questioning, research, seeking additional information and making comparisons to themselves.
- Is open minded and non-judgmental about other cultures and perspectives during discussions and experiences.

Technology Instruction Asks: "How can this tool/device allow students to become globally competent by making the world and community more accessible?"

Example:

- With guidance from the classroom teacher, students can use the app Flipgrid to connect with classrooms all over the world. They can build a digital pen pal relationship where they learn about different cultures, traditions, geography from those who live there.
- Take Virtual Reality "trips" to places that they may not otherwise be able to see. Learn how people live in all areas of the world, and develop empathy by seeing the reality that many face in other countries.

...is a CRITICAL THINKER who EXPERIMENTS, QUESTIONS, and SOLVES problems.

- Predicts and identifies problems and looks for and tries multiple paths to the solution.
- Uses higher level questioning and creativity to drive learning and can support thinking with evidence.
- Examines and employs possible solutions and gives him/herself permission to take risks without fear of failure.
- Relates, re-examines and reflects upon learning using self-monitoring or peer evaluation in order to improve.

Technology Instruction Asks: "How can this tool/device foster critical thinking and experimentation within our students?"

Example:

- The iPad is becoming a critical tool to extend learning to a student-led interactive role in learning. Science is best understood by demonstrating processes and phenomena. In order to engage students in otherwise abstract concepts, students need to create products that show their unique understanding and perspective about the scientific world around them. The iPad allows students to do JUST that, multiple times & multiple ways. Students can demonstrate understanding through video, annotations, and AR filters. Lab data is no longer relegated to bar graphs and data tables. The iPad allows students to synthesize results in a variety of methods unavailable with typical laptops.

...Builds strong content KNOWLEDGE, effectively FILTERS information, and demonstrates learning in AUTHENTIC ways.

- Proves content knowledge by creating, explaining and showcasing learning in various authentic ways in the classroom and the community.
- Applies learning to real world experiences and can articulate how the learning was applicable to the experience.
- Investigates, questions and examines information for credibility and relevance and can SUPPORT findings.
- Applies content knowledge to other areas of study by making cross curricular connections

Technology Instruction Asks: "How can this tool/device help students demonstrate learning in authentic ways?"

Example:

- Students are creating mini-documentaries that involves research, story writing, plot structure, information source analysis, and learning video production skills. Students produce and share their documentary with an authentic audience by posting to a class website.
- Students use Magic Move in Keynote to create interactive presentations.

- Students use SeeSaw to explain/show/share their individual understanding of the lifecycle of precipitation with images, interactive tools, and their voice. The learning is shared with their families and teacher.
- Creating a modern-day newspaper that details events from the Revolutionary War - Students are able to research information, and present it in a way that is more interactive and engaging.

The HIGHLY EFFECTIVE teacher . . .

...establishes and communicates clear, purposeful LEARNING TARGETS.

- Learning target is aligned to content standards, specific to the current lesson, and clearly articulated to students in “kid friendly” language.
- Teacher establishes the purpose for learning, its relevance, and connection to future learning.
- Lesson activities align to the learning target.
- Teacher regularly reinforces the learning target throughout the lesson and reminds students of what they should be learning.

Technology Instruction Asks: “How can this tool/device help students understand where they are going in their learning and how to get there?”

Example:

- Digital organization using learning management systems (LMS’s) such as Blackboard and workflow systems such as Google Classroom, SchoolWork, and Seesaw.
- Modules and sequential organization using google apps for education allows for teachers to assist in teaching structure, calendaring, and task/goal completion.
- Additionally, students learn how to manage their time by prioritizing what they need to complete

... flexibly and creatively applies his/her CONTENT KNOWLEDGE and KNOWLEDGE OF BEST PRACTICE when designing his/her instruction to maximize student learning (opportunities for guided instruction, differentiated learning activities, project/problem-based learning, inquiry-based learning).

- Teacher uses the gradual release instructional model that includes a balance of activities both teacher-led and student-led.
- Teacher creates opportunities for students to explore content deeper through strategic questioning, critical thinking, project-based and/or inquiry learning.
- Teacher uses a variety of research-based instructional strategies and the learning is spaced appropriately to meet the needs of diverse learners, differentiate instruction, and respond to student questions and interests.
- Teacher incorporates the use of appropriate, relevant, and innovative tools and resources to enhance instruction and deepen learning.

Technology Instruction Asks: “How can this tool/device motivate and inspire students to deepen their learning?”

Example:

- The use of Augmented reality to transform traditional learning opportunities...
- Walking through Downtown New York City instead of looking at a map

- Have an animal come to life in front of you that you've been studying.
- Walking up to a piece of art work otherwise not available to you.
- Coloring and labeling earth's crust and use AR app to make it come to life.
- The teacher can flip the classroom by providing content in videos that students watch before class. During class, the students can put the content to use, through creation, investigation, etc.
- Teachers can easily differentiate through the use of tools such as Schoolwork, Google Classroom, and Seesaw.

...MODELS strong and weak work for demonstrating mastery of the intended learning.

- Students have a clear understanding of expectations and criteria for the product they are being asked to create, problem they are being asked to solve, and/or project they are being asked to complete.
- Teacher shows students samples of strong and weak work and/or models successfully completing a task, solving a problem, etc.
- Students are given time to complete the assigned task(s) with guidance from the teacher and/or peers, and the teacher appropriately facilitates this work by answering questions, modeling thinking, and/or offering suggestions.
- Teacher encourages mastery of the intended learning through opportunities to re-work, re-do, and re-try until the desired outcome is achieved.

Technology Instruction Asks: "How can this tool/device help students demonstrate mastery of their learning?"

Example:

- Teachers are able to use the Apple TV screen mirroring function to model for students strong work and weak work from their screen or a student(s) screen.
- Teachers are able to create screen recordings of their iPad screen to share with students for anytime/anywhere learning. Khan Academy style. Students can then respond with their own screen recording explaining their thinking.
- Using an app like screencastify to explain "how to" do something- students can also use the app to explain their thought process. Teachers can then post comments back to the students all within the app.

...collaborates with students to set challenging, yet appropriate, LEARNING GOALS.

- Teacher has established challenging learning goals for each student using relevant assessment data and structures classroom activities and assignments to assist in reaching these goals.
- Learning goals are standards-based, align to learning targets, and encourage mastery of content.
- Students are involved in creating their learning goals and can articulate these goals to others.
- Learning goals are flexible and responsive to student progress and performance on assessments.

Technology Instruction Asks: "How can this tool/device be used to challenge each individual student?"

Example:

- Teacher uses data from math and reading programs such as IXL and Reading A-Z to pinpoint gaps in learning and provide intervention (both remedial and enrichment).

- Teacher can create leveled texts and assessments based on student levels daily.
- Teachers are able to provide workshop style instruction that allows for differentiated grouping and activities.

...facilitates productive and purposeful COLLABORATIVE LEARNING.

- Teacher defines clear expectations for the collaborative learning (i.e. group member roles, expected outcomes, etc.) activity and continuously offers feedback/prompts during the process.
- Students have individual accountability for the work created through the collaborative learning activity.
- The collaborative learning activity results in outcomes more meaningful than an individual learning activity would likely produce (i.e. complex problem solving, evidence of peer review, critical thinking & discussion, etc.).
- Teacher creates opportunity for variety in the collaborative learning – outcomes and products; learning groups; types of collaboration (i.e. face-to-face, virtual, digital, etc.).

Technology Instruction Asks: "How can this tool/device encourage collaborative learning?"

Example:

- Teachers use google docs to allow students to collaborate on science labs. Conducting research, experiments, and discovery that is shared in a common document for peer review.
- Students have choice in their assignments, leading to more personalized learning.

...gives frequent, ongoing, meaningful FEEDBACK to students and creates opportunities to receive feedback from students about the effectiveness of his/her instructional practice.

- The specific and timely feedback from teacher to student aims to fill the gap between what students understand and what the teacher wants them to understand and requires action by the students.
- Teacher gives students feedback in a variety of formats (e.g. grades, written, verbal, etc.) and focuses on what students have done correctly more than what they have done incorrectly.
- Teacher structures opportunities for students to provide feedback to one another through the use of targeted "look fors" and rubrics.
- Students give feedback to the teacher about what they know, what they understand, where they make errors, when they have misconceptions, when they are not engaged, etc.

Technology Instruction Asks: "How can this tool/device be used to provide meaningful real-time feedback?

Example:

- Teacher can use the live editing features to provide comments and feedback on student writing while they are working on the document.
- By using learning apps that have built in assessments, students receive feedback right away instead of waiting for the teacher to grade and passback.
- Feedback through SeeSaw, Schoolwork, Google Docs, etc from teacher to student.

...supports students to have an accurate understanding of their own learning through the use of FORMATIVE and SUMMATIVE ASSESSMENTS as well as SELF-ASSESSMENTS.

- Teacher uses a variety of assessments to gauge student understanding and plan instruction.
- Students are given opportunities to self-assess, can identify strengths/weaknesses in their learning, and understand how they are progressing toward reaching their learning goals.
- Teacher provides differentiated learning experiences for students based on formal and informal assessment results.
- Students can articulate what will be assessed and how they will be expected to demonstrate their learning

Technology Instruction Asks: "How can this tool/device be used to assess student learning?"

Example:

- To formatively assess students, teachers can use Kahoot, google forms, and other immediate feedback tools.
- To summatively assess students, teachers can use performance based assessments such as recording a student "performance reading" via clips, SeeSaw, or GarageBand.

APPENDIX C

ISTE Standards for Students

1. **Empowered Learner**
   Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.

   Students:
   - articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
   - build networks and customize their learning environments in ways that support the learning process.
   - use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
   - understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

2. **Digital Citizen**
   Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.

   Students:
   - cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
   - engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
   - demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
   - manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

3. **Knowledge Constructor**
   Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.

   Students:
   - plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
   - evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
   - curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
   - build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

4. Innovative Designer

Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.

Students:

- know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
- select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
- develop, test and refine prototypes as part of a cyclical design process.
- exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

5. Computational Thinker

Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

Students:

- formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problemsolving and decision-making.
- break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

6. Creative Communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

Students:

- choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- create original works or responsibly repurpose or remix digital resources into new creations.
- communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
- publish or present content that customizes the message and medium for their intended audiences.

7. Global Collaborator

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

Students:

- use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
- contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
- explore local and global issues and use collaborative technologies to work with others to investigate solutions.

Standards for Students

1. **Learner**
   Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning.

   Educators:
   - Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
   - Pursue professional interests by creating and actively participating in local and global learning networks.
   - Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. **Leader**
   Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning.

   Educators:
   - Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.
   - Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
   - Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

3. **Citizen**
   Educators inspire students to positively contribute to and responsibly participate in the digital world.

   Educators:
   - Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
   - Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
   - Mentor students in the safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
   - Model and promote management of personal data and digital identity and protect student data privacy.

4. **Collaborator**
   Educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems.

   Educators:
   - Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
   - Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
   - Use collaborative tools to expand students' authentic, realworld learning experiences by engaging virtually with experts, teams and students, locally and globally.

- Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.

5. Designer

Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability.

Educators:

- Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
- Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
- Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

6. Facilitator

Educators facilitate learning with technology to support student achievement of the 2016 ISTE Standards for Students.

Educators:

- Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
- Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
- Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.
- Model and nurture creativity and creative expression to communicate ideas, knowledge

7. Analyst or connections

Educators understand and use data to drive their instruction and support students in achieving their learning goals.

Educators:

- Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.
- Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.
- Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.

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Ohio's Learning Standards for Technology

STRAND: Information and Communications Technology
The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.			
• Develop basic skills for using digital learning tools and resources to accomplish a defined task. • With guidance, identify a goal and determine how digital learning tools can help accomplish that goal.	• With guidance, identify and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task. • Explain the use of selected digital learning tools and resources to support productivity and learning.	• Develop criteria for selecting digital learning tools and resources to accomplish a defined task. • Select and use digital learning tools or resources to support planning, implementing, and reflecting upon a defined task. • Evaluate the use of digital learning tools and resources to support learning and productivity.	• Develop strategies for using digital learning tools and resources to plan, implement and reflect upon a complex task. • Based on project-specific requirements, develop criteria to select digital learning tools and resources to support the concurrent management of multiple projects. • Analyze and evaluate the ease of use and effectiveness of available features of selected digital learning tools and resources.

STRAND: Information and Communications Technology
The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 2: Use digital learning tools and resources to locate, evaluate and use information.			
• Develop basic skills for locating information using digital learning tools and resources. • Identify main ideas and details in information found with digital learning tools and resources.	• Identify questions related to a topic of interest to broaden or narrow the topic as needed. • Use appropriate search techniques to locate needed information using digital learning tools and resources. • Use multiple criteria developed with guidance to differentiate between relevant and irrelevant information found with digital learning tools and resources. • Explain basic ideas of plagiarism and copyright. • Use digital citation tools to cite sources with appropriate guidance.	• Use advanced search techniques to locate needed information using digital learning tools and resources. • Use multiple criteria to evaluate the validity of information found with digital learning tools and resources. • Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism.	• Use advanced search and filtering techniques to locate needed information using digital learning tools and resources. • Independently construct an evaluative process for information sources chosen for a learning task. • Analyze the complexities and discrepancies found in digital information to make informed decisions. • Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism when using the work of others as well as creating personal work.

STRAND: Information and Communications Technology

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 3: Use digital learning tools and resources to construct knowledge.			
• Develop basic skills for gathering and organizing information from multiple digital learning tools and resources to build knowledge. • Use visuals found in digital learning tools and resources to clarify and add to knowledge. • Collect, record and organize observations and data during student explorations using digital learning tools and resources. • With guidance, create artifacts using digital learning tools and resources to demonstrate knowledge.	• Gather, organize and summarize information from multiple digital learning tools and resources to build knowledge of a topic. • Interpret images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc. in digital learning tools and resources to clarify and add to knowledge. • Organize observations and data collected during student explorations to determine if patterns are present. • Create artifacts using digital learning tools and resources to demonstrate knowledge.	• Analyze and integrate textual, visual, and quantitative information (images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc.) from multiple digital learning tools and resources. • Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present. • Create artifacts using digital learning tools and resources to demonstrate knowledge.	• Synthesize textual, visual, and quantitative research and data (images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc.) from a variety of digital learning tools and resources. • Analyze relationships and forecast outcomes using data collected by students or retrieved from a variety of digital learning tools and resources. • Create artifacts using digital learning tools and resources to demonstrate knowledge.

STRAND: Information and Communications Technology
The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.			
• With guidance, discuss and identify communication needs considering the task, situation and information to be shared. • With guidance, use digital learning tools to add audio and/or visual media to clarify information. • With guidance, select appropriate digital learning tools and resources to produce and publish information.	• With guidance, discuss and identify communication needs considering goals, audience and content. • With guidance, select media formats appropriate to content and audience. • Evaluate the features of digital learning tools and resources based on the characteristics of a specific audience. • Produce and publish information appropriate for a target audience using digital learning tools and resources.	• Use digital learning tools and resources to identify communication needs considering goals, audience and content. • Select and use a variety of media formats to communicate information to a target audience. • Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information. • Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.	• Use digital learning tools and resources to identify communication needs considering goals, audience, content, access to tools or devices, timing of communication (time zones), etc. • Based on communication needs, develop, implement and evaluate a communication plan to disseminate information to multiple audiences. • Integrate accessibility principles to effectively communicate to, and meet the needs of, multiple audiences. • Use digital learning tools to represent and model complex systems of information to a target audience.

STRAND: Society and Technology

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.			
• Demonstrate appropriate and identify inappropriate uses of technology required to be a responsible user. • Identify positive and negative impacts your use of technology can have on you and your family.	• Demonstrate appropriate use of technology and explain the importance of responsible and ethical technology use. • Identify positive and negative impacts your use of personal technology and technology systems (e.g., agriculture, transportation, energy generation, water treatment) can have on your community. • Describe legal and responsible practices when utilizing technology.	• Advocate and exhibit ethical, legal and responsible practices when utilizing technology. • Explore the advantages and disadvantages of widespread use, accessibility, and reliance on technology in your world. • Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. • Analyze an environmental concern and investigate technology solutions to that problem.	• Interpret and practice ethical considerations and legal requirements involved in the creation, and use of digital technologies. • Debate the advantages and disadvantages of widespread use, accessibility, and reliance on technology in your world, in the workplace and in global society. • Select a technology and analyze its global impact across multiple disciplines.

STRAND: Society and Technology
The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.			
• Communicate and collaborate using several digital methods. • Identify positive and negative ways of collaborating in digital and physical environments. • Investigate how technology does (or does not) impact the way(s) your family communicates.	• Create a plan and select collaboration and/or communication tools to complete a given task. • Exercise digital etiquette when communicating and collaborating. • Identify the positive and negative impact the use of technology can have on relationships, communities and self.	• Critique specific instances of how technology has impacted access to information, communications and collaboration. • Explain the positive and negative impact the use of technology can have on personal, professional and community relationships. • Investigate how social media impacts society and the digital identities of individuals and organizations. • Apply appropriate interactions and digital etiquette in varying contexts, reflecting upon potential impacts in both digital and physical environments.	• Demonstrate and advocate effective collaboration strategies and techniques using technology. • Describe and demonstrate professionalism and civility in communications and collaborative environments. • Analyze how social media impacts society, individuals and organizations. • Manage and adjust appropriate interactions and digital etiquette in varying contexts, in digital, physical and cultural environments.

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The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 3: Explain how technology, society, and the individual impact one another.			
• State the advantages/ disadvant ages of technology in your life. • Identify examples of how technology innovations/ inventions can have multiple applications. • Identify how the use of technology affects self and others in various ways. • Define and discuss digital identity and digital footprints. • Provide examples of how rules for respecting others' belongings apply to digital content and information.	• Describe the advantages/ disadvan tages of technology (past, present, future) to understand the relationship between technology, society and the individual. • Demonstrate how technology innovations/ invention s can have multiple applications. • Identify and discuss how the use of technology affects self and others in various ways. • Identify the components of your digital identity and your digital footprint. • Identify and discuss laws and rules that apply to digital content and information.	• Discuss and define how issues (such as economic, political, scientific and cultural) are influenced by the development and use of technology. • Explain how new technology development is driven by factors such as commer-cialization, creative/inventive thinking, and cultural/ historical influence. • Analyze how technological innovations/inventions can have multiple applications, both intended and unintended. • Describe the impact of an individual's wants, values and interests on the development of new technologies. • Manage components of your digital identity and your digital footprint. • Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.	• Debate how demand for technology and innovation have reshaped the social, cultural, political and/or economic landscape, citing references and examples. • Discuss how technological innovation has resulted when ideas, knowledge or skills have been shared across multiple fields. • Forecast the need to review, adapt, and innovate laws and policies applied to copyrights, patents, trademarks and speech. • Predict changes in society and intentional and unintentional consequences resulting from continued technological progress and defend the rationale within a given context. • Analyze and influence your digital identity and digital footprint while considering past, present, and future implications.

STRAND: Design and Technology

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.			
• Identify and discuss differences between the human-designed world and the natural world. • Describe technology as something someone made to meet a want or need. • Explain that systems have parts or components that work together to accomplish a goal. • Give examples of how resources such as tools and materials are things that help people get a job done.	• Demonstrate how applying human knowledge using tools and machines extends human capabilities to meet our needs and wants. • Give examples of how requirements for a product can limit the design possibilities for that product. • Describe a process as a series of actions and how it is used to produce a result. • Identify and describe examples of technology products and processes. • Explain how controls use information to cause systems to change, like a home thermostat turning on the heat based on the low temperature of a room.	• Explore and document how technology can impact efficiency. • Analyze how tools, materials and processes are used to alter the natural and human-designed worlds. • Define and categorize the requirements of a design as either criteria or constraints. • Explain how optimization is the process of making a product as fully functional and effective as possible. • Describe how trade-offs involve a choice of one quality over another. • Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.	• Explore and document how systems theory includes the concepts of system dynamics, systems thinking and computational thinking. • Discuss how the design process builds on the core concepts of technology, including the relationship between systems.

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Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 2: Identify a problem and use an engineering design process to solve the problem.			
• Observe and describe details of an object's design. • Demonstrate the ability to follow a simple design process: identify a problem, think about ways to solve the problem, develop possible solutions, and share and evaluate solutions with others. • Explain that the design process is a plan to find solutions to problems. • Demonstrate that there are many possible solutions to a design problem. • Communicate design plans and solutions using drawings and descriptive language.	• Critique needs and opportunities for designing solutions. • Plan and implement a design process: identify a problem, think about ways to solve the problem, develop possible solutions, test and evaluate solution(s), present a possible solution, and redesign to improve the solution. • Generate, develop, and communicate design ideas and decisions using appropriate terms and graphical representations.	• Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution. • Describe how invention is a process of turning ideas and imagination into devices and systems. • Explain how innovation is the process of modifying an existing system or system element(s) to improve it. • Consider multiple factors, including criteria and constraints, (e.g. research, cost, time, materials, feedback, safety, etc.) to justify decisions when developing products and systems to solve problems. • Identify and explain why effective designs develop from non-linear, flexible application of the design process.	• Evaluate a design solution using conceptual, physical, digital and mathematical models at various intervals of the design process in order to check for proper design and note areas where improvements are needed (e.g., check the design solutions against criteria and constraints). • Implement, document and present the design process as applied to a particular product, process or problem.

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Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding, and systems thinking.			
• Describe how different technologies are used in various fields. • Work as a team to identify possible problems to solve and their potential technological solutions.	• Design a product with multiple components and describe how the components interact to form a system. • Explore and document connections between technology and other fields of study. • Identify a product and describe how people from different disciplines combined their skills in the design and production of the product.	• Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions. • Explain ways that invention and innovation within one field can transfer into other fields of technology. • Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles. • Give examples of how changes in one part of a system can impact other parts of that system. • Deconstruct a system into its component parts and describe how they interrelate.	• Evaluate a technological problem that has benefited from a multidisciplinary approach. • Locate and evaluate past predictions about the development of technology. • Describe techniques for making decisions about the future development of technology. • Analyze the interactions within systems and between systems. • Apply systems thinking to solve a complex problem.

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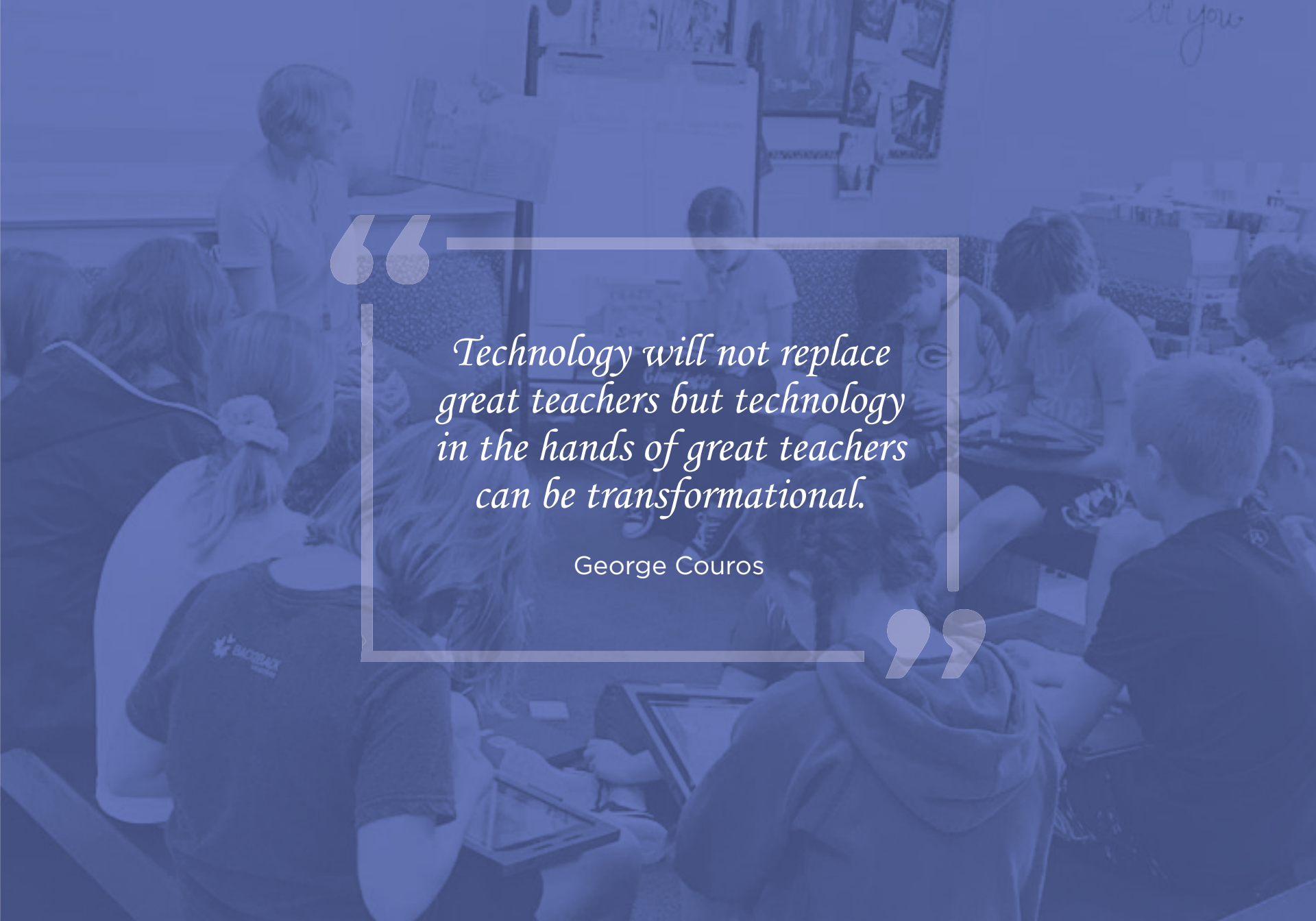
Grade K-2	Grade 3-5	Grade 6-8	Grade 9-12
Topic 4: Evaluate designs using functional, aesthetic and creative elements.			
• Identify and discuss the use of aesthetics in everyday objects. • Identify and discuss functional aspects of everyday objects. • Identify and discuss examples of creativity found in everyday objects. • Discuss and give examples of how changes in design can be used to strengthen or improve a product.	• Use criteria developed with guidance to evaluate a new or improved product for its functional, aesthetic and creative elements. • Examine a familiar product or process and suggest improvements to its design.	• Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied. • Analyze environments or products that are examples of the application of the principles of universal or inclusive design. • Apply the design principle "form follows function" to develop a product.	• Evaluate project/product solutions and communicate observations of the entire design process results. • Interpret data/information related to product testing to determine revisions and modifications to a design's function and aesthetics. • Critically evaluate a design solution at multiple points of the design process. Consider design requirements and adjust processes and outcomes as needed. • Explain the interrelationship between technology, creativity and innovation.


Technology will not replace great teachers but technology in the hands of great teachers can be transformational.
George Couros

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