Integrating Technology into Instructional Practice

Using the Rigor/Relevance Framework as the Primary Tool for Successful Blended Learning

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RIGOROUS LEARNING FOR ALL STUDENTS

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The following has been adapted from *Uncommon Learning: Creating Schools That Work for Kids*.

Technology is becoming increasingly present and instrumental in instructional approaches. In order to successfully embed and fully optimize technology, educators need reliable learning frameworks as the foundations of instruction. Without support structures and learning activities grounded in sound pedagogy, technology in the classroom risks having only a bells-and-whistles presence and making only a superficial impact on learning. When technology is integrated with purpose and aligned to the acquisition of new knowledge, the demonstration of conceptual mastery—or the acquisition of new skills—more authentic learning will take place and students will be better equipped to compete in the real world.

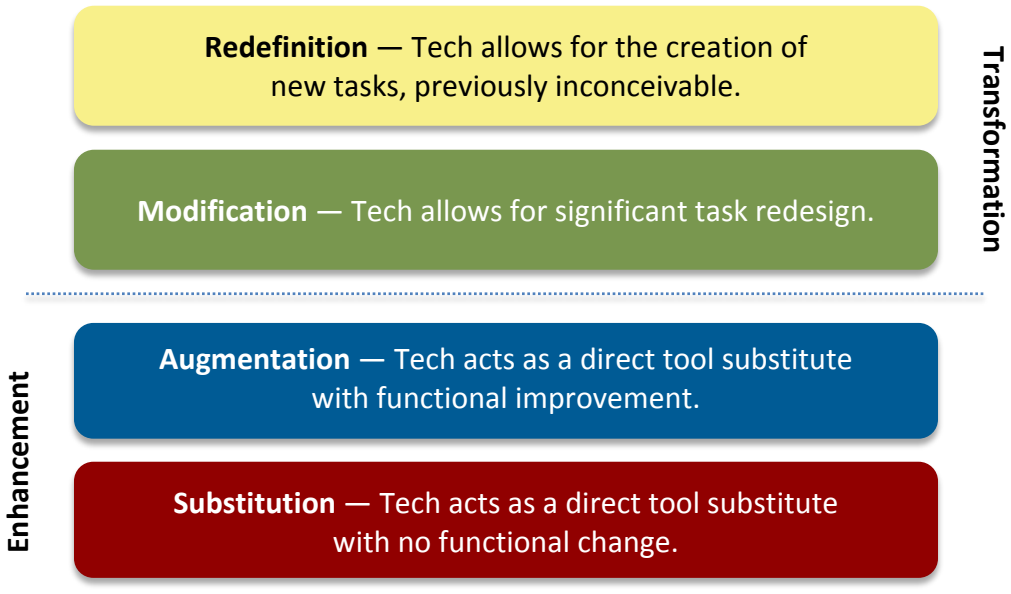
There are several learning frameworks and tools that can enable educators to effectively integrate technology into instructional approaches, all of which offer something to educators.

Frameworks for Integrating Technology into Teaching and Learning

Substitution Augmentation Modification Redefinition

The Substitution Augmentation Modification Redefinition (SAMR) Model structures a method for observing how educational technology can facilitate the teaching and learning process. SAMR shows how teachers commonly employ a progression when they integrate new technologies into instruction. As a teacher progresses along the continuum, technology becomes increasingly embedded into the learning activities. The further along on the continuum, the more effective the integration of technology as an instructional enhancement. Authentic student engagement and learning are the defined outcomes in this framework. The approach allows for constructive dialogue regarding activities and their assigned levels.

SAMR Model



Technological Pedagogical Content Knowledge

The Technological Pedagogical Content Knowledge (TPACK) framework aligns the successful integration of technology into the classroom with specific instructor knowledge. The framework outlines the interconnectedness of three primary forms of knowledge:

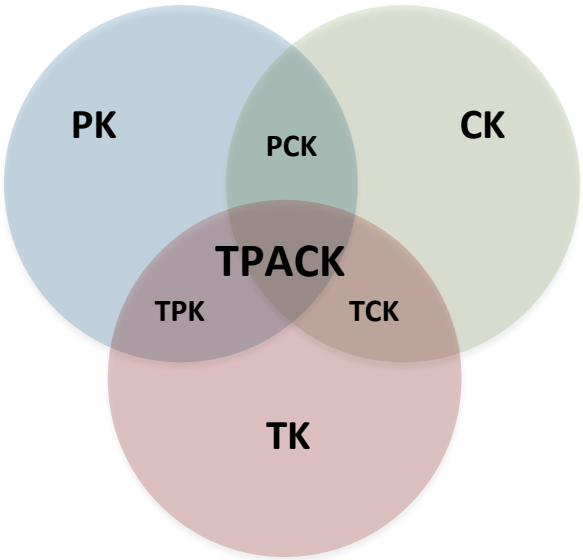
1. Content (CK)
2. Pedagogy (PK)
3. Technology (TK)

TPACK also emphasizes emerging types of knowledge that lie at the intersections between CK, PK, and TK, representing four more knowledge bases (the fourth of which is the intersection of the first three) that teachers can apply to technology-based pedagogy:

1. Pedagogical Content Knowledge (PCK)
2. Technological Content Knowledge (TCK)
3. Technological Pedagogical Knowledge (TPK)
4. Technological Pedagogical Content Knowledge (TPACK)

The effective integration of technology into pedagogical approaches to specific subject areas requires developing sensitivity to the dynamic, transactional relationships among these types of knowledge. Various factors ensure that every situation is unique and that no single combination of content, technology, and pedagogy will apply for every teacher, every course, or every view of teaching (Mishra & Koehler, 2006).

The TPACK framework is complex and educators can benefit from fully understanding the forms of knowledge and the best ways apply the framework to ensure the effective integration of technology. Mathew Koehler (2012) provides the following elaboration on types of knowledge:



- **Content Knowledge (CK)**: As Shulman (1986) noted, this knowledge includes that of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge" (Koehler & Mishra, 2009). Content in all subjects varies depending on the level at which it is being taught.

- **Pedagogical Knowledge (PK)**: Teachers' deep knowledge about the processes and practices or methods of teaching and learning including overall educational purposes, values, and aims. Understanding how students learn, how to manage classrooms, how to plan, and how to assess student learning are part of pedagogical knowledge (Koehler & Mishra, 2009).

- **Technology Knowledge (TK)**: This type of knowledge includes: ways of thinking about and working with technology, tools and resources; understanding information technology broadly enough to apply it productively at work and in everyday life; being able to recognize when information technology can assist or impede the achievement of a goal; and having the ability to adapt to changes in information technology (Koehler & Mishra, 2009).

- **Pedagogical Content Knowledge (PCK)**: PCK is founded in the idea that knowledge of pedagogy is applicable to the teaching of specific content. Central to this concept is the notion that any subject matter must be transformed for the purpose of teaching. According to Shulman (1986), this transformation occurs as the teacher interprets the subject matter, represents it, and adapts and tailors the instructional materials to alternative conceptions and students' prior knowledge. PCK covers teaching, learning, curriculum, assessment and reporting (Koehler & Mishra, 2009).

- **Technological Content Knowledge (TCK)**: TCK addresses the ways in which technology and content influence and constrain one another. In addition to mastery of the subject matter they teach, teachers must also have a deep understanding of the ways in which the subject matter and the ways in which it can be represented can be changed by the application of particular technologies. Which specific technologies are best suited for addressing subject-matter learning in specific domains? How can the content dictate or change the technology—or vice versa? (Koehler & Mishra, 2009).

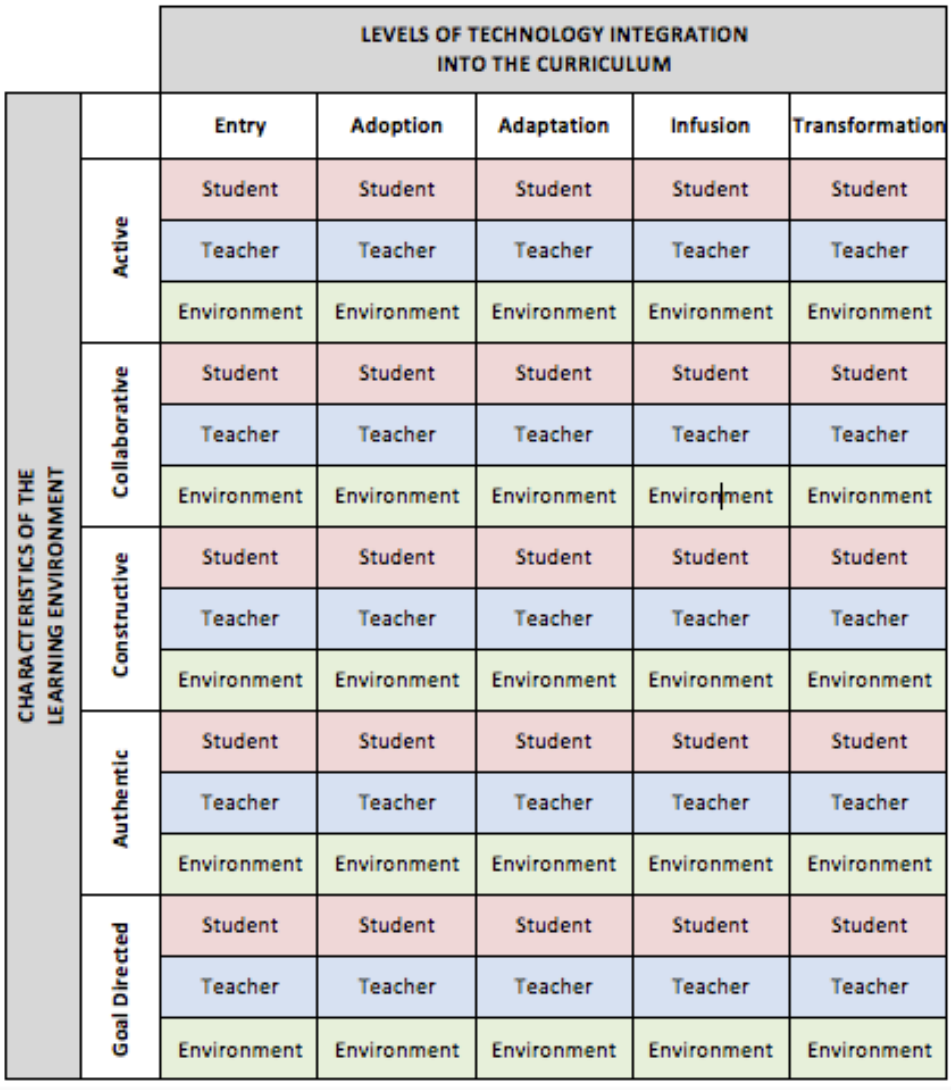
- **Technological Pedagogical Knowledge (TPK)**: TPK addresses the ways in which teaching and learning can change when particular technologies are used in particular ways, including knowing the pedagogical advantages and disadvantages of various technological tools as they relate to pedagogy (Koehler & Mishra, 2009).

- **Technological Pedagogical Content Knowledge (TPACK)**: TPACK underlies truly meaningful and deeply skilled teaching with technology and differs from knowledge of the three individual concepts. TPACK is the basis of effective teaching with technology, requiring, among other things, an understanding of how technology applies to the representation of concepts, which pedagogical techniques use technologies effectively, and how technologies can address the difficulties students face when learning concepts (Koehler & Mishra, 2009).

Technology Integration Matrix

The Technology Integration Matrix (TIM) provides defined indicators to measure the use of technology in enhancing learning for students at all grade levels. It includes the five interdependent characteristics of relevant learning environments—active, constructive, goal-directed, authentic, and collaborative. Five levels of technology integration—entry, adoption, adaptation, infusion, and transformation—are associated with each of the five characteristics of relevant learning environments. All in all, the five levels of technology integration and the five characteristics of relevant learning environments (represented as follows) create an interactive matrix of 25 cells. Educators can dive into each of the cells to view clear indicators for each at the student, teacher, and learning environment levels, as well as see sample lessons in Math, English Language Arts (ELA), Social Studies, and Science.

Technology Integration Matrix



CHARACTERISTICS OF THE LEARNING ENVIRONMENT	LEVELS OF TECHNOLOGY INTEGRATION INTO THE CURRICULUM				
	Entry	Adoption	Adaptation	Infusion	Transformation
Active	Student	Student	Student	Student	Student
	Teacher	Teacher	Teacher	Teacher	Teacher
	Environment	Environment	Environment	Environment	Environment
Collaborative	Student	Student	Student	Student	Student
	Teacher	Teacher	Teacher	Teacher	Teacher
	Environment	Environment	Environment	Environment	Environment
Constructive	Student	Student	Student	Student	Student
	Teacher	Teacher	Teacher	Teacher	Teacher
	Environment	Environment	Environment	Environment	Environment
Authentic	Student	Student	Student	Student	Student
	Teacher	Teacher	Teacher	Teacher	Teacher
	Environment	Environment	Environment	Environment	Environment
Goal Directed	Student	Student	Student	Student	Student
	Teacher	Teacher	Teacher	Teacher	Teacher
	Environment	Environment	Environment	Environment	Environment

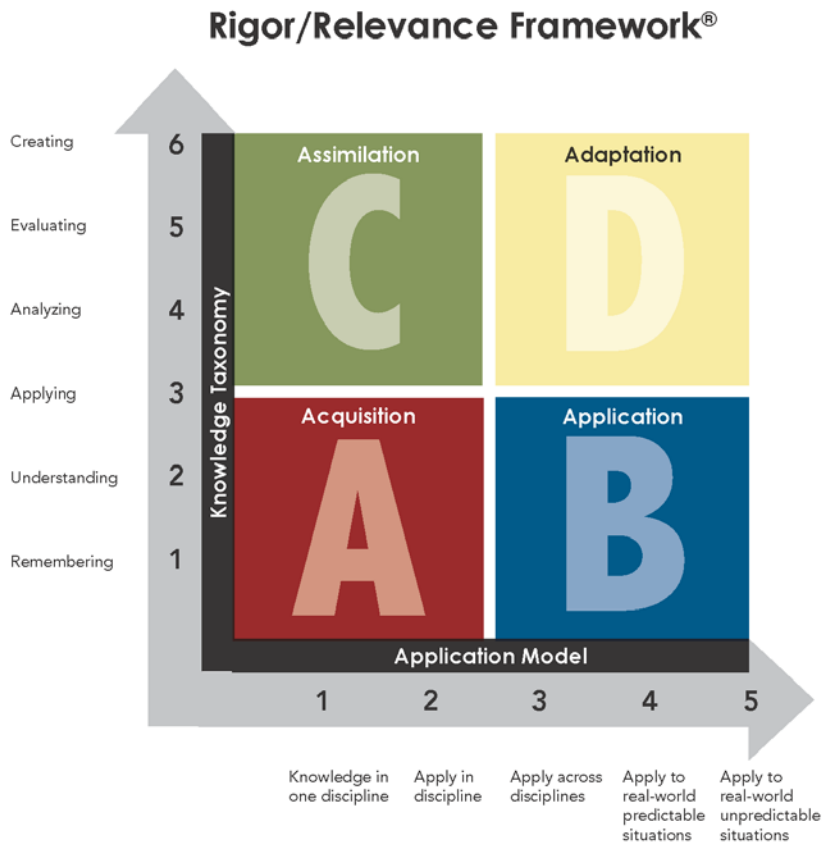
By using the interactive matrix, educators can also identify the level of technology integration in relation to student learning and outcomes. Descriptors for typical teacher activities, student activities, and instructional settings are included in each individual matrix.

SAMR, TPACK, and TIM serve as the main technology integration frameworks currently in use. While conceptually useful, each has its limitations. For instance, none are specific in helping teachers think about *what to change* to make their technology integration better. None of them illuminate the level of thinking our students are engaged in and how to apply their understanding. Additionally, the SAMR levels can mean different things to different people; educator audiences commonly place a particular use of technology in all four SAMR levels. A framework that can fully support teachers in these areas is the Rigor/Relevance Framework®.

The Rigor/Relevance Framework® — A Common Language for Teaching and Learning

The Rigor/Relevance Framework is an action-oriented continuum that describes putting knowledge to use by giving teachers a way to develop both instruction and assessment and by giving students a way to project learning goals—both with or without the use of technology.

Each of the four quadrants of the framework can be labeled with a term that characterizes learning or student performance: Acquisition, Application, Assimilation, and Adaptation.



This framework is based on traditional elements of education yet encourages movement from *acquisition* of knowledge to *application* of knowledge, charting learning along the two spectrums of higher standards and student achievement.

In the Rigor/Relevance Framework, capable teacher presence and teacher-centered instruction always belong in the foreground and always underpin lasting student learning, no matter what digital tools are in use. Grounded in rigor and relevance, instruction and learning with digital tools are limitless.

In every instructional situation, learning needs to be relevant, meaningful, and applicable. Student engagement is a bedrock necessity of attentive and deep learning. Excitement about academic growth, in turn, drives increased student achievement, not only in terms of meeting and exceeding standards but also in terms of learning that extends into all realms of life. With the solid pedagogical foundation that the Rigor/Relevance Framework provides, digital tools and

social media afford students the opportunity to take more ownership of their growth and development. Allowing students choice over which tools they will use to create learning artifacts that demonstrate conceptual mastery builds a greater appreciation for learning while simultaneously preparing them for the real world.

With robust and reliable digital tools in hand, students grow to develop their own learning tasks—such as podcasting, blogging, or digitally storytelling—that stretch their creativity, originality, design, or adaptation. These students think and apply knowledge critically to curate content and apply information to address a range of cross-disciplinary tasks that are both creative and original. This could include collaborating with others using social media, networking, or reviewing. Their work requires their ability to select, organize, and present content through relevant digital tools, which provide multiple solutions.

The following charts break down and categorize examples of learning tasks that use technology into quadrants of the Rigor/Relevance Framework. It is important to note that tools can vary from quadrant to quadrant based on how they are used.

Quadrant C		Quadrant D	
VERBS	**EXAMPLES**	**VERBS**	**EXAMPLES**
Analyze	Hyperlinking	Argue	Animating
Classify	Media Clipping/Cropping	Conclude	Audio Casting
Diagram	Monitoring	Create	Blog Commenting
Evaluate	Photos/Video	Explore	Broadcasting
Examine	Programming	Invent	Composing (GarageBand)
Explain	Reverse Engineering	Modify	Digital Storytelling
Infer	Software Cracking	Plan	Directing
Judge	Testing	Predict	Mashing-Mixing/Remixing
Research	Validating Resources	Rate	Modifying/Game Modding
Summarize	Video Editing		Networking
			Photo/Video Blogging
			Podcasting
			Reviewing

Quadrant A		Quadrant B	
VERBS	**EXAMPLES**	**VERBS**	**EXAMPLES**
Define	Bullets and Links	Apply	Advanced Searching
Identify	Creating and Naming Folders	Construct	Annotating
Label	Editing	Demonstrate	Blogs
List	Highlighting/Selecting	Dramatize	Google Docs
Locate	Internet Searching	Illustrate	Hacking
Memorize	Loading	Interpret	Operating/Running a Program
Name	Typing	Interview	Posting—Social Media
Recite	Using a Mouse	Sequence	Replying—Commenting
Record	Word Doc	Solve	Sharing
Select			Social Bookmarking
			Subscribing to an RSS Feed
			Tagging
			Texting
			Uploading
			Web Authoring

How do these categories align to the four quadrants of the Rigor/Relevance Framework?
The skills in each quadrant are grouped in progression from basic to advanced, with the foundational skills in Quadrants A and B setting up the integrative and advanced skills in Quadrants C and D.

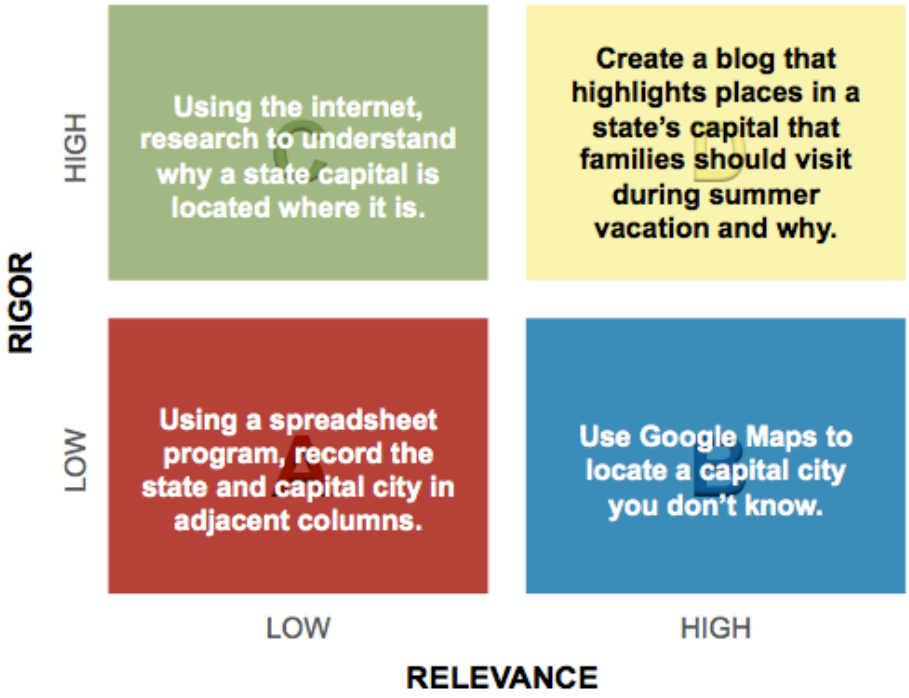
Quadrant A skills provide basic knowledge of digital and social media. Students gather knowledge or recognize their existing knowledge, demonstrating understanding of the purpose and outcome each skill provides.

Quadrant B skills are those that show the student's ability to apply his or her acquired knowledge in digital and social media: to solve problems, design solutions, and complete work. The skills at the end of the list will challenge students to apply their knowledge to new and unpredictable situations.

Quadrant C skills describe those that digitally capable students have mastered. These skills show an extension and refinement of acquired knowledge and an ability to solve problems and create solutions in predictable situations.

Quadrant D skills are those that apply to real-world, unpredictable situations. These skills mark the ability to use digital tools and social media to think in complex ways and author one's own understanding in the digital world.

Student Learning Tasks That Incorporate Technology by Quadrant



The Rigor/Relevance Framework, when coupled with literacy in digital and social tools, frees teachers and students to do much more than just meet standards. It liberates them into an understanding of growth that gives students relevance and positions them to be owners of their knowledge and members of their world.

Applying Digital Tools to Daily Practice

How can we create pathways for rigorous and relevant use of digital tools? These best practices can help:

Prioritize Instructional Excellence—Technology can be an effective tool, but it remains just that, a tool. Educators provide the backbone of the student's learning experience. A teacher should always have concrete answers to these questions:

- What capabilities do I want my students to develop? In what specific ways is my instructional design rigorous, relevant, and goal oriented?
- What are my benchmarks for rigor? Relevance? Relationships? Clear objectives? Teachers and students can use their responses to consider a specific digital tool, asking the following:
    - How does this digital tool support the development of the capability I want to develop in my students?
    - Is my teaching, using this tool, still as structured, rigorous, and relevant as it would be without this tool?

Identify Student Needs Around Use of Digital Tools—Information should not be confused with knowledge of evaluating digital tools. Knowledge is the recall of information, discovery, observation, or naming. Teachers should be able to define what knowledge (not information) students will need to apply when using a digital tool.

Create a Game Plan for Managing Student Use of Online Tools—It takes work and careful planning to implement the use of digital tools in defined ways. Before introducing a digital tool into a learning context, teachers should understand the following:

- How will they support students in using a tool that might be unfamiliar?
- How will each student be able to manage it independently?
- How will they take advantage of students' diversity and inclination toward building community online?
- How will students and the instructor connect, sometimes across great distance?

Maximize Opportunities for Diverse Forms of Feedback—Rather than relying on feedback or evaluation models suited to outdated models of assignments, have teachers ask these questions:

- How will this online tool allow me to hone in on each student's thought process and provide targeted, formative feedback that can be immediately and usefully applied?
- How can my feedback help pave the way for next steps in learning and in reaching established, articulated, or modeled goals?

Five Steps: Building Successful Digital Communities Infused with Rigor and Relevance

A dynamic combination of mindset, behaviors, and skills is required for schools to become places where social media and digital tools are integral and beneficial parts of a rigorous program and where they work symbiotically with active, engaged, and applicable learning. How can we take the greatest advantage of this moment in time and create compelling and challenging learning spaces for students? The most important things to do are to give up control and to trust students and their teachers to use real-world tools to unleash creativity and a passion for learning. After creating a strong foundation based on these ideas, the specifics can take several different forms:

Step 1: Realize that social media is a predominant tool in the world. It fosters personalization, creativity, and collaboration, giving students infinite ways to create artifacts of their learning and knowledge.

Step 2: Make use of devices students already have, know, and use. Bring your own device (BYOD) signals to kids that teachers know and understand their basic makeup. BYOD enhances learning, increases productivity, allows students to grow their research skills, and gives teachers the chance to teach appropriate digital responsibility.

Step 3: Create spaces for making, collaborating, and tinkering. Give students chances to build and create using real-world tools (woodshop, electronics, metal work, and coding stations) and solve open-ended, real-world problems. Bring play back into the picture. These spaces provide students with challenging problems to solve where there is no one correct solution. Through self-directed learning, students are driven to find solutions to create a product that has value.

Step 4: Structure schools so that they more accurately reflect the real world. Ubiquitous connectivity, charging stations, and casual zones that promote conversation and play increase students' sense of belonging and engagement. Digitally astute students engage through such models as blended learning, flipped classrooms, games, makerspaces, and virtual learning.

Step 5: Give students access to open courseware and open source technology. Inherent in these approaches is a high level of choice about what to focus on which leads to greater ownership over learning and personalized ways to demonstrate understanding.

Effective, successful teaching and learning have become inherently intertwined with the digital world. Educators must be able to develop and enact rigorous, relevant instructional methods and formats while using digital tools effectively to underpin their instruction. Students and teachers can transform learning so that it not only prepares them to excel in academic life but also endows them with essential digital age skills.

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