# Mixing It Up: Technology Integration Through Creative Learning Design

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**Abstract:** In this paper, we share a process for creative learning design with technology. The process draws on combinatorial creativity and backwards design to support creative uses of technologies. After describing the process, two teachers share their experiences with applying the approach to high school English and elementary school science. We also discuss challenges with the approach and future areas for exploration.

## Introduction

Technology integration is as much about creativity and design as it is about technology. For example, early work on the Technological Pedagogical Content Knowledge (TPACK) framework focused on the knowledge teachers needed to effectively integrate technology into teaching and learning (Mishra & Koehler, 2006). Because of the rapid change of available technological tools as well as cultural and societal shifts, developing TPACK might be best supported by design (Mishra & Koehler, 2006). Creativity–the creation of something that is novel and effective–is also a critical component of effectively using new tools. Put together, creative design supports both learning and making as designers "learn their way to a solution" (Lawson & Dorst, 2009, p. 34). When teachers learn to creatively design with new technologies, they develop the type of knowledge and skill needed to continually adapt their teaching to maximize the affordances of new technological tools.

In order to support creative design with technologies, we created a process for teachers and teacher candidates based on combinatorial creativity and creative synthesis. Combinatorial creativity explains creativity as the remixing and synthesizing of ideas. From this perspective, "to create is to combine existing bits of insight, knowledge, ideas, and memories into new material and new interpretations of the world" (Popova, n.d.). The similar idea of "synthesis" was presented as a creative habit of mind by Henriksen et al. (2015). They emphasized that synthesis not only combines multiple ideas, but it presents the combination in a manner that changes the experience of the audience, much as some technology integration models call for transformative uses of technology (see, for example, Kimmons et al., 2020).

One approach that we have found that can help teachers design creative and effective uses of technology is through a process of combinatorial learning design. In this approach, teachers or teacher candidates mix disciplinary and technology standards into a design for learning. We have found that this approach is not only effective at supporting the development of design, creativity, and technology integration skills, it also empowers teachers as they gain ownership of their learning and teaching. They begin to see more possibilities for meeting the content-area standards they are required to address while at the same time helping students develop creative and technical skills.

Our combinatorial learning design builds on the backwards design process created by Wiggins and McTighe (2005). First, the designer (teacher or teacher candidate) selects at least two learning outcomes–one content-focused and one technology-focused–which they would like to design for. For the technology standards, we have used the ISTE student standards (ISTE Standards: Students, n.d.). Then, the designer mixes and synthesizes these outcomes into an authentic assessment that will provide evidence of whether students have met both learning

outcomes. In this phase, the designer might ask what their students should be able to "do" or "make" if they have achieved the learning outcomes. We emphasize authentic assessment using creative products that support student voice. Finally, the designer creates a set of activities and associated tools that will support students in successfully meeting the learning outcomes.

The power of this approach to learning design comes from the combination of both disciplinary and technology-focused learning outcomes into one design. Teachers must not only understand each set of standards, but also synthesize the standards into activities and products that draw upon the affordances of various digital technologies. The result is a combination of standards, tools, activities, and assessments that have the potential to transform teaching and learning.

Next, we will describe this mix-and-synthesize process as implemented in an online technology integration course. First, we will describe how the process was introduced to teacher-learners. Then, two teachers will share how the process helped them develop creative uses of technologies in high school English and elementary school science. Finally, in the conclusion we will address the challenges of the approach as well as directions for future research.

## Learning to Create Learning Designs

We began experimenting with creative learning design in an online master's level education course in a small southern university. The majority of class members were teachers pursuing a master's degree in curriculum and instruction, special education, or educational technology leadership. The course was structured around the ISTE educator standards (ISTE Standards: Educators, n.d.) with an added emphasis on visual and web design for learning.

During the first three weeks of the 8-week course, class members developed personal statements on teaching, learning, and technology; explored the meaning of digital literacy; and practiced aligning learning outcomes with authentic assessment approaches. Content included Kimmon et. al's (2020) PICRAT model as well as Mishra and Koehler's (2006) TPACK model.

During the fourth week, class members were introduced to learning designs as a combination of content and technology standards, activities, technologies, and assessment. We connected learning designs to both the PICRAT and TPACK model: learning designs would focus on creative and transformative uses of technology and be deeply connected to a content area. Class members began by identifying a content area and two standards: one in the content area and the other from the ISTE student standards. Next, they determined what acceptable evidence of meeting the standards might be. We emphasized authentic, creative assessment approaches. Finally, class members selected activities and technological tools that could support achieving the learning outcomes. In week 4, ass members completed learning designs in small groups; in subsequent weeks, they created two additional learning designs, shared them with their groups, received feedback, and revised.

## Two Learning Design Examples

Next, we share the creative design experiences of two class members. The first, Alisha Butler, found the approach gave her and her students more ownership in their work. Next, Tracey Hatfield focused on giving students ownership and voice while constructing their own understanding of pure substances and mixtures. More information, including the full learning designs created by these as well as other teachers, can be found on this wakelet (https://wke.lt/w/s/ozHtB2).

### Example 1 Alisha Butler- #TikTokCrucible

The CrucibleTik Tok Characterization Challenge learning design is meant for teachers to use as a reference point at the end of each act of the play, *The Crucible*, to check student comprehension and connections. It also allows for students to communicate with one another via social media as if they are their chosen character, posting and commenting. It provides learners with ample and diverse opportunities to express and simulate their character observations and prognosis into modern day language, actions, and trends. The driving factors behind my learning design are ownership and creativity– both for myself and my students. I want the units and lessons I design to be empowering and self-motivating for my students, through the opportunity to creatively express their learning in ways they are more comfortable with. For myself, I want to be able to use my professional knowledge to create authentic learning opportunities I can be proud of, which not only align with state curriculum, but technology

standards as well. I also want to be involved and play a crucial role in my students' work and movement to mastery of the standards. The framework I follow for my learning design allows for all of this to be accomplished and more through three parts: standards, instruction, and assessment.

The sequence behind my creative learning design developed over time, as a trial-and-error process of meshing standards, ideas, and potential activities into a rigorous, relevant, engaging, and measurable lesson. Like backwards design, I first considered the type of end goal I desired—not only with content standards, but also with technology standards and how those might interconnect with the project piece. I first had to determine what is one of the most essential concepts and/or skills students needed to grasp and have opportunity to apply by the end of the unit. I chose characterization. From there I was able to choose my Louisiana state standards which best matched the desired outcome from the Louisiana Department of Education website. I decided on two specific content standards that I reworded and simplified for exact alignment with the objective I created with the activities and assessment outcomes.

The standards I selected were "Analyze the development and relations of the main characters of a story to further the purpose and plot of the literary work" (Louisiana State Standards), "Analyze a particular point of view" (Louisiana State Standards), and "Creative Communicator: Students create original works or responsible repurpose or remix digital resources into new creations" (ISTE Standards: Students, n.d.).

Focusing on specific standards enabled me as a planner to be purposeful in my alignment, meaning I am able to return to specifically worded standards and objectives to ensure congruity throughout the design plan, while ensuring that all standards, including my technology standard can be measured through activities and assessments.

My next step was to create or remix a realistic or authentic assessment appropriate to match my three selected standards. This is where real life application comes into play and what sort of technology should be used to make this learning creative or transformational. Authentic assessments not only incorporate complex real-world situations within a field, but they also require opportunities for rehearsal and/or practice, meaning there are scaffolded activities throughout a course which allow the instructor to provide feedback students can then implement in future drafts. I was aware of how trendy TikTok and reels from other platforms are lately, including the parodies and reflections of *The Crucible*. I chose to combine some of the #CrucibleTok trends with my own spin in order to track students' observations and predictions throughout the unit. Hence, my rationale for this learning design to cover an entire unit and not just one act or lesson—the students needed to practice their content skills and technology skills, and I needed time to provide purposeful feedback to drive each project's refinement of the individual products, in order for students to fully meet the criteria and mastery levels established by the rubric for the final project piece.

To finalize my authentic assessment, I made sure the rubric I created aligned directly to all three selected standards, so that each could be measured in some way. This means that I am not grading this project based on the "usual" or "normal" criteria that goes into any ELA project or writing, such as grammar, usage, spelling, etc. This applies to the "standard" criteria included to grade technology-infused projects such as layout and design. Effort should also never be an assessment criteria. Only those which directly apply to the standards chosen. Therefore, my rubric criteria were categorized (vertically) by the ISTE standard chosen, and ranked based on the content and skill standards (horizontally).

Finally, I came back to my instruction pieces: the objective, materials, and activities anticipated to build students towards success for their final assessment product. Since this is a unit design plan and not specific to a lesson, I provided optional materials that I believe best support my students and their learning. I noted in my design that others' students may have different needs which in turn may mean changes to the activities or omitting some of the materials listed. I have divided the activities into "During Reading" and "After Reading" categories to denote the scaffolding which is needed for each act of the play. Prior to creating and sequencing these activities, I took a second look at the standards and objective. The terms "perspective" and "analyze" stood out to me, as did "original or repurposed digital works." I asked myself, "How do I ensure students can prove they know how to analyze a character's perspective through digital interpretation?" I had to not only consider how students would take notes throughout the play (During Reading), but also how they could put their understanding into writing-- a rough draft to serve as a reference point or guide to later turn into a media post (After Reading). It was the process needed for

students to be given the ability to analyze, or breakdown, and then synthesize or build a plan to later simulate the chosen character on social media- being able to express what and who they were in the play. For these activity sections, I provided materials such as my personal preference of audiobook via YouTube, film version, and characterization tracker which is licensed and attributed for images, as well as a writing template for with sentence stems for drafting.

The repetitive steps and broad sequencing to the CrucibleTok Characterization Challenge provided me a genuine way to connect with, assess, and provide feedback to my students in a way they were comfortable and could continue to challenge themselves. It also enables other educators to navigate and make adjustments to the learning design as desired. I created incentives in order to encourage and motivate students to make it more game-like and simulated like real social media interactions or even impersonations that are commonly made on reels. Together, I combined content and technology standards, with my interpretation and spin on social media, and in relation to what is trending lately that students are familiar with in order to create a competitive and fun way to assess their ability to analyze and interpret perspectives and motivations within a text.

**Example 2 Tracey Hatfield- Exploring Substances and Mixtures**

I chose a simplistic science standard —distinguish between a pure substance or a mixture—to design my learning plan. When students understand and can distinguish between these terms, they are more able to grasp the concepts of physical and chemical properties and physical and chemical changes.  Instead of simply giving students definitions and examples, I wanted to give my students an opportunity to cultivate their own knowledge about both terms and then share that knowledge with their peers. My goal. I wanted students' learning to be more meaningful by giving students an opportunity to take ownership of learning. I also wanted to challenge myself - Can I *not* "teach" the content, but rather allow my students to discover the content and to construct their own knowledge? How might different technology tools support this?

Next, I found an ISTE student standard (1.6d: "Students publish or present content that customizes the message and medium for their intended audience") that matched my pedagogy and would help me focus on how I wanted students to showcase their learning. I liked the idea that students could choose a medium to show their knowledge because this matched my pedagogy of giving students a voice and ownership as well as emphasized creativity. Giving students a choice on how to show me what they know is something I am trying to work on this year. It does make my job harder, but I feel this makes assignments more meaningful when students can take ownership of their own learning.

I decided to design a culminating project for the substances and mixtures project: students would share what they learned through a slide presentation or video. This activity would allow me to assess students' progress on both the content standard and the ISTE standard. Students would need to select the most appropriate medium to share their learning and then use that medium to express what they know.

Focusing on the ISTE standard helped me select the content and how I would present that content to my students; I needed to find ways to get them ready to complete the performance task. This way of thinking helped me select the best tools for presenting the content. To align the content standard with the ISTE standard and the performance task, I had to be constantly thinking about how one choice  (activity, tech tool) would affect the alignment of all three.

 I chose a text for students to read that introduced pure substances and mixtures and connected to their prior knowledge. Then, I used the EdPuzzle app to find some interactive videos that went into more depth and explanation of the terms. Finally, I chose several games that allowed students to apply what they had been learning. These games would be engaging while at the same time address any misunderstandings.

I believe my learning design shows how teachers can use technology to facilitate learning, allow students to build their own knowledge through exploration, and give students a chance to share their learning with others. Technology can enhance the learning experience of our students if we are willing to let go of the reins and if we choose the correct technology that supports the content and how we know our students need to learn the content.

## Conclusion

Alisha and Tracey found the process of combining content-specific and technology-focused learning outcomes helped them design opportunities for learning that increased teacher and student agency, ownership,

engagement, and voice. They were able to enhance the required curriculum by incorporating technologies in creative and transformative manners.

Although Alisha and Tracey were successful, some class members struggled to see beyond their normal classroom practice. For example, some class members taught in schools with rigid and scripted curriculums. It was challenging to help these class members move beyond a focus on a "lesson plan" to more transformative and creative uses of technology. Additionally, some did not have an adequate understanding of the ISTE student standards to fully apply them in their designs. In a current iteration of the course, we are experimenting with additional methods for helping class members understand the ISTE standards, including adding additional exposure to a variety of learning designs through the ISTE website as well as the Chromebook App Hub.

We hope our work on learning design can support teachers in finding more creative approaches to effective technology use and provide examples of learning designs that show teachers how to employ the affordances of technologies within the confines of their curriculum.

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