Productive Failure

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Mariana Pineda

Technology Integration

How to Cultivate Productive Failure When Using Edtech and AI Tools

Common edtech tools guide students toward right answers instead of letting them grapple with wrong ones, but teachers can plan intentionally for this valuable learning experience.

By Mariana Pineda
May 17, 2023

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During my time as a teacher, I constantly encountered students impatiently looking for answers, and if the answers didn't come fast enough, frustration took over. This *craving* for immediate answers has been eased by the implementation of educational technology and artificial intelligence (AI) in educational settings. The boom of edtech and AI has been intensifying in the last years, and its use was significantly accelerated by Covid-19.

But how do we guarantee that students are truly understanding, internalizing, retaining, and transferring knowledge? How do we support students' use of edtech and AI? One way is through the use of productive failure (PF).

PF is a learning design developed by Manu Kapur, a renowned learning scientist. It arose from a need to balance direct instruction and discovery learning, both long-lasting dominating teaching methods.

Kapur conducted research to prove the impact of PF in students' learning outcomes. To summarize the findings, both PF and direct instruction were equally effective for developing basic knowledge. But when analyzing students' conceptual understanding and transfer skills, PF significantly outperformed direct instruction. In his September 2019 TEDx Lugano Talk, Kapur said, "To put it practically, if you were learning via productive failure, it would seem as though you were performing one to two academic years ahead of direct instruction."

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Providing Support for PF

When designing for PF, educators must do so in a safe, curated, and supportive environment. As Kapur further stated in his TED Talk, “Making learning easy does not necessarily ease learning.” PF encompasses four core mechanisms:

- Students’ prior and background knowledge are activated in relation with the new or targeted content.
- Students become aware of the most important aspects of the new content (ease the learning process by decreasing cognitive load).
- Students generate and explore different representations and solutions leading to explanation and elaboration.
- Teachers then assemble the content purposefully and correctly by rectifying and building on the possible solutions generated by students.

To learn more about PF, I highly recommend you read Kapur’s Edutopia interview: “If You’re Not Failing, You’re Not Learning.” As I learned more about PF, I had three main questions: How can we establish what PF looks like if failure and success look different for every student? How do we implement PF in an era of personalized learning? How does PF relate to edtech and AI?

If used well, edtech and AI tools can be a great support for educators. One of the greatest benefits of AI is how personalized it can be. Students have the opportunity to advance at their own pace and review content they find challenging.

In a way, these tools allow students to experience failure on an *individual level*. Nonetheless, many of these tools quickly prompt students toward the right answer instead of letting them engage productively with the wrong ones. One of the biggest questions is *How do we find common ground when each student is on a different level?*

Edtech and AI are also outstanding tools for developing and strengthening *hard skills*, such as how to solve mathematical problems or write a well-structured essay. Incorporating PF lessons periodically would help strengthen *soft skills*, such as better communication between students and educators, coping strategies when faced with frustration, leadership skills, and a better sense of community, among others.

As recent research has shown, soft skills are paramount in today’s context. In fact, research shows that they’re six times more important than hard skills! If students start developing these skills at a young age, it’ll be easier for them to keep strengthening those skills during their adolescence and adulthood.

As new edtech, AI, frameworks, and research findings continue to emerge, it's important to find ways to bridge the gap between them and learn to use them intertwiningly to create a richer educational experience for students. Merely adopting edtech in educational settings is not enough.

As educators, it's our responsibility to ensure that we're using these tools mindfully and in a purposeful manner. One way to enrich students' use of edtech is to incorporate PF lessons throughout the school year.

5 Things to Consider When Incorporating PF Lessons

1. Start right away. Before introducing an edtech or AI tool to your class, plan a PF lesson instead of having students use edtech or AI right away.

2. Assess students' performance throughout the year and plan PF lessons that students can engage in collectively. These should be planned periodically after formative or summative assessments. For example, if you're using IXL during the semester, make sure to incorporate PF every three to four weeks.

3. Teach students to cope with frustration and uncertainty. This is one of the most important skills that students develop when engaging in PF lessons. These are *big feelings* for a lot of students, and that's where social and emotional learning (SEL) comes in.

SEL goes beyond simply telling students "You've got this!" during class. It's important to address, through different interventions, the Collaborative for Academic, Social, and Emotional Learning's five SEL pillars: self-awareness, self-management, responsible decision-making, relationship skills, and social awareness.

4. With edtech tools, students advance at different paces. Additionally, you might have neurodiverse learners in your educational setting. Planning a lesson that takes all these differences into account is crucial—and hard. One way in which you can address this is by planning your PF lesson using Universal Design for Learning.

5. Parents and caregivers are your most important allies. It's important to explain to them what PF is and why it's important. Many parents put a lot of emphasis on grades, and many perceive frustration and "not doing well" automatically as something bad.

If parents understand what's happening inside the classroom, they'll support PF at home—*even if at first they might perceive it as a setback*. And remember, not all your lessons will be PF lessons. That's why planning for them strategically is key.

Student Wellness

How to Help Students Resist Their Phones and Develop Better Digital Habits

Excessive phone use can lead to depression and poor school performance, but building academic confidence can forge healthier habits.

By Tyler Rablin
May 24, 2023

This summer I ran away to the woods to be out of cell service because I needed to get some writing done. I had tried to finish my book at home, at coffee shops, and even while on vacation. None of it worked because I was fighting a losing battle with my phone and technology.

I'm someone who remembers life before the iPhone and whose first exposure to social media was copying and pasting code into MySpace, and my upbringing was a world away from the one my students live in.

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Literacy

How Audiobooks Help Emerging Readers and Inspire a Love of Books

Audiobooks allow students to enjoy books above their reading level, introducing them to engaging stories that will hook them for life.

By Kimberly Rues
May 11, 2023

Not long ago, one of my third graders was struggling to find books he liked. His teacher reported that he kept picking up titles that were far too simple or far too difficult for him to manage successfully on his own. In addition to not being able to find books he wanted, he struggled to read them once he had them.

I'm a pre-K through 6 librarian, so I visited with this student one morning one-on-one to find out what he was looking for. He started telling me that he just didn't like to read. He couldn't specifically tell me that he wanted a particular genre or style of book, but after a bit of conversation, he shared that he loved dragons.

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Administration & Leadership

5 Ways to Make PLCs Work Better

Tips for teachers and school leaders on how to ensure that school-based professional learning communities are successful.

By Maggie Espinola
May 23, 2023

“And I think that maybe people, myself included, might be thinking to themselves, ‘Man, I’m in the middle of the day right now. I have a meeting today. I have eight classes before and after, I have a family at home.’ I can imagine somebody thinking to themselves, ‘Oh my God, I could be doing anything else that would be truly helpful.’” —Anonymous teacher

Over the past three years, I have interviewed numerous teachers expressing this sentiment regarding the value of professional learning communities (PLCs). Although educators cherish moments when they can collaborate with their peers, it has been rare to find teachers who felt that their PLC provided the time and resources needed to make dialogue a meaningful practice to improve their teaching. But we can make them work better.

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Administration & Leadership

How One Principal Builds Strong Relationships

An award-winning principal shares how she navigates social and emotional learning and community building at school.

By Brittany R. Collins
May 23, 2023

Forging relationships with students, staff, and caregivers is critical to the success of any school leader. But what does relationship building really look like in action? How can leaders operationalize their educational missions to foster genuine support and collaboration in their learning environments?

These questions feel especially urgent in the wake of the pandemic, as many schools are encountering challenges related to social and emotional learning (SEL), and nearly 55 percent of teachers are considering leaving the profession. With so much in flux, cultivating a strong school culture is critical to creating dependable, supportive spaces for both learners and teachers.

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Assessment

Using Skills to Grade Proficiency in Science

Proficiency scales provide an excellent way to evaluate students on their scientific knowledge and skills.

By Allie Kollman
May 24, 2023

“Are we preparing students to enter into and succeed in STEM fields?” This question haunted me while meeting at weekly professional learning communities to discuss curriculum and assessments. As science educators, we acknowledge that science is more than a mere accumulation of facts. The discipline should foster our students’ scientific thinking skills, improving their capacity to engage in scientific inquiry and reason with evidence.

To achieve this goal, I needed to equip my students with a core set of knowledge and skills that they could use to engage in scientific inquiry. The combination of knowledge and skills would enable students to become scientists who could potentially contribute to the discovery of new knowledge.

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Family Engagement

Making Parent Meetings More Meaningful

A successful parent-teacher night involves providing objective feedback on student progress and listening carefully to parental concerns.

By Crystal Frommert
May 23, 2023

Depending on the size of your school, parents may be invited on campus during the day for parent conferences or maybe to a Parent Night. Small schools tend to open their doors more often for parent presentations from teachers such as literacy night, math night, parent coffees, etc. Teachers have a long list of preparation items for Parent Night such as decorating the room just so, sharing samples of student work, pronouncing the parents' names correctly, and most important of all, not looking incompetent in front of the parents. Just as important is making the night meaningful and informative for families, avoiding the fluff.

Drs. Robert Evans and Michael Thompson suggest, in their 2021 book *Hopes and Fears: Working with Today's Independent School Parents*, that teachers address parents' fears and worries during their presentation. Teachers can help parents predict what's to come in the new grade level. As an example, "You may have heard that there is a significant increase in homework from third to fourth grade. (Pause for

head nodding and affirmative murmuring.) I can assure you that we guide our incoming fourth graders by teaching them organizational skills that will help them manage their workload. We also offer homework help time after school for students who have additional questions.” In this example, you’re not denying that the workload increases, but you’re assuaging parents' worries about whether their child can handle it. Don’t shy away from the real stuff parents want to hear.

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Social & Emotional Learning (SEL)

Using SEL to Meet the Current Needs of Students and Staff

Social and emotional learning provides a guide for what schools can do to help students and teachers perform at their best.

By Maurice J. Elias
May 23, 2023

We are seeing reports about higher-than-usual numbers of teachers leaving or strongly considering leaving their jobs. At the same time, the mental health of students is characterized by high rates of anxiety and depression.

Would it surprise you to know that there is a common approach to helping schools retain teachers, help teachers to be motivated to stay in their jobs, and improve the mental health of our youth? It involves listening to what social and emotional learning (SEL) is telling us now.

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