



a podcast about how we learn, how we teach, and how they overlap

Episode 23: How Making Mistakes Helps You Learn

Adam: Hi, I'm Adam Sanford. I'm an academic life coach and professor in Los Angeles.

Dinur: And I'm Dinur Blum. I'm a college professor in Los Angeles. This is Learning Made Easier, a podcast where we discuss how we learn, how we teach, and how they overlap.

Adam Welcome back to Learning Made Easier. This is Episode 23, where we'll discuss how mistakes can actually help you learn.

Dinur: And the first thing we want to tell you is: do not be afraid to make mistakes. Adam and I cannot stress this enough, because making mistakes is how we, as people, learn. If you've never made any mistakes, you're not learning. The best people in their professions all make mistakes. Musicians hit sour notes. Goalies give up terrible goals. Pitchers give up home runs. Lawyers lose cases. The big question is how do you use a mistake now to help you improve later?

Adam: And the process of learning is about trying, failing, figuring out what went wrong and doing it better next time. And I hate to tell you this, but you're not exempt from this fundamental law - you are human.

Now Brooke Castillo has had people say, "Well, I tried and I failed, so I'm never going to try again."

And she says, "What if you had said that when you tried to take your first step, and then you fell down on your butt? Would you be walking right now?"

Just because you failed doesn't mean you shouldn't try again. In fact, that should be a really big reason to try again. And remember, you're a human being. Mistakes are part of what you are. Mistakes are part of being human. There's no way to get away from that.

So let's talk about how to use mistakes constructively. Now, in doing research for this particular episode, Dinur and I stumbled across an article on KQED.org, and the name of the article is "How Making Mistakes Primes Kids to Learn Better." And we're going to put that in the show notes, but we want to go over some of the main points from the article, because they're really fascinating,

Dinur: Right? And one of the big, big points the article makes is that highlights the difference between how American and Japanese teachers teach their students. It says that Americans are focused on getting answers right the first time, and on using really specific procedures - like when you're doing math - and teachers here

tend to use a lot of heavy praise for the right answers. This kind of follows Skinner's view that making a mistake might make the mistake entrenched, but the Japanese don't view it this way. The Japanese view learning as a struggle, and they see making mistakes and setbacks as a natural part of learning, and there's less praise put on students in order to keep their focus on how to solve this process

Adam: Rather than just getting the answer correct, and I remember reading an article about this - not this article, but there was a fellow who was doing, I believe his dissertation - and he went to Japan to sit in on Japanese elementary schools.

And he's sitting in a math class, and I believe the boy was about seven or eight years old, this fellow was watching him - and this boy was at the blackboard trying to draw a particular figure from their math geometry homework. And the teacher kept looking up and saying, "nope, that's not right yet. No - you're getting a little better, but you're still not right yet. Keep working on it. Keep working on it."

And the funny thing was that the American observer was getting more and more and more and more tense and going, "Oh my God, he's going to feel so embarrassed that he's not doing it right!"

And, and when it became clear that the child could not do it, the teacher said to the other kids, "okay, help him understand what's going on, because you all understand this, and he doesn't. Give him some hints."

But at no time was the child punished for not understanding it. At no time was the child scolded for not understanding it. It was just, "hey, you're still working on it. You're not there yet. It's okay not to be there yet."

That is an idea that many Americans would say, "it's never okay not to be there yet!"

Well, if you get on a plane to Hawaii from LAX, you're going to be on the plane for five hours. Is it not okay to not be there yet, for those five hours that you're in the air? Kind of an unrealistic view, right?

So another thing that this article on KQED points out is that people learn a lot better when they actually make a mistake and get corrected. So I'm just going to quote from the article here:

Nate Cornell of Williams College, he conducted a word pair experiment in which people were cued with a word, for example, "tree." And then they were asked to pair it with a related target word, like "oak". And he found that they remembered the target word a lot better if their first guess was wrong. Like if they had guessed "maple" or "pine" and then they were corrected instead of just giving the correct pairing and told, "memorize this."

And this research also led to this finding that the more certain you are, the more sure you are that your wrong answer is right, the better you're going to learn the right one after you get the correction. They're not certain why this happens, but some of their speculation about it at least is that when you make a mistake, it pulls your attention to the mistake. And it does it even more so if you're surprised that you got it wrong, like if you're really sure you have the right answer and you're not, that's going to really draw your attention to the fact that "Oh my answer was wrong. Ah!"

And in addition, once you've summoned up all your prior knowledge, it's a lot easier to learn something new. And this is a process that neuroscientists - remember when we talked with Gretchen Wegner and she talked about the neuroscience? This is part of it - this process of learning something new after you

brought your prior knowledge to mind is called “memory reconsolidation.” And so the thing is, making mistakes actually makes it stick better once you figure out where you made the mistake.

Dinur: And the article actually gives some really good tips as well. And it suggests that we teach students how to identify and learn from their mistakes. As teachers, we should not give students the answers. Instead, make students figure out where they went wrong and correct the mistakes. Giving students the chance to explain how they get to the right answer works a lot better than asking them to explain the procedure they were taught. Because if they're just explaining the procedure they were taught, they may be regurgitating rather than actually incorporating that procedure and thinking all the way through it. But if students have to reason through not just how, but why an answer is right, it creates deeper learning.

Adam: And the article gives some suggestions on how teachers can incorporate this into class. So when you hand back papers, say, a math assignment, mark the errors, but don't give any scores and don't give any feedback. And then give students the time to correct and hand back the corrections. And they really suggest: do this in groups. Get your students into groups of four, hand back their papers with the mistakes marked, but no guidance and no scores. Because if they look at the score, they're not going to - remember, we want to keep their minds off the points because the point is not the point, right? But the problem is, is that once you give them a score, they don't care anymore about learning how to fix the problems. But if you hand them back their papers with the errors marked but not commented on, and no score, then it creates this situation where they have to figure out what the mistake was.

And the research points to this is not only possible, but it's good. It's really good. So for example, if you're turning back a paper, you could highlight mistakes and give it back to the student. One man I heard about, he looks at their papers, he has them printed out, and for every line that he finds an error he just puts a check mark next to that line. But he doesn't indicate what the problem is. He just puts a check mark. And that forces the student to go through that paper and say, “there's a checkmark on the first line of my second paragraph, why? He won't tell me what I did wrong. He only told me that something is wrong. So what might be wrong here?”

So it forces the student to really dig deep into what could be wrong and recognize errors, learning how to recognize their errors.

Some teachers will teach from those errors. They'll turn back the papers and they'll say, “okay, before you all get started going through and figuring out what you did wrong, I have four favorite mistakes and I'm going to go over those first in class.” And I realize, I kind of do something like this when I have my students take a quiz at the beginning of the class, and then I go over the quiz and say, “okay, so we have five questions. And at three of them we didn't hit the 70% mark. So let's go over those.”

So this is the same kind of thing.

Dinur: And just as Adam mentioned teachers discussing their favorite mistakes, we're about to discuss some of the favorite mistakes that we've made, both as researchers and as teachers.

Adam: So Nelson Mandela once said, “I never lose. I either win or I learn.” And what we're going to talk about is going to try to frame our mistakes as: what did we learn from the situation?

Dinur: And one mistake that I've made in the past, and I still do, is in how I write my test questions. There are times that I'm positive that I've written a really clear test question. I've gone over the material, it's completely fair game, and I look at my students - and like 80% of them miss it.

Now is it possible that all 80% of them didn't study this? Theoretically, sure. But it's pretty unlikely. It's way more likely that I wrote a bad question, or that maybe I didn't cover the material nearly as thoroughly as I thought I did.

And so what I do in order to correct it is, I throw that question out. I take any penalty away from the students so that they're not hurt from my mistake. We cover that material and then I learn to revise and rewrite that question in case I want to test students in the future on it.

Adam: And I've had the same problem, but for me, it's often just: I did a programming mistake, I upload a question to Blackboard and tell it "this is a true false question" when it's actually a multiple choice question, or vice versa. And then I get students sending me very confused emails saying, "This says true false. But that's not what the question is asking. Um, what's going on here?"

And then I say, "Okay, as soon as the quiz is closed, I'm going to give everybody credit for that question." And then I go in and I remove it from the test bank, and write a new question that does it right and is programmed right.

Now another thing that we see a lot of mistakes with, and that we make a lot of mistakes with, is writing.

I used to love certain words when I would write articles or lectures. And then someone pointed out to me that I had thumbprints all over my work where they said, "I can tell that Adam wrote this, because this word is on every page. It's in every paragraph. This phrase is showing up at least once every other page."

And it just made it repetitive, and even cringeworthy. Because my favorite word, apparently, is "obviously," and it's a huge big written fingerprint for me. Let's not discuss my dissertation, because it's on every page. And if it was that obvious, then I didn't need to write a dissertation on it, did I?

So I now have a list of words that I keep on my computer, and I bring it up when I'm proofreading, and I check for those words every time I write something. And I'm really strict with myself. Like, "you get one 'obviously' per paper. That's it. That's all you get." I've got to really pick: where am I going to put it?

And this may not seem like a mistake, but think about how your teacher grades you when you've put in a lot of unnecessary words to pad the word count. It doesn't usually go very well, does it?

Dinur: So, Adam mentioned a mistake he's made writing. I know I make mistakes when I'm writing, because for me, learning to write well, making a good concise, clear argument - was and still is challenging for me at times. And there are times where I find that I get caught up talking around a subject rather than talking about it really directly.

And one of the ways that I've learned to deal with this is, I've given papers to my friends, and I've talked to them about it, but I have them proofread it and give me feedback. And one of the comments that helps me a lot goes back to the way that I was taught how to write - we'll do an episode on this in the future - but it's "writing as football."

Well, in football, the quarterback speaks in a clear code. That's how they tell their teammates where to go and where a play's going. For me that's - that's the thesis statement. That's got to be my code. It's got to let me and the reader know "this is what you are looking for. This is where this paper is going." And so, if I give my paper to a friend and they tell me, "Hey, where's the quarterback call? Where are you doing here?" that lets me know that I have to make it really clear early on and take here. This is why this paper is being written. This is what you are looking for.

Adam: Now the thing is that making mistakes is not limited to what you do in school. When you get out of school, there's going to be a ton of situations where you will make mistakes. And I'm working on launching a course for sale right now, and the advertising and marketing part of the game. Ah, it's all new to me. I don't do this stuff, and I'm really bad at it, and I know that I've probably already made mistakes that I won't be able to correct until I get back the metrics from the ads that I'm running right now. Just like ,you know you made mistakes on that test, but till you get it back, there's nothing you can do about it.

But I can either kick myself for not being perfect, or I can look at what went wrong and learn from it.

And the course I'm taking right now, about how to create and launch an online course for sale - it emphasizes just because your launch didn't work, doesn't mean you're a failure. It just means you need to find where things were not working and fix them.

And for me, this is new ground for me. This is kind of scary to say, "Yeah, I made a mistake. Yeah, this is not working." It feels bad, but that doesn't mean that I'm bad. It doesn't mean - this is one of the things that we talked about, I think, in episode 19 or 20 - where we said, making a mistake doesn't make you a bad person. And a lot of us still think that the bad grade, the mistake, makes us a bad person.

Dinur: Right. We even talked about it too when we talked about the fixed mindset versus the growth mindset. We're trying to emphasize growth, and mistakes are a natural part of growing. Look, making mistakes feels awful for many people, but hopefully you're hearing from Adam and myself that this, that just because you make a mistake doesn't mean you have to beat yourself up for being wrong. Because a lot of the time, your wrong answer can help solve some other question better than available answers could. Maybe you're thinking about material in a new way.

Adam: When my father was dying - my father was a composer. He had a lot of music that he hadn't yet written down. And I know I've mentioned this in previous episodes, but I'm just going to mention it here real briefly, as an example of how a mistake actually might help solve a question.

My dad was dictating the music to my brother, so he was singing it, and my brother was writing it down. And then he showed my dad the manuscript, and my dad looked at it and said, "okay..." And he's humming along with it, and all of a sudden he said, "this is not what I sang. Nate."

And my brother looked at it and said, "Oh, I'll get the Wite-out."

And my dad's all, "hold on, hold on..." And he hummed it, and he says, "Actually, let's try this."

And he started singing something totally new, and my brother scribbled it down. A whole new piece of music came out of that mistake, because my brother wrote down two quarter notes and an eighth note that weren't supposed to be there. And my dad sang it and said, "actually, I like this," and created a whole new piece of music, on the fly, that would never have happened if my brother hadn't made that mistake.

And this isn't the only way in which mistakes can lead to better things. I mean, a lot of companies will give a prize once per fiscal quarter to the person who made the best mistake that quarter. And you could do this for yourself. What was your best mistake today? All right, what was your best mistake in the past week? What was your best mistake in the past month in the past year? A "best mistake" is one that you're going to learn from. It's one that helps you improve.

So Dinur and I really want to emphasize this: never, ever regret making a mistake unless - and this is the one exception - unless you keep making the same mistake over and over and over, and not learning from it.

Dinur: And you know, Adam mentioned one sports metaphor for me, but you're getting the second one for free - one on the house! A lot of sports leagues give an award for the Most Improved Player each year. And how do you improve? Because you made mistakes one year, you learned from them and you've improved your skills, so that if you're making mistakes, they're new mistakes, but you've corrected old ones.

Adam: In a book that I've read to my daughters, there's a character who tends to make a lot of mistakes, and her adoptive mother says to her, "You must be so tired of making mistakes."

And she says, "Oh no, no. There must be a limit to the number of mistakes a person can make. And I'll be so glad when I've reached the end of them."

Of course, she never reaches the end of them. But having that attitude that, "At some point, I'm going to be improved enough that if this won't happen anymore" and yet, keeping a positive attitude about it: "Okay, but this is just another step on the road to finally being improved enough to not have to make more mistakes."

You'll always make mistakes, but having that kind of outlook on it really changes how they feel.

Dinur: And in episode five - we mentioned earlier in this episode as well, but Adam and I discussed the growth mindset and the OLI, the Observe, Learn, and Improve method. And using this is one of the best ways to handle mistakes. And in a future episode, both of us are going to talk about how you handle bigger mistakes that you make.

Adam: But in the meantime, let's talk about how teachers can use this information. And we've, we've been pretty balanced here. We've talked some about how teachers can do things, and how students can do things. But let's start with the fact that you've got to be up front with your students: Mistakes are part of learning, and you've got to be up front with them that you know that.

I can't tell you how many times students have said to me, "Well, I figured that you were a professor because you never make mistakes."

I'm sorry, I still make mistakes. I made mistakes this week. I made mistakes this morning. And they don't see that unless you tell them. Because we have this "front stage" face that Dinur has mentioned in, in recent episodes. You know, we have our front stage and they only see the front stage and you only see their final cut. I know I've mentioned that before. You know I, you know, nobody sees your, your backstage, nobody sees what's going on inside your head, or what happened to you that morning.

And you've got to be up front that mistakes are normal. They're natural, they're part of learning. Because if you aren't upfront about that, then students are going to think you expect them to be perfect.

Dinur: And one of the ways that I try and emphasize that is I tell my students when I have articles rejected and I say, “hey, they didn't like this. This was a mistake I made. So this is what I've got to do, if I want to try and publish in this journal.”

And I tell them, it hurts being rejected. No one likes getting that bad grade. No one likes getting, hey, we're sorry, but those kinds of emails. But you learn and you see that life goes on. One mistake doesn't ruin your career.

And related to this, Adam talked about being upfront as a teacher about mistakes being part of learning as teachers, we should never expect perfection. We should look for progress and reward that. We're not looking for students who get 100% on everything because, well, that doesn't tell us whether or not they're learning.

It tells us they're very, very good at what they're doing, but I like to reward progress for my students, because if I have a student who starts out writing poorly or taking tests poorly, but they build and build and build, well, by the end of that semester, I can see all that effort. I can see the steps that they've taken. And ultimately, it even helps me when I write letters of recommendation for them, because I can speak so well to the progress I've seen and to the improvements that I've made that it makes. It honestly makes it a much easier letter for me to write.

Adam: And this thing about not expecting perfection; it just actually came to me. I should have put it in the notes. There's a book written by a man named Stanley Kiesel and it was called *The War Between the Pitiful Teachers and the Splendid Kids*.

And in this book, and it's a fiction book and it's, it's a very highly fantastical book, but the, the idea of the book is that the kids, you know, the K-4 kids, you know, the kids in kindergarten through fourth grade, they fight a war against the teachers - and the teachers win. And the teachers then use the Status Quo Solidifier to turn all of these Kids into Young People.

And the teachers, at first, say that they're overjoyed to be teaching Young People because Young People never make mistakes. Their first question is always, “what can I do for extra credit?” They all line up, and they all obey the rules, and they never talk back. And they never, they never - there's no class clowns anymore. There's no bullies anymore.

And it's so boring, because grading isn't grading anymore, because there's never any mistakes. There's never any feedback to give. There's never anything you need to tell these kids to improve, because they're already perfect. They're already a hundred percenters all the time.

And imagine - teachers, professors, how boring it would be if you never had a student who needed your help; if you never had a student who did struggle a little bit. It would be, what would the job be anymore? You'd just become a grading machine.

And so the students think that we expect them to be like that, and it's really important to tell them, “I don't expect you to be perfect. I just expect you to learn. I expect you to make mistakes. It's normal to make mistakes. I make mistakes, nobody's perfect.”

And some students will fight you on that. They will say, "But if I'm not perfect, then I'm not good enough." Maybe you need to sit down and have a heart-to-heart with that student and say, "tell me why you think perfect is the only good enough."

But really, I mean, let's have a war against perfection. Let's have a war against students' perceptions of what's "good enough."

Dinur: Yeah.

Adam: And then as a - as an additional thing you can do as a teacher, allow the students to make mistakes and plan for it. Make it part of the learning process. So like those teachers who turned back papers with errors marked but no score, that's putting make mistake-making into the learning process. It's saying, "all right, you've given me your attempt. Now go over it and identify the mistakes."

And you may not even make them correct them. You may just make them identify them, like, you know, have them write a two page paper, go through and mark: "okay, there's no thesis statement here." So put a check mark in the, in the um, margin. And "okay, I don't understand where your support is," put a check mark here. Maybe they didn't put a citation after a quote, put a check mark there. Turn it back to them and say, "okay, your next job is to turn this back into me with a cover sheet, or an additional page, that says, 'okay, the mistake on line five of page one is because I didn't.'" You know, "you need to tell me what your mistakes were."

And then once they've identified the mistakes, then maybe the next step is for them to correct it and turn it back in, and then they finally get a grade on it.

Now, does this take time? Yes.

Is it worth doing? Absolutely. Absolutely. Because if you, if you get the students to not just learn the material but recognize their mistakes, you are doing them such a service. You are giving them such a benefit. Because then they can take that understanding of "how to figure out my mistakes" into other classes, into the real world, into their job, into their home life, into their work life - where they do not sit there and go, "Okay, I made a mistake. My life is over." They say, "I made a mistake. Let's figure out how to do this. You know, I did this in Dr. Jones' class. I did this at Dr. Rashid's class. How do I do this?"

Dinur: And as teachers, we can design our assignments with mistakes in mind.

I allow for my students, I demand that they bring in an in-progress draft of their term papers, because I know that that in-progress draft is going to have mistakes, but it's still early enough that they can take these mistakes, correct them and write a much stronger final paper.

Or another way that I look at mistakes and improvement is, I look at my students' grades throughout the term and I look to see are they improving bit by bit. And if they do, I give them a bump up if they're borderline between two grades, because I'm seeing improvement, I'm seeing growth and I want to reward that.

And Adam and I have talked about how teachers can use this information, but students can also use this information. We had an episode about not judging yourself and on being in slumps. You have to accept that mistakes are a fact of life, but they're only bad if we repeat the same ones and we don't learn from them. If you learn and you make a new mistake, you might not like it in the moment, but you're growing, you're learning.

Adam: And this means that you've got to focus on improvement. If you're focusing on perfection, then you're going to beat yourself up for every mistake. You're not going to see them as learning opportunities. You're going to see them as a judgment of the self, not a judgment of your work.

But if you focus on improvement, if you focus on one more step, one more thing you can do - and we're going to talk about this in our next episode, in episode 24 - if you can focus on "what can I do this week to improve what I did last week," or "what can I do today to improve on what I did yesterday," instead of "how can I get 100% on this test" - do you see the difference?

And teachers - going back to teachers - if you tell your students to focus on improvement, then you've got to find ways to reward it. And I know, Dinur, you said you bump their grade up at the end, but you've also got to give them feedback in the process, in the moment.

Like, "I see that you have reduced the number of adverbs you've used. Great. That's good, that's really good." Or, "I see that you're really working on run-on sentences. I only caught one instead of 16 in this last - good, you know, I could see that you really improved on that."

Make sure that these are comments you are giving to your students. "I see your improvement in this area. Good job." Because that reinforces that making mistakes is not the end of the world. and that improvement is the goal.

Dinur: And note that it has to be a concrete thing that you are commenting on. Don't just say, "Oh man, I'm seeing improvement" and leave it. You want to show where, specifically, you're seeing that improvement.

Adam: Exactly. So if you're teaching a math class, "I see that you finally grasped how the decimal works. Good job." Or if you're teaching a history class, "I see you're finally getting the hang of how to tell these guys apart. Good job. Okay." Whatever it is, you've got to tie it directly to the improvement they made, and tell them what it is. They may not really know what their improvement is until you point it out.

So that's what we've got for you in Episode 23.

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Dinur: Be sure to join us next week for Episode 24, when we'll dig into how small improvements lead to big outcomes.

You've been listening to Learning Made Easier: a podcast about how we learn, how we teach and how they overlap.

Adam: We want to say thank you to all of our supporters on Patreon who make this podcast possible.

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Adam: And we look forward to seeing you next week.