The Learning Pit: Helping Students Learn from "Productive Failure" in the Thinking Classroom

LCEEQ

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Playing with Concepts-Diamond Ranking a Metacognitive Activity

- **Cognitive conflict**

- **Cognitive Dissonance**

- **Productive Struggle**

- **Productive Failure**

- **Error**

- **Mistakes**

- **Disequilibrium (Piaget)**

- **Conceptual misunderstanding**

- **Deliberate dilemma**

Teaching Students to Embrace Mistakes
MARCH 20, 2014

For the last ten years, we've worked one-on-one with students from elementary school through graduate school. No matter their age, no matter the material, when you ask what they're struggling with, students almost universally name a subject: "math," "English" or, in some instances, "school." Doubting that *all of school* is the issue, we then ask to see their last test. After some grumbling, the student digs down, deep into the dark, dank recesses of his or her backpack, and pulls out a balled-up, lunch-stained paper that, once smoothed out, turns out to be the latest exam.

To a teacher, this should be incredibly frustrating. You spend a huge part of your life grading tests, commenting on essays, and providing thoughtful feedback on homework assignments . . . only to have them wadded up and ignored. (Yes, students look at their tests, but you shouldn't harbor any illusion that they look at anything but the red letter grade.) Before writing students off for being ungrateful or lazy, you need to understand why what they're doing makes perfect sense.

The Science Behind Mistakes

Telling students they need to take advantage of the feedback they get isn't just good advice -- it's established science. In the last few decades, researchers have discovered a lot about how people become experts. The main idea, made popular by everyone from author Malcolm Gladwell to rapper Macklemore, is the 10,000-hour rule. Ten thousand is the number of hours it takes to become an expert in almost any field. While it's wonderful that people are starting to understand how work leads to expertise, the most important part of that research is not *how much practice* someone needs to perform, but *what kind of practice*. This latter category is called deliberate practice and involves isolating what's not working and mastering the difficult area before moving on.

Picture a classical violinist rehearsing. He or she would not play a new piece start-to-finish, fudging through tricky sections and trying to "be done."

That musician stops in trouble spots, figures them out, and then plays that measure over and over again, and only moves on when it's perfect. The same principle applies to schoolwork.

Mistakes are the most important thing that happens in any classroom, because they tell you where to focus that deliberate practice.

So why don't students view their mistakes as a valuable asset? Well, students don't think about their mistakes rationally -- they think about them emotionally. Mistakes make students feel stupid. "Stupid" is just that: a feeling. Specifically, it's the feeling of shame, and our natural response is to avoid its source. If we say something embarrassing, we hide our face. If we get a bad grade, we hide the test away. Unsurprisingly, that's the *worst* move to make if you ever want to get better. Academic success does not come from how smart or motivated students are. It comes from how they feel about their mistakes.

Changing your students' perspective on mistakes is the greatest gift you can give yourself as a teacher. Imagine having a classroom of students who are engaged and constantly improving -- it's every teacher's dream. Instead, teachers face too many students who are disengaged and really rather surly. That surliness is years in the making. By the time students walk into your classroom, they've likely already internalized their mistakes as evidence that they're just not smart. Getting a bad grade feels like a

personal attack. No wonder they're giving the deliverer of those grades the stink eye.

How Do You View Your Mistakes?

I Can't Fix It

I don't think I can ever fix it

The mistake happens again

So I don't make sure it gets fixed. Why bother?

I Can Fix It

It works! On to something else!

So I find a way to fix it

I can fix it

Credit: Hunter Maats and Katie O'Brien

A Fresh Take on Mistakes

To help your students rethink mistakes, help them be *specific* about their errors. Knowing that answer #3 is wrong doesn't mean much. Knowing that they didn't understand mitosis gives them a mandate for getting better. Often, when we go through tests with students, the mistakes they perceive as dire are either careless errors or a single concept applied incorrectly on several questions. Either way, the "fix" is usually smaller than how big the problem feels.

You can also help students view their mistakes as helpful. The red pen isn't the enemy -- when students understand how to deal with errors, red means go. One way to encourage that attitude is to take the most common mistakes that the class made on a test or quiz and analyze them together. The more open everyone is about the mistakes they've made and how they happened, the less significance any student will place on future errors.

Mistakes happen for concrete reasons. A student didn't memorize all the requisite facts, didn't execute the steps of a process, or perhaps just ignored the directions. The red "X" is just a simple assessment of the actions that student took -- actions he or she can easily fix next time. Sharing that clarity and causality with your students is the best way to teach deliberate practice, instill motivation and help them develop a more constructive relationship with mistakes. In short, this creates the class you *and* your students have always wanted.

Schema Theory

Researchers believe that what we know is stored in knowledge frameworks called "schemata". Learners draw on schemata to make inferences and predictions, organize and reflect on new information, and elaborate on it (Vacca and Vacca, 1993). When learners are confronted with "new" information, they try to make sense of it be seeing how it fits with what they already know. In other words, they try to match this new information with existing schema so that it can be understood. To illustrate, read the paragraph below and fill in the missing words:

The questions that p_____ face as they raise ch_____ from in_____ to adult life are not easy to an_____. Both fa_____ and m_____ can become concerned when health problems such as co_____ arise any time after the e_____ stage to later life. Experts recommend that young ch_____ should have plenty of s_____ and nutritious food for healthy growth. B_____ and g_____ should not share the same b_____ or even sleep in the same r_____. They may be afraid of the d_____.

This passage illustrates that deriving meaning is not simply a matter of reading words on a page. In order to comprehend, the reader selects a schema that seems appropriate and connects it with new information, filling in gaps so that the text makes sense. Because no two students bring the same background and experience to class, no two students will comprehend in the same way.

Source: Billmeyer, R. & Barton, M.L. (1998). *Teaching Reading in Content Areas.* Aurora, CO: McRel adapted from the © Leadership and Learning Centre 2009, Accelerating Academic Achievement for ELL

The Four Stages of the Learning Challenge (The Pit)

Stage 1: Concept
The Learning Challenge (The Pit) begins with a concept. The concept can be drawn out from a stimulus such as a story, article or photograph, or is it determined directly by the curriculum. So long as most pupils have a basic understanding of the concept, then *The Learning Challenge* can work.

Stage 2: Conflict
As soon as a concept has been agreed, the teacher's responsibility is to create cognitive conflict in pupil's minds. Cognitive conflict arises when people have at least two opinions in their minds, both of which they agree with, but that conflict with each other.

Stage 3: Construct
Once pupils have explored their concept for some time (this could be minutes, hours or even days, depending on the concept and on your purpose), Some of them will begin to construct a reasonable sound understanding of it. These pupils are then expected to help other pupils construct their own understandings.

Stage 4: Consider
The final stage encourages pupils to reflect on how their thinking has changed, ben adapted, assimilated and/or constructed throughout the course of the lesson. Thinking about thinking, or metacognition, is a crucial factor in the learning process. *The Learning Challenge (The Pit)* provides a frame of reference to help structure this metacognitive reflection for pupils.

In the bottom of the pit:

- I don't get it.
- This is so hard!
- I like to be challenged, but this is hard.
- I'm confused.
- I'm angry.
- I am frustrated.
- I am mad.
- This is so frustrating.
- I'm sad that I don't get it.
- I don't understand.
- Help me.
- I need help.
- I want to lash out.
- I'm out of ideas.
- This is impossible.

On the stairs climbing out of the pit:

- Let's brainstorm some ideas.
- What task/project/book is like this?
- Collaborate
- Think outside the box.
- Compare or contrast
- Use what you already know.
- Sort out what you know from what you don't know.
- Ask good questions.
- Watch how to do it.
- Keep trying.
- Try something new.
- Trial and error
- Go your own way.
- Talk out loud.
- Act it out.
- Review past mistakes.
- Stay confident.

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On the top out of the pit:

- Eureka!
- I know this!
- Finally!
- Yes!
- Victory!
- I didn't think I could do it.
- Great!
- I feel so confident.
- I know this is right.
- Oh!
- I got it!
- I did it!
- I can do this!
- It's not hard once you understand how to do it.

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Anticipation Guide

Directions: In the space provided, mark each statement true or false, based on what you think now. After you have finished reading and studying the reading excerpt, take the quiz again and compare your new answers with your original ones.

Before Reading	Questions	After Reading
T F	1. Thomas Edison was Spanish.	T F
T F	2. Thomas Edison was born in Michigan.	T F
T F	3. Thomas Edison preferred to work alone.	T F
T F	4. Thomas Edison and Henry Ford were rivals.	T F
T F	5. Thomas Edison was partially deaf.	T F
T F	6. Thomas Edison dined with a President.	T F
T F	7. Thomas Edison had a laboratory on a train.	T F
T F	8. Thomas Edison had a very sharp memory.	T F
T F	9. Thomas Edison once sat on a nest of hen's eggs.	T F

Source: Long Beach Unified School District

Thomas Alva Edison

Thomas Alva Edison was born in Milan, Ohio in 1847. His middle name, Alva, comes from his relatives in Mexico. When he was seven, his family moved to Michigan. Even as a young boy he was curious about how things worked. He once sat on a hen's nest of eggs to see if he could hatch them. To his mother's chagrin he came to the house with his pants dripping of raw eggs. By the age of twelve Thomas had quit school and was selling newspapers and candy on a train. One of his early laboratories was in the boxcar where he performed experiments in his spare time.

Over the years Thomas Edison has several laboratories. He enjoyed working with others and used teamwork to solve problems. He invented new machines as well as made other machines work better. Edison and his helpers tried out thousands of ideas before they invented the electric light. Edison was a friend of Henry Ford, another great inventor of that time. They were guests of President Harding in 1992.

Although Edison was partially deaf, he did not feel impaired. This lack of hearing allowed him to focus on his inventing including the movie projector and phonograph as well as the light bulb. Edison had an interesting sense of humor. He nicknamed a daughter Dot and a son Dash after the Morse code. His memory, however, could be a problem. He is known to forget things, even what day it was. Thomas Alva Edison's great ideas changed the lives of all Americans. Lights were dimmed across United States on the evening of his funeral in 1931.

Source: Long Beach Unified School District. © Leadership and Learning Center

Generating and Testing Hypotheses

What will I do to help students generate and test hypotheses about new knowledge?

This activity may be completed in pairs or triads.

Experimental inquiry is a task for generating and testing hypotheses. It involves making a prediction based on observations, designing an experiment to test that prediction, and then examining the results in light of the original prediction.

Observe the picture displayed on the PowerPoint slide. **1. Describe what you see in the space below**	**2. Write a hypothesis about the picture.**
3. If you were a student in a classroom, what types of experiment or activity could you use to test your hypothesis as stated in #2?	**4. Explain what you believe would be the results of your experiment or activity.** ***After being given further information about the picture, decide if your hypothesis was correct or if you needed to conduct additional experiments or activities to generate or test an alternative hypothesis.***

Source: The Leadership and Learning Center. (2007)

The Learning Challenge Planning stages for an open-ended, dialogue driven lesson*

Stage	Design Feature	Teacher Planning
1	Identify a key concept	
2	Ask students for their initial ideas about the concept	
3	Create cognitive conflict by identifying contradictions and exceptions to students' early answers	
4	Ask students to compare their differing ideas by searching for similarities and differences.	
5	Help pairs or groups select a thinking tool that will help them explain, sort, and relate the ideas together.	
6	Challenge students to develop a roust definition of the concept that will stand up against "what if" and "how about" questions.	
7	Consider how students' final definitions apply to new contents and reflect back over the learning journey	

*Source: Nottingham, J. The Learning Challenge: How to guide your students through the Learning Pit to achieve deeper understanding. Thousand Oaks, CA: Corwin.

Error Analysis: Five Key Questions

1. What might the students have been thinking to make this error? What are our hypotheses?

2. How can we find out which of these hypotheses is true?

3. What different teaching strategies could we use to "fix" or undo whatever led to this error and help students solidify their skills and concepts?

4. How are each of us going to plan and manage time and tasks in class so that we'll get fifteen minutes (or whatever it takes) to re-teach the skills and concepts? [Target: at least 2 times a week for groups of students who don't have it.]

5. How can the team help? Determine whether there is a way to share/exchange knowledge, skill, or students to benefit both students and colleagues.

Source: **Research for Better Teaching, Inc.** • One Acton Place, Acton, MA 01720 • 978-263-9449 • www.RBTeach.com

Dealing with Common Errors in your Classroom

In a previous post, we pointed out 5 common errors Spanish speakers make in English. We also stated that errors could be ignored if they are not impeding communication. However, there are times when error correction exercises are needed for the students to make progress in the language. Here are five top tips for dealing with common errors that will help your students to 1) become aware of their own mistakes and 2) make them responsible for their own learning.

Point them out. All students will have an "error calendar" in their notebooks. What errors do the learners remember you mentioned that day in class? For each lesson, make a few students responsible for noting down the mistakes you have pointed out that day and get them to dictate them to the rest class. At the end of the lesson, each student will write the errors down on their calendars and correct them. Later in the term, are there any errors repeated throughout the calendar? That should give you and your students an idea of which errors are more common / need more attention. You can also test your students with a quiz or a game at the end of each unit / every two units to check that they can all correct those mistakes.
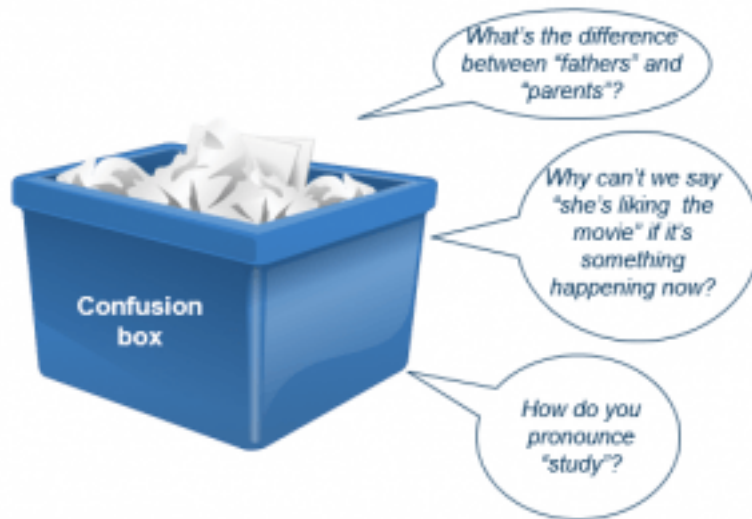

Become the teacher for a day. After you've finished one unit, students write down what they are not yet sure about on a slip of paper (the more the better). Then, they put them in the "confusion box". In teams / pairs, they draw a few slips of paper and provide a solution to their peers' problems. After that, they present their answers to the class. Why not bring this to SchoolTube? Create a SchoolTube channel and get your students to upload videos explaining how to deal with those errors. I am sure that other students around the world will also benefit from those explanations!

Error exchange. Collect the mistakes from your students' writings and write sentences containing one or two errors on sticky notes. Distribute the notes with different errors among the students. Give them a few minutes to correct them

(without writing). Then, students stand up, find someone to talk to and read their incorrect and correct sentences to them. If that new person understands why there was a mistake / agrees with the correction, they exchange notes. Then, with the new note they have just received from their former classmate, they find a new pair and follow the same procedure: read the mistake, explain the solution, exchange papers. Tip: this activity works better with big classes.

Classify the errors. If your students are allowed to use mobile devices in the classroom, you can create a Padlet similar to this, with different categories referring to the most common mistakes generally made by your students (add examples if necessary). Ask your students to write an essay, collect them and post them on the walls around the classroom (their names can be deleted). Students work in teams to find examples in the writings for all or some of those categories (make sure they write the examples with a sufficient context but they should not correct the error). Finally, display the Padlet on the screen and discuss the errors with your students. How can they be improved? Alternative: categories and examples can be written on the board.
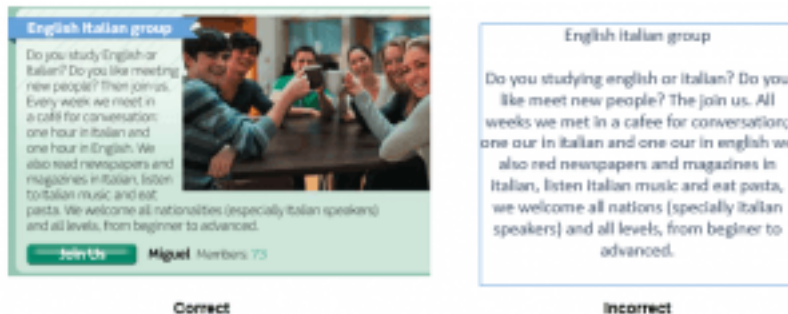
Can they remember? The teacher takes a text that the students have previously read in class and writes an incorrect version of it (i.e., with grammar, vocabulary, spelling, punctuation mistakes). Then, the teacher displays the incorrect text on the screen and, in pairs / teams, students try to reconstruct the lines based on their knowledge and memory. After that, they compare the original text with their version. Did they spot all the mistakes? Which ones were easier / harder to detect? Why?

Source: Elena Merino Posted April 18, 2017
http://eltlearningjourneys.com/2017/04/18/tips-common-errors-in-your-classes/

Ainsley Rose has been in education for over forty-five years. His career extends over many roles in education. He began as a teacher in the District of Bedford School Board in Cowansville, Quebec. A former Director of Education and Curriculum for the Western Quebec School Board in Gatineau, Quebec, a high school and elementary school principal and teacher. He has also taught graduate level course for teachers and principals. Throughout his career as an education leader, Ainsley has incorporated his expertise within a wide range of principles, practices, and concepts, all of which have significantly improved schools. These include Effective Schools, Professional Learning Communities at Work™, Instructional Intelligence, and standards and assessment. Ainsley was also a Steven Covey's Seven Habits of Highly Effective People® trainer. He is certified in the TRIBES teaching process, and more recently One Smart World, an approach that emphasizes the essential underlying thinking and emotional strategies of successful, intelligent, behavior. As a keynote presenter and workshop leader Ainsley has presented across Canada and the United States as well as Katmandu, Nepal, Hawaii, Bermuda, Lebanon, Mexico, Rotterdam, Australia, England, and Zambia on a range of educational topics.

He served as chair of the Committee for Anglophone Curriculum Responsables and the Implementation Design Committee, and was named to the Advisory Board of English Education by the Minister of Education of Quebec. Ainsley is also the recipient of the Outstanding Achievement Award from the Association of Administrators of English Schools of Quebec.

Ainsley is a contributing author for several publications; The Teacher as Assessment Leader, The Principal as Assessment Leader, The Collaborative Teacher all with Solution Tree publishing and finally Data Teams: The Big Picture, published with the Leadership and Learning Centre in Denver, Colorado. He has recently published with a colleague in Buenos Aires, Argentina, Learning for the Future: Rethinking schools for the 21st Century. He is a contributing author for Active: A leader's guide to people, practices, processes, and finally Engaged Instruction: Thriving classrooms in the age of the common core.

Ainsley is currently president of his own consulting company, Thistle Educational Development Inc. (TEDI). He is also a professional development associate with Solution Tree in Bloomington, Indiana, Marzano Research in Denver, Corwin Press in Thousand Oaks CA. He was the first Canadian to be certified with The Leadership and Learning Centre in Denver, Colorado (HMH), where he worked as a Senior professional development associate.

As a Corwin Author Consultant Ainsley is part of a team of certified presenter's for Dr. John Hattie's Visible Learning in North America in partnership with Cognition Education in Auckland, New Zealand. He has presented at every International Visible Learning institutes including the first ever being in Brisbane, Australia and more recently in London, England.

Ainsley is also an associate of Dr. Jim Knight and is certified in Instructional Coaching, Better Conversations and High Impact Instruction training with Corwin Press. More recently, he is certified to deliver and animate the Impact Team Model for Corwin Press in Thousand Oaks, CA.

He is specifically certified to present Data-Driven Decision Making, Data Teams, Impact Teams (Corwin), Visible Learning, Engaging Classroom Assessments, Common Formative Assessments, and recently has added Implementation Audits for School Districts to his repertoire. He is also a certified Senior Leadership Coach and has several candidates across Canada and the United States with whom he is working to develop their leadership skills and mentor their personal development plans.

He has been certified to deliver the Hulley Centre Planning for Student Success Program developed and initiated by Wayne Hulley in Canada

Ainsley earned a Master of Arts degree and Bachelor of Arts Honors degree from the University of Western Ontario, Certificate in Education from Concordia University, and Certificate in French as a Second Language from the Adult Education Center in Cowansville, Quebec

Ainsley is married with three grown children who all live in the province of British Columbia. His wife, Rahnieda, is a high school music instructor who keeps his educational theories grounded in practical approach. Ainsley continues to remain active by participating in sports, most notably men's doubles Racquetball, where he competes nationally in Canada.