

Drawing to Learn – Engaging the Brain

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Introduction

I was/am that student in class that doodled or stared out the window. My teachers were not always kind about it. They found my perceived disengagement “lazy” and my hyper-focus on other tasks “willful.” What they couldn’t deny (and I’m sure was the root of their frustration) was that I was a quick, passionate learner and avid reader. I had “so much potential.”

My older sister is an artist and when I was little, she provided me with a sketchbook of my own. I drew all sorts of things around me and tried to reproduce her drawings. Later on, I used drawing to illustrate my college studies, to daydream, to decorate my bulletin boards, and to demonstrate concepts to my students. I’ve dabbled in many creative practices and enjoyed them immensely, but there is something so simple and easily accessible about putting a pencil/pen to paper. I use the term “paper” loosely; one of my favorite drawings was done on a napkin during a teacher workshop. Don’t mistake that for boredom or inattention, I was better attuned to the speaker and simply sketching. In retrospect, that might be why it came out so well, because I wasn’t “trying too hard” or hyper-focusing on making it perfect.

Background

I teach at William B. Keene Elementary school in the Christina School District. Once the largest district in Delaware, recent closings of some of our city schools has changed that distinction. Christina is spread out between the City of Wilmington, Suburban Newark, and the nearby region of Bear. It is one of only four districts in the United States to serve a non-contiguous area.

Keene Elementary School is located in a region known as “Bear” in New Castle County, Delaware. The school address is technically “Newark, Delaware” but our location is far from the bustling college town of that name. Despite the school’s proximity to some of its feeder neighborhoods, its location between a major highway and a strip of woods means that all students are either bus riders, or car riders, not walkers. This corridor of the highway has a very transient population and many of our students come and go throughout the K-5 grade span of the school.

Our location is next to the Troop Two State Police Barracks, which is a mixed blessing. We have the benefit of quick security response but proximity to the comings and goings of criminals. While the students were off for this year's Spring Break, a criminal assaulted a Troop Two Officer and escaped, prompting an all-out manhunt that eventually culminated in the escapee being taken down by a police dog just outside of our school building. There were tons of police cars, a helicopter, and eventually a few ambulances on the scene. Administration, office and custodial staff were all on lockdown during the incident. While the students weren't exposed to the significant trauma inherent in an actual lockdown, swarming law enforcement, sirens, hovering helicopters, and the powerful and dangerous efficiency of a police dog doing its job just outside of their classrooms, most of them living in our surrounding neighborhoods were still at risk. Our students are acutely aware of the gravity of these kinds of situations and are often concerned about their personal safety and that of their loved ones. Additionally, school and other mass shootings are now happening with such frequency that we cannot afford to think we are immune.

Our school is considered a Title 1 school and over 70% of our students receive free or reduced lunch. The majority of our students come from non-traditional households. Many of our families are single parent or even another relative (grandparents, aunt or uncle, older sibling). It is not unusual for a family to have transportation and technology issues. We also have a large population of English Language Learners from a variety of cultures: Asian, Hispanic, Middle Eastern and the Caribbean. Despite this wide range of differences, Keene is a close-knit family.

I am dual certified, so I have Special Education students assigned to my room. These students' IEPs range from Speech Therapy only, to Occupational Therapy, Learning Disabilities, Autism, and Severe Oppositional Disorders. There are also children with 504 Plans for Attention Deficit Disorder. I do have a full time Special Education teacher who comes in every other day and a para professional that comes in on the interim days. We find ways to motivate and engage these students by providing as many hands-on opportunities as possible.

Rationale

Today's educators often see students like me, or ones who struggle to retain focus or information, are well-versed in digital games or love art class. These students will gravitate towards the simple graphic novel over chapter or picture books. They can tell you every detail about these graphic laden experiences, so how can we harness that ability to increase their engagement in the learning environment?

Teaching students to think about their environment, knowledge and selves quantitatively and graphically can provide them with an efficient way of both processing and expressing information. These skills translate into many academic benefits, as well as social-emotional ones.

Learning Objectives

One objective is to use drawing as a means of increasing students' ability to attend within the learning environment, whether as a focusing strategy, a brain break or a communication tool.

Consider the students who are forever doodling in the classroom while we are teaching, we tend to ask them to "stop and pay attention;" but what if, like me in my teacher training drawing example, they *are* paying attention? Can we teach them a way of drawing that would increase our confidence in their attention and simultaneously support their learning?

The next objective is to use these focusing strategies to engage students with learning opportunities. When we talk of focus, expand that beyond the simple idea of "paying attention" into the idea of activating the brain whether it be through cueing schema (prior knowledge/experience systems), channeling anticipation or strategizing.

The last objective is to improve students' integration of knowledge and ideas by providing them with new methods to express their learning and expanding students' drawing toolkit to include a visual vocabulary which they can utilize across the curriculum to identify, process and communicate information.

Background

We live in a world where we are bombarded by visual and sensory stimulation. Consider a routine trip to the mall that finds us dodging the lady spritzing cologne, kiosk salespeople wanting to apply a little lotion to our hands, and the sheepskin display that begs to be touched. The food court overflows with fast food, chairs scrape and people jostle, bags bumping. Scents and textures beckon from Body care shops, candle stores are selling a heady mix of impossible to single out smells and dazzling displays, plus every high dollar clothing store is marketing the latest cuts and colors, each to its own hip soundtrack. If we are lucky, we leave with what we came for, sometimes less, sometimes more; it can be overstimulating and exhausting. Gee, I forgot to mention the parking...or the holidays.

How many times are we sidetracked on that trip? The displays that distract us, the time spent making small talk with that person you tried to avoid because you couldn't

remember the name but ran into at the register anyway, the backtracking for the store that relocated to another wing, the sale that we just can't pass up, all take us off track. Now we are hungry, somebody needs to find the nearest restroom, our feet hurt, and the car is parked all the way on the other side...

For some students, school is very much like that mall experience, sensory overload. We expect them to come to school for the learning but there are so many things vying for their attention: friends, other students, learning activities, groupwork, centers, manipulatives, classroom displays, social scenarios, school routines and rules, hallways, the cafeteria, recess or study hall, interactions with adults, and plenty of assessments. That list doesn't even address if there are already negative experiences attached to any of those interactions, it is just the daily routine for any average kid. Then there are students who have to engage in this routine but have consistently struggled to succeed emotionally, behaviorally, or academically; students who have medical issues, learning or developmental disabilities, and trauma that may or may not be recognized.

As adults, we leave a hectic mall trip and think, "Man, I'm not going back there any time soon if I can help it!" but we regularly tell our students, "See you tomorrow... and don't forget your homework!"

My intent is not to portray school as a huge negative experience, and we know it is actually a safe haven for many students, but we do need to consider the challenges. I am not suggesting school should be a sterile, low stimulation environment, it should reflect reality. Instead I propose that we provide all students with some tools for navigating their school experiences, teach them how to recognize ways to help them self-regulate, and introduce new ways to focus and process their learning.

Mindfulness

While "Mindfulness" is a current buzzword, its therapeutic use has been around for several decades and its philosophies are rooted in ancient eastern cultures. In 2004 a group of eleven authors developed an operational definition through a grant from the Canadian Institutes of Health Research. Their proposed definition and supporting research appeared in *Clinical Psychology, Science and Practice* as two-part description.

First, "Mindfulness is the self-regulation of attention...recognizing mental events in the present."¹ They go on to describe that this self-regulation works "by bringing awareness to current experience—observing and attending to (acknowledging) the changing field of thoughts, feelings, and sensations from moment to moment—by

regulating the focus of attention. This leads to a feeling of being very alert to what is occurring in the here-and-now. It is often described as a feeling of being fully present and alive in the moment.”² Self-regulation is further characterized by the ability to switch focus between the present (selected focus) and arising thoughts or feelings, as well as sustaining attention. It is important to understand that the arising thoughts and feelings are acknowledged without judgement or examination which brings us to the other half of the definition.

Second, mindfulness should be practiced with “curiosity, openness, and acceptance.”³ Much of the therapeutic benefits of mindfulness relies on this second aspect. When individuals recognize thoughts and feelings as acceptable passing events, they are less likely to adopt them as reality or fully representative of who they are as a person.⁴

It is this attitude of acceptance that we need to adopt for ourselves and teach our students. Rather than find fault with ourselves for having other thoughts and feelings arise while focusing on the present, we need to recognize them and then return to our focus. The first step is to stop categorizing these thoughts and feelings as intrusive or distracting, they simply “are”. When we remove the stigmatizing labels, we reduce our likelihood of slipping into negative attachment, frustration, blame, and overthinking. Assessing our thought processes is not the same as judging them and we need to extend that to how we define students’ focus and attention.

Sustained Attention

Not only do we need to stop reacting negatively to passing thoughts and feelings, research shows that the occasional diversion actually increases a person’s attention to task. An article in Science Daily breaks down the study shared in the Journal *Cognition* by explaining the phenomenon of “vigilance decrement”, which basically means the longer you work continuously on something the less efficient you become.⁵ Most of us know this already on an experiential level, that’s why we take coffee breaks, step away from our desks or project, take a deep breath to extend our patience in the classroom, or like myself writing this paper, lean back from the laptop screen and stretch. We hope our brief intermission will sustain further efforts to our task, and usually it does. The field of education has recognized and embraced these intermissions in the form of “Brain and Movement Breaks,” planned opportunities for students to reboot their focus. This isn’t just a “good” or “nice” thing to do for students, it is based in brain science. The study argues that the long-held belief that people only have a limited attention span which is why performance declines after an extended time is false, rather we simply shift our

attention away from the task at hand. It becomes a sort of sensory overload and our mind begins to tune it out.⁶

I teach my students about sensory overload and how the mind can shut things out by telling them a story about myself and the blind dog I used to have. My dog was very attached to me and when he first lost his eyesight, not being able to track my whereabouts was very distressing to him. I purchased an anklet that had little bells all around it so he could follow me where he needed to go or know where I was. It worked perfectly but the constant jingle took some getting used to. By the time the school year started I had effectively tuned the sound out but had to explain all about it to my new students. I suddenly became acutely aware of the sound once again and tried to tread lightly in the hallways. Within a few weeks both my students and I had tuned the gentle “Ching, Ching” out. Any new students to our classroom were promptly filled in by the others and adapted quickly. Then sometime in October we had our first staff development where all of our teachers gathered in the cafeteria to review the latest curriculum changes. After awhile I was struggling to keep focused; my go-to fidget is bouncing or swinging my crossed leg which seemed to help. A close friend was sitting far across the cafeteria with her own grade level and she had given me a couple looks but I didn’t get it. At our first break she beelined over to me, “Oh my gosh, will you stop shaking your foot? All I can hear is ‘Ching, Ching, Ching!’” she laughed. I was mortified, I hadn’t heard a thing but everybody else had!

Based on the study mentioned above, it is not only sensory input that can be tuned out but our thought processes and actions, too.⁷ Have you ever shelled nuts or peeled vegetables and after a while put the desired part in the discard pile? Funny that when you catch your mistake, you then discover it was not the first! Now you know, your veggies fell victim to vigilance decrement. A harmless example but unfortunately lost attention to task can have larger implications. I am sure I am not alone in that unsettling experience of having arrived home with no memory of the actual driving. Our muscle memory kicks in when our brain loses focus which is literally a life saver, but not necessarily the best way to go about a task. When our brain loses its ability to maintain its focus, the repercussions can be financial, educational, or literally, life and death. In order to be proactive, the psychology professor that led the study recommended “deactivating and reactivating your goals” as a means to maintain focus, “Brief mental breaks will actually help you stay focused on your task!”⁸

Fidgeting

The role of fidgeting in sustained attention is fairly predictable. Research shows us that there is a positive correlation between time on task and increased fidgeting.⁹ The studies indicate that fidgeting is a clear marker for lost or wandering attention. However, in some cases, such as my anklet story above, fidgeting is used intentionally as a means to maintain attention. In this form, fidgeting functions as the brief mental break recommended in the previous study. It is not helpful to simply tell our students that it is okay to fidget. We need to provide them with effective fidgets that allow their attention to return to the task at hand, without infringing on the attention of others.

I teach my class about sensory overload to help them understand the unintended effect some of their behaviors might have on their classmates. I follow up my anklet story with an explanation that the students' own fidgets (foot tapping, drumming, rolling pencils, etc.) might not be distracting to them because their brain has grown accustomed to them, but others may be bothered by them. I teach them substitute fidgets such as rolling their pencil on their leg rather than the desk, including the bonus benefits of extra sensory feedback through their arm movements. I have them practice using fidgets without allowing them to take over our attention, telling them "Don't watch the pencil rolling, just feel the sensation of it." I encourage them to switch their fidgets up to keep their brain tuned in. They are encouraged to keep their fidget motions within the space of the body by using small movements. My philosophy for choosing smaller movements has always been to keep the fidget low-key, recognized by the individual, and not everyone else.

In some research, fidgets are coded as either macro (full positional changes) or micro (incremental shifts). The macro fidgets were a stronger prediction of lost attention, while the micro were not. The research also showed that information retention was subsequently reduced in extended tasks, especially those resulting in macro fidgeting.¹⁰ Instead, incorporating micro fidgeting into sustained attention tasks supports the idea that "fidgeting may also help individuals sustain attention by increasing physiological change and arousal."¹¹ More specifically, "fidgets can be quite small yet still have a pronounced effect. For example, Andrade (2010) had participants doodle during a "boring" task and discovered that it improved performance which was attributed to an increase in overall arousal."¹² Her study supports the use of doodling as an effective tool for maintaining sustained attention and improved information retention.

Doodling

Reflecting on my many years in the classroom, I recognize a lot of conflicting teacher feelings around kids doodling while I am teaching. In some ways I have been accepting

because of my own history of doodling. But I think I also may have determined that my doodling was okay because I always “knew the information” whereas my students are frequently lacking in a lot of common knowledge or just acquiring the information. I confess, at some point I have probably told my struggling students things like, “You can’t afford to be drawing right now, you need to be paying attention.”

Andrew Spiegel of NPR shares some anecdotes of famous doodlers such as Bill Gates, Lyndon Johnson, and many U.S. Presidents in support of doodling.¹³ Spiegel further analyzes Andrade’s Doodling study, and summarizes that Andrade proposes that “the function of doodling is to provide just enough cognitive stimulation during an otherwise boring task to prevent the mind from taking the more radical step of totally opting out of the situation and running off into a fantasy world.”¹⁴ Spiegel goes on to suggest that the study supports the notion that “doodling doesn't detract from concentration; it can help by diminishing the need to resort to daydreams.”¹⁵

Doodling may be a totally independent, self-driven activity or may take place with a purpose. If you google “National Doodle Day,” you will discover that many present-day famous doodlers even contribute their doodles to raise money for brain-based health issues such as neurofibromatosis and epilepsy. The doodles are auctioned off and the proceeds go to support research and treatment. Another popular doodle event is the annual Doodle for Google contest which encourages students worldwide to create a doodle based on a theme and the google logo.¹⁶ The contest typically runs January into early March and students love to participate. This contest is a good example of the shift from doodling as random image generation for mental stimulation, to doodling to a specific purpose.

Directed Doodling

We have established the mental benefits of doodling, but we now turn our attention to recognizing ways to build and strengthen our doodling practice. I think it is important to acknowledge that while we are looking for doodling to be a mental focus that increases our success with other mental tasks, there is value to explicitly teaching some skills that initially make it the main focus so that it can be utilized at other times with greater efficiency and less mental effort. We need students to practice doodling in such a way to build muscle memory and gain some automaticity. Because doodling has endless possibilities, we can teach some basics without fear that we build automaticity to a level that the brain tunes it out and it becomes ineffective.

In seminar we were introduced to Lynda Barry's work and we began keeping a notebook of observations and sketches as suggested in her book, *Syllabus*. Her book is a compilation of writing, drawing and coloring exercises she designs to build her students' drawing confidence, improve their observation skills and strengthen the hand/mind connection. Her ultimate goal is to help non-writers use their new skills to find entry into story telling through visual and written expression. One of her exercises is spiral drawing which I was able to quickly adapt into one of my classroom activities. She emphasizes exploring different drawing mediums for students to discover their preferences. She encourages self-acceptance of one's work, and also requires presentations (sharing) of work. Many of the activities she uses in class are also collaborative, requiring students to build off the work of others. *Syllabus* has a very colorful, and stream of consciousness presentation to it and I highly recommend buying or borrowing a copy to understand her methods firsthand.

Another drawing exercise we utilized in seminar and also recommended by Lynda Barry is by Ivan Brunetti. In his book, *Cartooning: Philosophy and Practice*, Brunetti has students practice simple drawings such as just a sideways view of a head but with different expressions according to the mouth and eyebrow. The drawing is to be repeated with varying expressions, but also with copied expressions, until the entire page is filled. The task requires the student to come up with very minor changes that result in significant differences in expression, while also calling upon them to recreate their previous results. It is trickier than it seems initially. It turns out drawing in the style of Ivan Brunetti exemplifies much of cartooning where simplicity of style opens the door to conveying much, with less.

Doodling Versus Drawing

Somewhere along the doodling continuum, we need to address understandings around the terms "doodle" and "draw." The historical origins and associations of the term doodle are probably at the root of some educator prejudice towards the activity. Most often it was associated with meaningless drawings and foolishness. Merriam-Webster defines it as "an aimless or casual scribble."¹⁷ Oxford says, "to scribble absentmindedly."¹⁸ Cambridge English is slightly softer with "a drawing or pattern that you make while thinking about something else or when you are bored."¹⁹

Alvalyn Lundgren, an independent design director who creates visual branding, publications and books presents an interesting argument describing doodling as an inferior but useful form in relation to drawing. She offers the following statements: ²⁰ "A doodle is simply a mark or series of marks. They can be playful, geometric, linear, shaded... whatever. Doodles are often the result of thinking, but they're not a *depiction* of thinking in the way a

drawing is. Because doodles are aimless in nature, they don't *need* to communicate."²¹ She continues to differentiate by saying that while they "are both the result of mark-making, drawing takes it up several levels. Drawing is the evidence of focused thinking and attentive observation. Drawing is meaningful. It communicates something, whether form, space, likeness, action, or ideas."²²

It is important to note that Lundgren does not dismiss doodling in its entirety. She compares doodling for artists to free writing for authors, says that it is calming and quieting, and agrees with studies that say it improves cognition.²³ She shares doodling exercises she uses to build muscle memory and automaticity for her students as a foundation for drawing instruction. In alignment with both Barry and Brunetti on the importance of practicing, Lundgren believes that if students "get used to making a wide variety of marks and scribbles, mark-making becomes automatic and they don't need to be aware of how they create marks during their drawing session. That means they can focus on what those marks are communicating, which is a higher level of skill and understanding."²⁴

Making Meaningful Marks

Lundgren's mark making is directed towards marks that are then combined into an overall drawing effect, such as the cross-hatching marks that create shading on an object transforming it from two-dimensional to three-dimensional. With practice, an artist draws without consciously considering each step or technique. But meaningful mark making, with intention and attention, has been an integral part of communication since cave painting. Our entire written numeric and language systems are built on meaningful marks, yet we don't exactly consider tally marks or letters to be drawings. Consider the world changing development of computer coding using symbols-based script. We have developed particular marks as representations of information. These marks, or symbols, are often widely recognized and adopted. But we also continue to develop multiple variations and symbols to suit our own needs for expression. We have also begun to modify existing symbols to reflect new understandings, such as a new symbol to represent gender neutral restrooms. We may choose to make marks for our own purposes. If we want to share our purposes, we simply need to create our marks and then create a key for others to understand them.

Visual Data

Let's start by visiting the bigger scope of visual data. "Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data."²⁵

When Chris Stolte, at Stanford's University Computer Science department was presented with a Department of Defense project to improve people's data analysis, he immediately saw potential for world-wide benefits. Stolte took his ideas and enthusiasm to his Ph.D. advisor, Professor Pat Hanrahan, who also happened to be one of the original animation gurus from Pixar. Hanrahan co-created Pixar's early award-winning photo-realistic software. The two men joined computer graphics and databases to create a user-friendly, drag and drop, data analysis software program. With Christian Chabot, a Stanford business graduate as chair, the three men launched the company Tableau designed for business analytics.²⁶ The company not only changed the business world, it also opened up understanding and appreciation for the benefits of visualizing data to the average person. There is even a free public version of Tableau software.²⁷ The important focus of their work is the desire to use visual data as a means of storytelling.

Tableau is a computer-based method of creating visual data, but it is not the only avenue, nor is it the original. There are famous works of visual data throughout history, many showing information that resulted in major changes in practice such as John Snow's map pinpointing a prime source of contamination in London's 1984 cholera outbreak, and Florence Nightingale's portrayal of the role of hospital care in the large mortality rates of the 1850's Crimean war.²⁸ There are multiple books that address data visualization throughout history and practice.²⁹

While all of this information surrounding data visualization has tremendous potential for educational applications, let's bring it back down to the individual, personalized level. How can visual data add to our mindfulness toolkit for students?

According to two information designers, Georgia Lupi and Stefanie Posavec, tracking personal data requires us to take the time to notice the little things we do, then express them creatively.³⁰ In 2014 the two women began a yearlong, weekly postcard correspondence tracking the same data with their own visual interpretation.³¹ The resulting collection of postcards and accompanying journaling was purchased by the Museum of Modern Art in 2016³² and published as the book *Dear Data* the same year.³³ The women discovered that noticing tiny aspects of our lives, and finding a way to creatively express it, puts us in touch with ourselves and others. The overwhelming interest in their project spans countries, cultures and ages. Lupi and Posavec have since published a postcard kit for others to replicate their project,³⁴ began a google group for teachers wishing to develop their concept and locate data pen pals for their classroom,³⁵ and published a visual journal guide titled, *Observe, Collect, Draw*.³⁶ The visual journal walks the reader through a series of exercises to develop some meaningful marks and

explore variations, to practice data collection and visualization, then ends with a section for individualized explorations. The concepts are easily modified for younger students both in types of data collected, to marks created to express the data. The book supports practice in building automaticity, self-reflection, creativity and expression. The skill set can be adapted to track a myriad of academic data, too. We find ourselves at the crossroads of drawing for mindfulness and drawing for meaning.

Graphic Organizers

In lieu of linear note taking, many graphic organizers seek to improve students' comprehension and retention by creating a corresponding graphic for information. They are a very simple visual that have been incorporated with classroom materials for some time. Mind mapping uses a center focus with related details radiating, then branching outwards. Concept maps allow students to connect multiple ideas and use arrows to indicate relationships as they understand them. There are many other graphic organizers but they all face the same constraint, they rely on words to communicate the key information, within their visual support. Graphic organizers can be useful but there are other ways to engage the learner's brain with information.

Visual Notes

There is some controversy surrounding the differences between doodling and drawing. Above we had Lundgren's clear distinction between the two but some people see it differently. Sunni Brown is an author and world recognized leader of "The Doodle Revolution."³⁷ In her 2011 article, "The Miseducation of the Doodle," Brown dismisses disparaging definitions and asserts that "There is no such thing as a mindless doodle."³⁸ In addition to the *mindfulness* benefits previously discussed, she describes the power of doodling in engaging visual, auditory and kinesthetic modes of learning. She proposes a form of doodling she terms "strategic doodling...with the intention of tracking auditory or text-based information and displaying it back to an audience (it can be an audience of one)."³⁹ Brown also begins incorporating the term visual language with her explanation, as she introduces a basic visual alphabet and other simple graphics for conveying information in individual and group doodling activities.⁴⁰ In 2014 Brown published her book, *The Doodle Revolution* fully developing her concepts. In her book she further explains her choice to use the term doodle rather than draw, particularly with adults, to prevent the "I can't draw" negative mindset.⁴¹ Brown continues sharing and teaching her approach to visual note taking through TED talk, articles, and conferences.

Interestingly enough, Brown was not the first to promote visual note taking. As far back as 2007 Mike Rohde was blogging about his visual note taking which he termed “Sketchnotes.”⁴² By fall of 2007 his conference sketchnotes were starting to grab public attention which created a demand for him to share his process and materials.⁴³ In 2011 his article “Sketching: the Visual Thinking Power Tool” was published in the design magazine *A List Apart*, the same issue as Sunni Brown’s article mentioned above. Rohde even referenced Brown as a friend in his post announcing the article and their shared publication.⁴⁴ Rohde published his own books, *The Sketchnote Handbook* (2012) and *The Sketchnote Workbook* (2014), both available with video instruction. He created multiple podcasts and YouTube videos on his techniques. Many others who utilize the sketchnotes technique have gone on to publish additional videos and books inspired by his concepts. He even created the website SketchnoteArmy as a space for sketchnoters across the globe to share their work.⁴⁵

A valuable educator resource on sketchnoting published recently was *Ink & Ideas* by Tanny McGregor. In her introduction she shared life experiences with doodling that echoed my own. She included an annotated list of famous scientists, inventors, writers, artists and leaders who utilized sketches to capture their thinking with “intentional design decisions.”⁴⁶ But McGregor knows that educators want to know why a practice is worth adopting and how is it supported by research. So thorough is her presentation that I can only present highlights for the purposes of this unit but encourage you to read her book in its entirety. Each of the following items were supported with research and anecdotal evidence.

Sketchnotes:

- Are thinking made visible – evidence of the learner’s interaction with the material.
- Welcome linguistic and nonlinguistic representation – thus improving encoding and retrieving of information through the use of verbal and non-verbal modes (dual coding).
- Allow for student choice – taking tools like concept maps to a higher level with visuals but still student driven.
- Help strengthen memory – information becomes more synthesized when semantic, visual, and motor processing combine.
- Make annotation thinking-intensive – promotes active learning and metacognition.
- Enhance focus and reduce stress – creating visual art (coloring, doodling, sketching) is proven to reduce cortisol (stress related hormone) for many people.

- Embrace design – nurtures thoughtful design and alternative learning responses.⁴⁷ (Tanny McGregor 2019)

McGregor includes a parent's view of the value sketchnoting has brought to her child, reminding us that good teaching practices follow our students out of the classroom. She recommends that you use a variety of samples when introducing your students to sketchnoting. Like most of the preceding experts, she acknowledges the importance of students not getting caught up in a certain level of artistic skill or perfectionism. To address this concern, she recommends reinforcing sketches as quick drawings that suggest rather than replicate, in addition to reading aloud stories that highlight characters dealing with mistake making. Throughout the highly detailed lessons and activities, McGregor shares the experiences of various teachers that help reinforce the interactive but personalized nature of sketchnoting. In closing, she invites us to embrace the idea of "art" being attainable by all, and valuable in the acquisition and expression of ideas.⁴⁸

Visual Storytelling

Teaching students to utilize the doodling and drawing techniques above can also assist them in visual storytelling, a technique that teachers have effectively used for years, especially with students who struggle to find their words. By providing them choices of structure, visual vocabularies, and practice, we can scaffold students' attempts at expression or comprehension. We functionally expand students' ability to communicate. Kindergarten teachers typically have their students show their ideas and stories with pictures due to their limited word writing but it is something that can be incorporated at all grade levels. In fact, we already encourage student generated visuals for mathematical problem solving (Show your work using numbers, pictures or words.), illustrations of science experiments, maps, graphs, charts, and so on. Visual storytelling just allows them to explore alternative interactions with information that they generate. Students can effectively use visual storytelling to show their integration of knowledge and ideas. Information is not simply regurgitated but reinterpreted.

Next-level Graphics

As mentioned above, we already include opportunities for students to illustrate responses. If we are looking for a straight forward representation of the information, we want an illustration. Say the students conduct a survey and we want them to present the results, then we are looking for a data table and graph of some type. We are asking them to perform a knowledge or comprehension level task. We can assess their ability to produce a graph, but we don't necessarily know if they learned anything more about the survey

process, information, or applications. Sometimes, we might just need to know if they can do the graph...but what if we can set them up to easily tell us a little bit more about their thinking...and in the process, get them to think just a little more...

Comics and cartoons help take students to the next level by integrating information. Most of my life I have used the terms cartoons and comics interchangeably without recognizing the difference. In seminar we studied Scott McCloud's book, *Understanding Comics: The Invisible Art* to help understand how they differ. McCloud starts his first chapter by establishing a common definition of comics which is: "Juxtaposed pictorial and other images in deliberate sequence."⁴⁹ which roughly translates to "side by side sequential pictures." Comics tell a story. Cartoons are stand-alone images that are more like a single snapshot of a situation. Both comics and cartoons use pictures to convey much of their meaning. We can teach our students which type of graphic is most appropriate for different purposes. Being able to make these differentiations will assist students on picking the best method to show their understanding and reduce the risk of time spent producing the wrong kind of graphic. Looking back at our survey and graph example, we can teach students how to use a simple head or stick figure plus speech/thought bubbles to convey their ideas about the survey results. We can use the progression from illustration, to cartoon (point of view or feeling added), to comic (sequenced events and reactions),⁵⁰ to move students into deeper interaction and understanding. Model this for your students; let them see your drawing's imperfections.

McCloud's book offered insight as to why this kind of drawing can be so powerful in building connections. When we use images to represent nouns (person, place or thing) and verbs (ideas) we refer to them as icons. Symbols are specific icons that hold deeper meaning (symbolism.) Think symbols: icons as squares: rectangles. Icons can have no visible relation to what they represent, for example printed words are icons; they may be content specific, or in the case of pictures, literal representations.⁵¹ If you ask a child, a high schooler, a professional artist, and a computer design artist to draw a picture of a dog, you will get four pictures of a dog that will likely vary significantly in their representation of the real thing, yet they are still considered picture icons. The great thing about pictures is that usually despite the level of sophistication, they are still recognizable. Even very young children's pictures are recognized and identified by their creators and then explained to the viewer.

McCloud continues with an extensive explanation of how we interact differently with pictures based upon their complexity, especially when it comes to pictures of the human form and face. The essential explanation is that when it comes to pictures of people, the more simplistic the form and face, the more universal the appeal. The fewer the details in

a face, the more we are able to identify with what the face represents.⁵² McCloud also points out that as egocentric humans, we tend to see our human face and form reflected in all sorts of things around us.⁵³ For instance, the two windows on the back of my neighbors' house with their shades partially drawn look like sleepy eyes with the back door below as an open-mouthed yawn. Cartoon style drawing, in its simplicity, invites all readers into the message being delivered. The Smiley Face image is a perfect example of a simple image that became universally recognized, and eventually transformed into the current language of emojis.⁵⁴ Our students today are primed more than ever to use this style of imagery to represent information and their own thinking.

Perfection

Striving for perfection often strips the joy out of activities by flooding the brain with negative thought patterns and stress induced hormones. I've struggled with perfectionism all my life. I know personally that it can delay engagement with activities, waste an inordinate amount of time, and result in incomplete projects. Beyond my personal battles, I have watched students of all ability levels be crippled by perfectionism. Every single source I encountered in developing this unit stresses the importance of helping students to focus on process over product. When we began our seminar, we were given a composition book to use as our notebook for our daily observations and sketches. Our seminar leader, Greg Shelnett, explained that he had initially thought to provide us with really nice sketchbooks but decided that the plain composition books would be better utilized since we would be less concerned with "messing them up" and actually use them. Having just met the man, I wondered how he knew about all the pretty notebooks and paper I buy, then save for a "special" use. Apparently, reluctance to use something new for fear of ruining or wasting it, is not just my own personal quirk. There are many ways to help students who need to get past the "clean page" issue such as, using scrap paper, small paper, dry erase boards, butcher paper, brown bags, newsprint, and other recycled products. Of course, the other perfection problem is the mindset that drawing must be artistic. Part of the purpose for pairing doodling or drawing with mindfulness is to have students reframe their ideas about picture or image creating into more of a tool, than a finished product. One thing we need to remember to explain to them is that it is also okay to enjoy the aesthetic outcome.

It is important to understand some of the underlying concerns that often drive perfectionism. The most obvious is the fear of failing, not being able to "do it". Setting clear expectations that you appreciate variations in results can be one way to help students reduce this fear. Attaching the drawing to specific mindfulness practices such as controlled breathing can be another way to keep students focused on the process instead

of the product. Another culprit associated with perfectionism is fear of comparison. Students worry about being compared to others, or they over compare themselves to others. Have students keep a private book for their own doodles and drawings, but also have them do group doodles/drawings to reduce sensitivity. Comparison concerns can be related to previous activities, even. A student who once produced something they were happy about may be afraid of re-engagement with an activity in case they don't do as well. In addition to reading many books that are available on moving past our fears or mistakes, it is important to teach students the difference between perfectionism and doing their best, or really applying themselves. Dr. Brene' Brown writes and speaks extensively on perfectionism and offers this distinction: "Healthy striving is self-focused: "How can I improve?" Perfectionism is other-focused: "What will they think?"⁵⁵

Lastly, students may be afraid that they won't get the image in their head right on the page. Using low-level activities to build some drawing automaticity can help take off some of the self-imposed pressure when it comes time to do more involved drawing, such as sketchnoting. Creating a class visual dictionary can provide support for students who lack the confidence to create their own images. Conference with students about their individual images to help them create a personal visual dictionary, or to create a key for a specific activity. Students will benefit from the following advice, "being creative is a brave and vulnerable process. Better yet, there may be someone who needs to hear or see exactly what you're creating. Don't squander your gifts. The best thing you can do for your creative life is to learn how to let go of the need to be perfect in favor of being yourself."⁵⁶

Classroom Activities

The following activities can be adapted across grade-levels. Always model for the students. If you are fairly comfortable drawing, you can create a more authentic model for your students by modeling with your non-dominant hand. By doing so, you will more naturally approximate the challenges of the drawing task for the students. Think aloud the tricky parts. While these are specific activities, I highly recommend viewing additional video and reading handbooks on sketchnoting to incorporate it regularly throughout content areas.

Noticing Notebooks (Inspired by Lynda Barry's *Syllabus*⁵⁷ and our seminar activities)

Tell students that writers begin by being good observers, noticing little things around them every day. Read aloud *Jamaica Louise James* by Amy Hest, pointing out the way the character likes to tell her stories in full detail, and that her daily sketches include little

details. Be sure to draw connections between the character's displayed pictures at the end and her earlier storytelling.⁵⁸ Despite this being a picture book, the style of writing has universal appeal across grade-levels.

Next, let students know that similar to the story character, they will be keeping a daily "Noticing Notebook" to record observations in both words and sketches. Scale the number of required items according to your age group. In seminar we completed items in each category as suggested by Barry: What you did – 7; What you saw – 7; Something you heard someone say – 1; Draw a picture of something you saw – 1.⁵⁹ I scaled the number of items and the categories down for my fourth graders to:

- 3 things I did
- 3 things I saw
- 1 of them to draw

For each student and teacher, pre-label "Noticing Notebooks" on small, portable notebooks (Dollar store sells in packs of four.) I also wrote the bulleted list above on the inside of the front cover. Have a completed entry in your own notebook to share with students. Next model another entry to show students how they only need to spend a few minutes to complete each section. Establish the expectation that the notebook should be kept daily either through homework or during any freetime at school. Determine times when students can share one thing from their notebooks such as a warm up time or after a lesson, especially early on to encourage them to build the habit of keeping it. It is ideal to set this up at the beginning of the year when there is greater focus on establishing routines, then it becomes a natural part of the class. As academic demands increase, sharing can be scaled back to more random opportunities, or to classroom collections. Classroom collections can be where students may show one item from their notebook on things like a weekly displayed poster, or weekly class pages that can be combined and run-off for the students as an end of year keepsake. When students are looking for topics during journaling or free-writing time, direct them to their notebooks. Be sure to include their notebooks in workshop conferences, too.

Starfish Mindfulness Data

Starfish breathing or meditating is a widely used practice in therapy and schools to help students focus on their breathing. One hand is held up in front of your body or face, fingers splayed, while the other one uses one finger to slowly trace up and down each digit while focusing on in and out breaths. There are many versions available to check out on the internet. We can combine our drawing for mindfulness practices with this activity

for even greater impact, while visually representing our work in a way that pleases our own aesthetics.

Begin by teaching the hand tracing/breathing actions of the practice. Be patient with students who may want to be silly about it. If needed, use gentle redirects to maintain a calm atmosphere. I also explain to students that they will be able to breathe better by pushing out their stomachs (bellies) to give more room for their lungs to expand. I model the difference between chest breathing and belly breathing. It is also important that you tell them that contrary to what they might guess, the out breath is as important as the in breath because we need to get rid of the old air to make room for the fresh air. When we breathe in and out too quickly, we don't give the old air enough time to get out and we leave less and less room for the fresh air. When students make exaggerated noises with their breath I explain that noise is a clue that we are breathing too high up, and we need to focus our breath lower.

Practice the activity over a few sessions until you are sure they are fairly proficient. In your next session provide each student with a half sheet of construction paper (4.5 x 6 inches). Show them how to do the starfish breathing while tracing their hand flat on the paper with pencil instead. Model repeating the exercise after repositioning their hand in different ways on the paper. Have them do this independently and repeatedly to fill up the page with no set requirements except repositioning and slow breathing. The results end up looking pretty scribbled and it is difficult to tell the form of the original traced item. Have them keep the papers.

Next session have students analyze what they see on their paper. Many will admit rushing or that it looks really messy. Most have no idea how many times they traced. Tell them that it is okay, sometimes our breathing and our thinking can get like that, all jumbled up. Explain that practicing slowing down even more, and really focusing on breathing a few specific times can be more effective than before. Model again, really pushing the new hand positions into the open white spaces of the paper, this time for a total of five tracings only. Point out that while each tracing overlaps, they are still able to tell that it is a hand. Distribute new half pages and have the class do each of the five tracings simultaneously with you calling the breaths. Have them analyze their new images. Can they see each hand? Can they count their breaths? Explain that they have just created visual data of their mindfulness breathing. Have them keep the papers.

Last session, have students once again analyze their papers, this time paying attention to the lines and the shapes created. To emphasize those details have them trace the lines with a dark color, allowing them to better notice the negative (unfilled) spaces. Have

them close in any unfinished lines. Next show them how they can fill in the spaces with more mindfulness, either by selecting colors or patterns to fill each space. Have examples prepared to show them. Guide them to be purposeful in each choice and mindful of the overall effect. They should make deliberate choices about what colors or textures they feel might look good together. Depending on your grade level, tie this part of the practice to how we can deliberately choose to fill the spaces in our thinking with positives, or conversely the idea that leaving some empty spaces allows the filled spaces to stand out with greater clarity. Students may choose to keep or display their work.

Shaving Cream Sessions

While the previous two activities involve creating a product through a mindfulness practice, it is important to remember that mindfulness requires deep focus on a process. This activity incorporates a nonpermanent medium to reinforce this notion. The activity is one that has been used in other ways by primary teachers, but I contend that it has value at any grade level, even the big kids. Its intensely sensory based nature allows students to experience the activity through multiple modalities. Even big kids appreciate a chance to “get messy” and “play.” Your desks will get really clean and if you choose wisely, your room will smell great, too. (Be aware of allergies, you can always opt for unscented.)

Using inexpensive shaving cream (again, try the dollar store), spray a small amount on each student’s desk. Older/responsible students may be able to do their own or you may appoint helpers. Students spread foam across desk in a layer to create a “writing” surface. Students then practice mindful doodling. Remind them to be attentive to their senses and movements. Some suggestions: starfish breaths, spirals, concentric shapes, and other doodles of their choosing. Once the space is filled, they can redistribute the foam and go again until foam is spent. Process the experience with your students, what did they notice, enjoy, dislike, wish was different? How were their doodles different in the different medium? Encourage them to write about the experience using visual storytelling.

Storyboards – Reverse-Engineering Picture Books and Novels

Many years ago I attended a presentation by the author, Jack Gantos at my children’s school. He shared how he struggled to be published initially but that he soon discovered that if he followed a particular formula, he could successfully write and publish a picture book. The formula entailed a sixteen-panel storyboard that featured story elements introduced at specific points. Picture books are typically thirty-two pages so the idea was sixteen pages of text and sixteen accompanying illustrations. Elements were introduced

as follows: Setting, Main Character, Story Problem or Conflict, Multiple Events, Climax, False Resolution, Reevaluation, True Resolution, Reflection.⁶⁰ I taught his storyboarding formula to my second-grade students and they happily embraced it, showing higher levels of motivation than with previous writing activities. I related the activity to graphic novels which were gaining in popularity thanks to the efforts of authors like Dav Pilkey and Jeff Kinney. But I still had students that struggled with understanding ways to express the story elements. In an effort to improve their understanding, I began using storyboarding to deconstruct our classroom read alouds, highlighting the way the story fulfilled each element. After repeated modeling, many students wanted to use storyboarding and the elements to discuss various readings, they made inferences about the author's choices and cited evidence. Some students critically analyzed the stories to see if the author had gone "off formula."

This activity can be directly taught to students of varying grade-levels Even following a specific formula requires students to analyze which parts of the story fit each element and how can pictures contribute to the storyline. With increased grade levels comes increased text complexity. Upper grade students can use the same storyboarding formula to analyze novels. The greater length of the text requires the students to synthesize story events and integrate the content in order to present a story panel that represents the key concepts and details in a concentrated fashion. With the storyboard format, older students must also determine visuals that can help deliver the content or message effectively. The activity can be completed whole group, cooperatively, or independently. It can be utilized to interpret a picture book, a chapter, or an entire novel. The finished result is a story told in panels of sequential images and text...a comic.

Appendix on Implementing District Standards

As described above, the goal of mindfulness is to assist students with self-awareness and self-regulation, to include screening out other stimuli. Mindfulness has also been proven effective in increasing sustained attention for improved information processing and retention. While there are no established standards in this area, its benefits improve students' ability to meet local and national education standards.

The State of Delaware along with 40 other states has adopted the Common Core State Standards.⁶¹ This unit is intended to be utilized across grade levels and disciplines. The standards cited include the over all informational content of the unit rather than just the specific classroom activities, with particular emphasis on visual storytelling techniques. The bulk of identified standards are those related to Language Arts but can be applied across the other content areas, as those areas are dependent on the reading, writing,

interpretation, and representation of information. Accordingly, they touch upon most of the subcategories of the standards as indicated.

Language Arts (Also Content Areas of Science and Social Studies) – Sketchnoting, Storyboarding, Comics

Key Ideas and Details:

- CCSS.ELA-LITERACY.CCRA.R.2
Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

Craft and Structure:

- CCSS.ELA-LITERACY.CCRA.R.5
Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

Comprehension and Collaboration:

- CCSS.ELA-LITERACY.CCRA.SL.2
Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge and Ideas:

- CCSS.ELA-LITERACY.CCRA.SL.4
Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-LITERACY.CCRA.SL.5
Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Integration of Knowledge and Ideas:

- CCSS.ELA-LITERACY.RH.6-8.7
Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
- CCSS.ELA-LITERACY.RST.9-10.7
Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Mathematics – Visual Data, Sketchnoting

Mathematical Practices

- CCSS.MATH.PRACTICE.MP2 REASON ABSTRACTLY AND QUANTITATIVELY.

Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

- CCSS.MATH.PRACTICE.MP4 MODEL WITH MATHEMATICS.

Mathematically proficient students are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

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