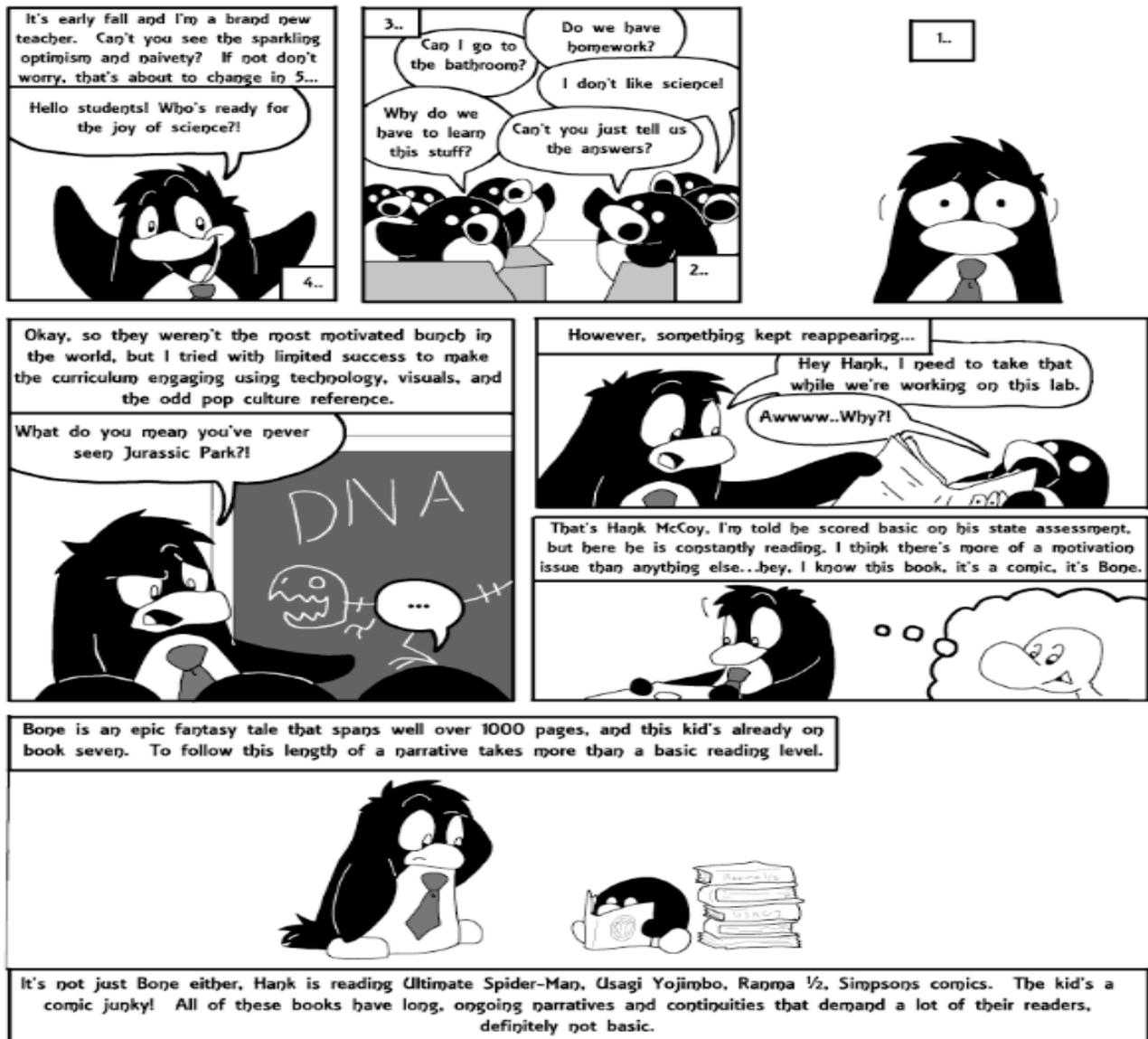


The Spectacular Teacher-Man: Comics as Primary Text in a Science Classroom

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Sequential SmArt: Teaching with Comics, May 19, 2012

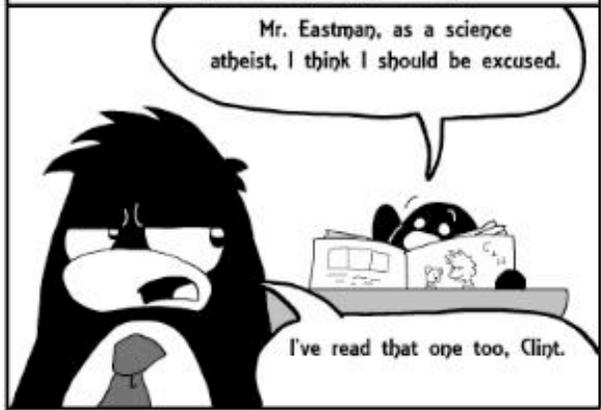
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Here's another reader, this is Clint Barton. He's labeled in the autistic spectrum and he's developed tourettes tics recently, it gives him a lot of anxiety issues when completing work or speaking. His written work is extremely minimal. I'm told he just doesn't understand writing conventions like nuance or irony. However, here he is reading Calvin and Hobbes.



He LOVES Calvin and Hobbes. So do I, and I really doubt you can ever understand Calvin and Hobbes without a considerable wit and sense of irony.



More doodles from Matt Murdock I see. Matt's constantly doodling, but look at these, they're relevant to the content. In fact, he's making some ingenious creative connections between his imagination and the content. He's really engaging on paper.



However there he is right now...unfocused and unengaged.



Well, that's it. I keep seeing these kids doing things I'm told they can't do.



There has to be a way to engage them and bring them into this content. I'm gonna do it,



I'm gonna....draw a really big comic.



The public view on science is not a friendly one. You will not be hard pressed in a public school to find students who would describe their science class as dry due to all the vocabulary and fact memorization they have to do. A student will often state in exasperation, “I’m just not good at science.” That’s a sad statement to me because it reflects the image the school system has created for science. In its essence, science is a way of thinking. Science happens when a person observes a phenomenon and wishes to explain it. One then collects data and evidence to create a theory. This process is not limited to any specific content area or context. Yet, here I am with a student claiming that he or she is just “no good at science.”

While many scientists view science as a way of thinking rather than any specific topic, curriculum writers and school districts clearly do not. Science curricula and texts have had more content and information infused in them at the expense of coherence. A “spiral” curriculum is common in middle schools where students will study a unit from biology, then physics, then chemistry in the same year. This content shift is often jarring and proves to be a constant source of frustration to many of my students who struggle with pacing and take a while to feel comfortable with a way of thinking and working.

The National Assessment of Education Progress has made some findings about science education in our nation that do not really surprise me considering my experiences with these students who are “no good at science.” The National Science Board estimates that only one in five people understand the process of scientific inquiry and its worth. The National Science Board has since called for programs and research to reintroduce the public to the wonder and worth of science.

In this research project, I used comics in place of a genetics text for a seventh-grade science classroom. These comics were intended to achieve the same goals as county-provided texts and assessments. The assessments were compared with the assessments from other units, and student understanding was also evaluated through student-made comics describing the concepts of inheritance.

It is my strong hypothesis that the use of comics in a science classroom will show a positive effect on both student learning and engagement. This conviction goes beyond simply applying my interests to the classroom, and is based on the literature of comics as well as the basic properties of comics themselves. This medium is tailor-made for education, and for the sciences in particular. This hypothesis is based on six assumptions:

1. Comics engage students in a way that increases their motivation to read.

Comics have already been implemented, to varying degrees of success, in many content areas. It is the medium’s special blend of the visual engagement of a film with the narrative elements of a text that make this medium such an attention grabber. If it is our goal to instill in students the wonder and joy of

science, using such an engaging tool seems obvious.

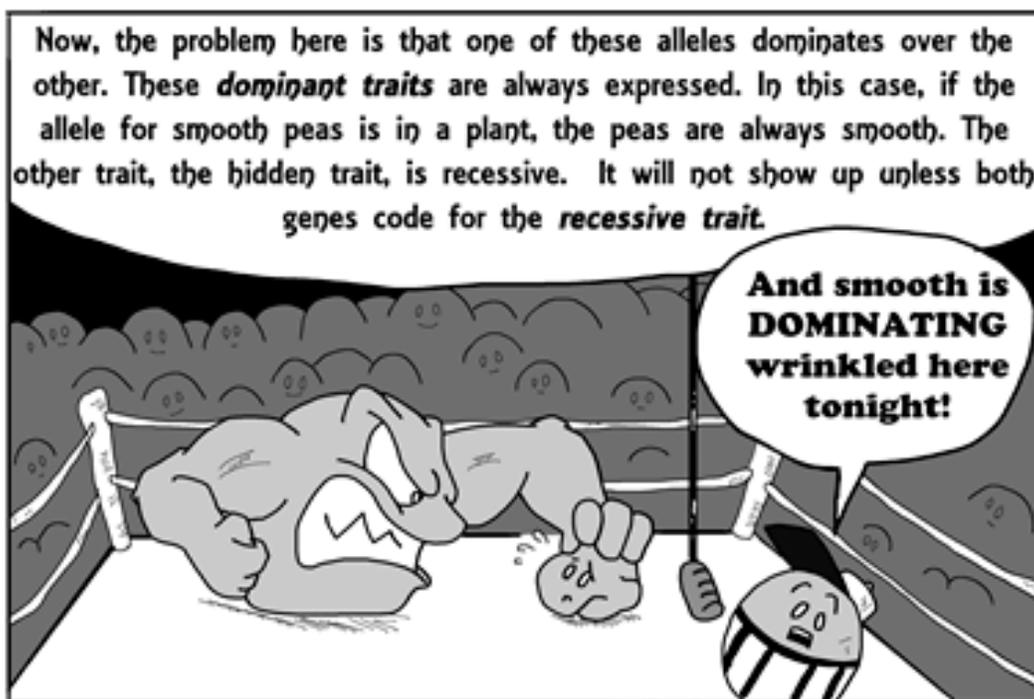


Fig. 1: Anthropomorphized peas or other imagery communicate abstract concepts because it is shown to be memorable to young students.

2. Comics give readers a level of control over the pacing of their reading not found in other media.

Comics create an environment where the past, present, and future are on the page at the same time. This allows the reader to read as quickly or as slowly as he or she wants. These controls over pacing will even the playing field with regards to students' presumed ability levels. It is common for comics readers to re-read sections of books before moving on with the narrative. It is my goal that students who read at a fast pace will quickly read the story, but return to other sections to delve into the minutia of the text. Students who require more time to process text will gain greater confidence in their abilities as they can control how quickly they engage with this medium. This heightened engagement and confidence should translate into higher levels of understanding from all students.

3. The skills involved in reading comics mirror skills necessary to read and understand scientific diagrams and graphs prevalent in traditional texts.

Comics are not just present in scientific textbooks but essential to their effectiveness. Many books have diagrams depicting the life cycle of a caterpillar or the water cycle. These diagrams are

glowing examples of sequential art, or comics. Diagrams in science texts often combine chronologically positioned artwork with text to convey scientific information. It would be much more difficult to help students understand the Krebs cycle without these invaluable comics. However, despite the prevalence of these “comics” in science text books, many students do not understand the skills necessary to gain information from the diagrams. Having students read content-related comics will provide students with an arena to practice the skills necessary to understand scientific diagrams without appearing to be the same daunting academic diagrams in the texts.

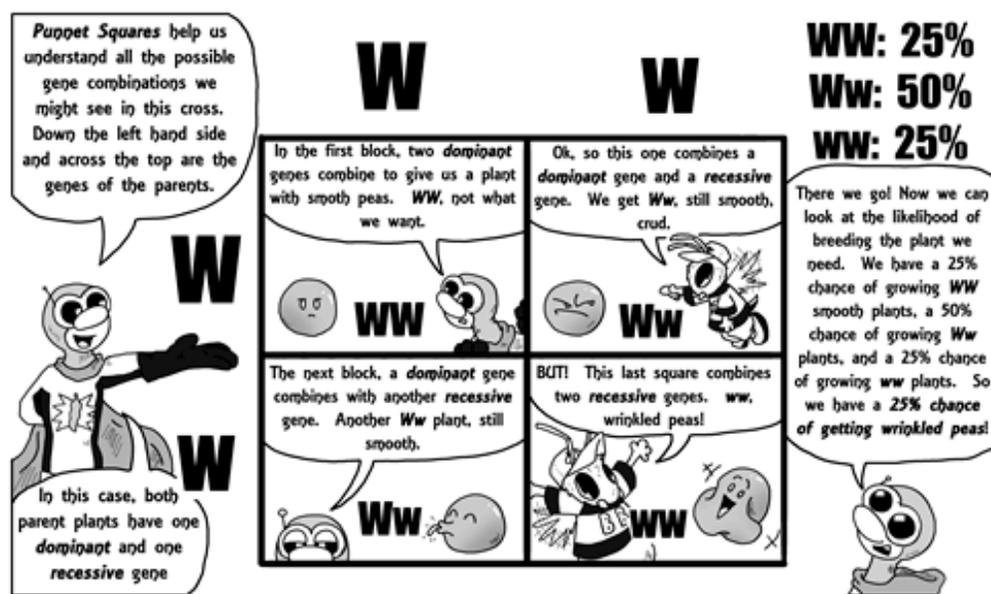


Fig 2: A Punnett Square represented as both a scientific diagram and part of the comics narrative.

4. Reading comics demand literacy skills from the reader that go beyond traditional readings and cater to differing learning styles.

The synthesis of visual imagery and text provides comics with interesting literary properties. In most comics, it takes more than simply a literal interpretation of the text to understand the stories and information contained within. Comics also integrate skills that empower and utilize other learning styles. The gutters of the comic (the spaces between panels) require that students fill in events and make inferences about the changes between scenes that traditional text will simply describe for you. This interpretation allows students to explore the context and make inferences from the text, an essential skill in the sciences. The visual nature of the text itself enriches the experience for visual or spatial learners. There is scaffolding in comics for both visual and textual learners. Those who struggle with the text can

find supporting clues from the images, and those who struggle with the images can find support from the text. Unlike traditional text, which can favor a certain kind of learner while hinder another, comics are accessible to all learning styles and will allow students who typically struggle with texts to feel confident in their learning.

5. Storytelling elements found in comics create a human and historical element not found in traditional scientific texts.

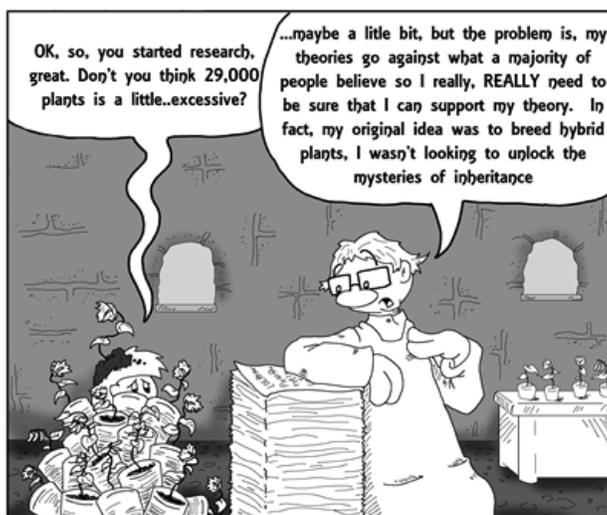


Fig. 3: Focusing on Mendel as a person allows students to engage on more personal levels with the text.

Interestingly enough, if we are to recapture the wonder and joy of science in our students, this assumption is the most important. While communicating the human side of science does not help students memorize the factoids used on standardized tests, the human and historical relationships with science make the content relevant to students. As educators, we are guilty of going out of our way to make science irrelevant to students. A field driven by a human aptitude for curiosity and exploration has been stripped down to a classroom for term memorization and scripted experiments. The wonder and joy of science in students has been lost because the current system does not reward students for seeing this joy. The storytelling influences of comics will reinstitute this joy by making the stories of famous scientists relevant and personal to the students. The story of any scientist is one of personal relationships, discoveries, and often bias. Famous scientists were rarely well behaved, academic people. They were often eccentrics who were seen as strange and even belittled for their ideas, hardly the scientific deities with which students are presented. Creating personable, intimate stories centered on these scientists will provide students with a relevant image of these people as humans, not ideas. A personal relationship with

the person and history of the science will allow the students to project something of their own personality onto the story, making the experience both informative and individually profound.

Based on classroom observation, the students were highly engaged by the comics and seemed to respond not only to the more-accessible reading, but several students noted that strange imagery served as a sort of bookmark for them. Students at higher reading levels studied the text in detail while those with lower reading levels were motivated to engage with the text. Overwhelmingly, the students favored the creation of more resources like the comics. While the results were not statistically significant, there is a wealth of observations and data to consider for future research projects such as this.

Science finds a valuable partner in the comic book. The medium allows information to be conveyed effectively and with higher retention, while also engaging the reader. Comics do not just appeal to a niche market of superhero fanatics, but to virtually all readers, even those who have never read a book-form comic. The melding of visual and text elements creates an experience that readers can engage in at their own pace and revisit whenever they please. Comics create stories and characters that make the science content relevant and personal to the student. I have rarely seen my students show such interest in the content, as well as invest themselves so personally in a topic. If our goal as teachers is to convey the wonder and utility of science to all students, comics are the perfect tools.

APPENDIX:

The following pages are student-produced comics that serve as excellent artifacts of their content learning, as well as their engagements with the curriculum and the comics.

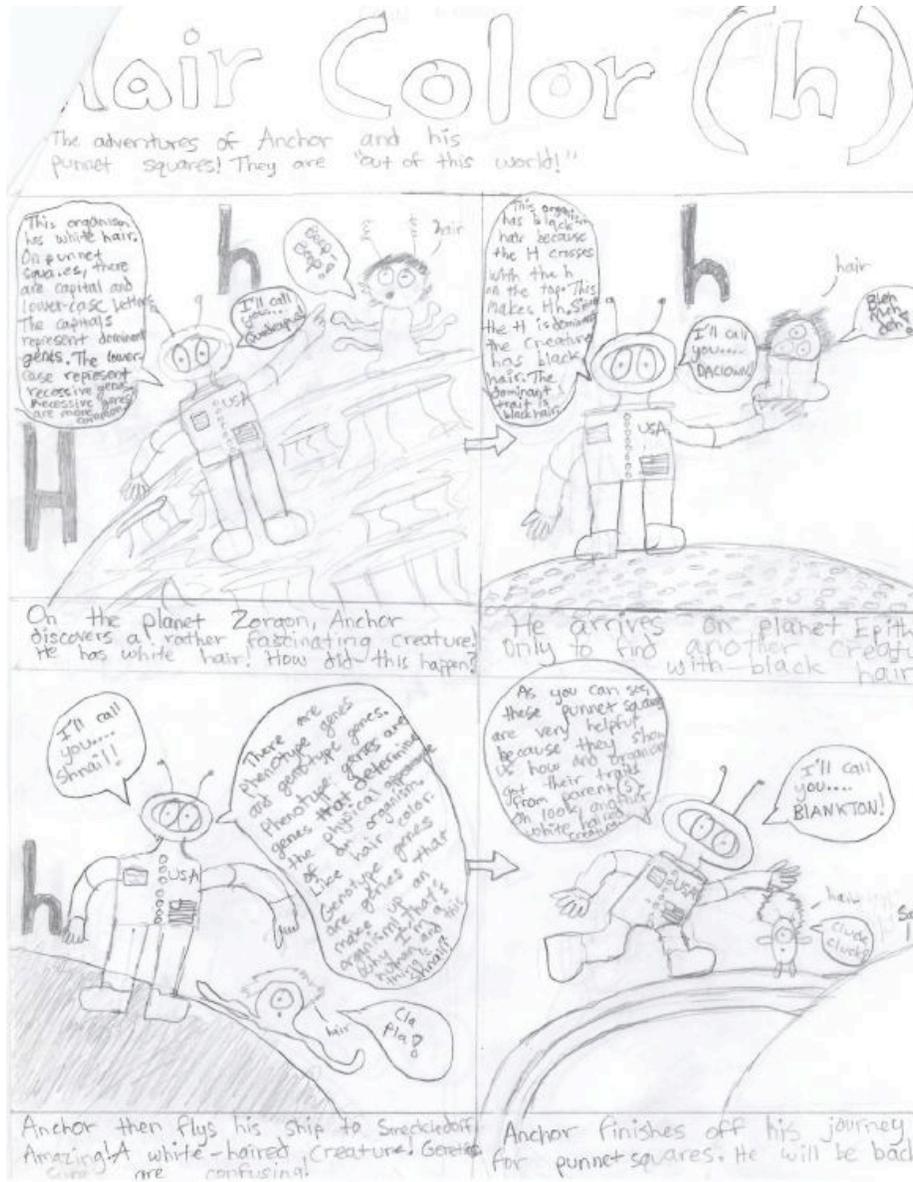


Fig. 4: This student has created a comic that is both a comic and a Punnet square in one. Each frame looks at the result of the cross between letters seen along the side and top of the borders.

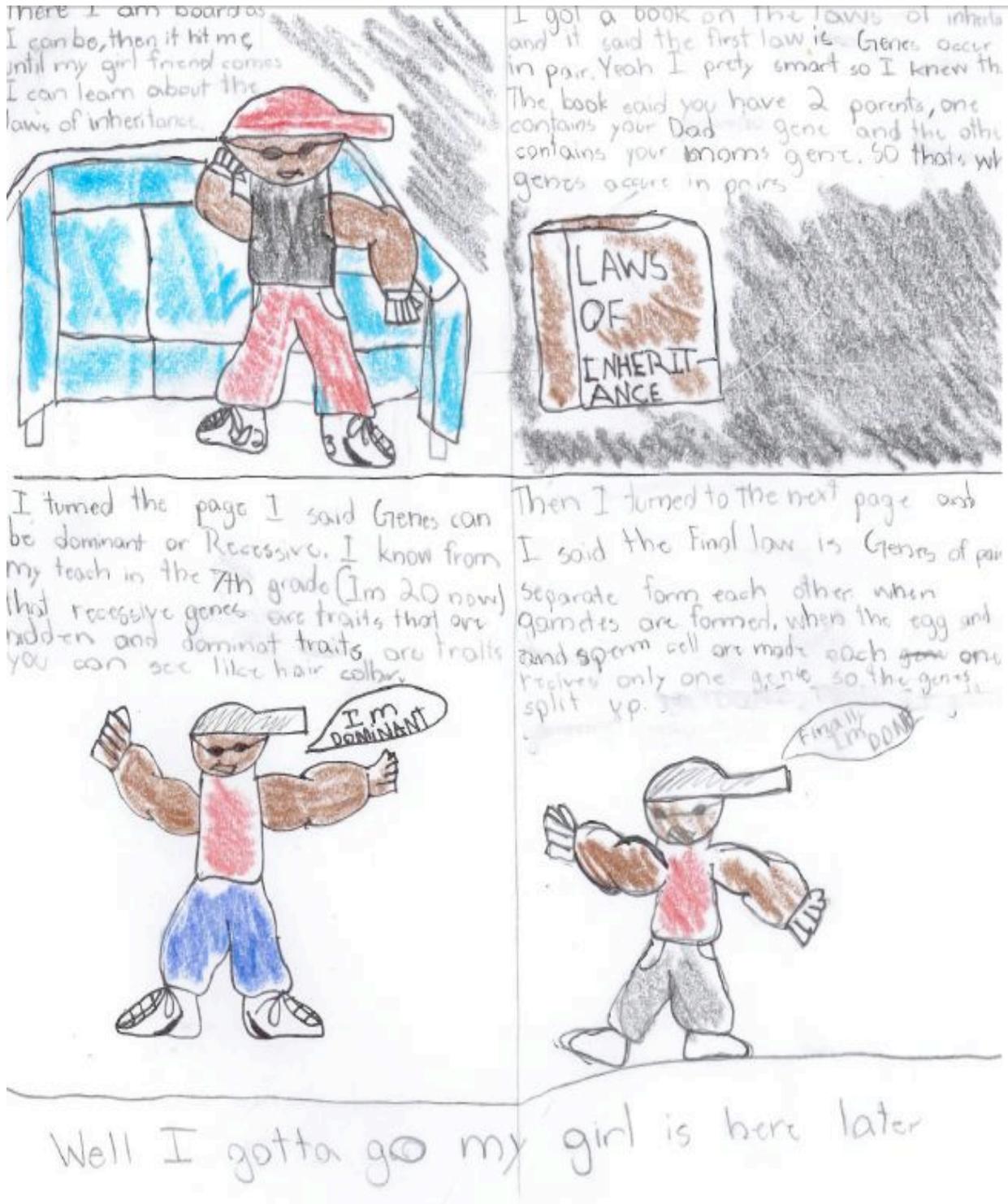


Fig. 5: This student includes a personal caricature into his comic. This shows a much more personal connection with the material from a student who had previously seemed to lack confidence in science.

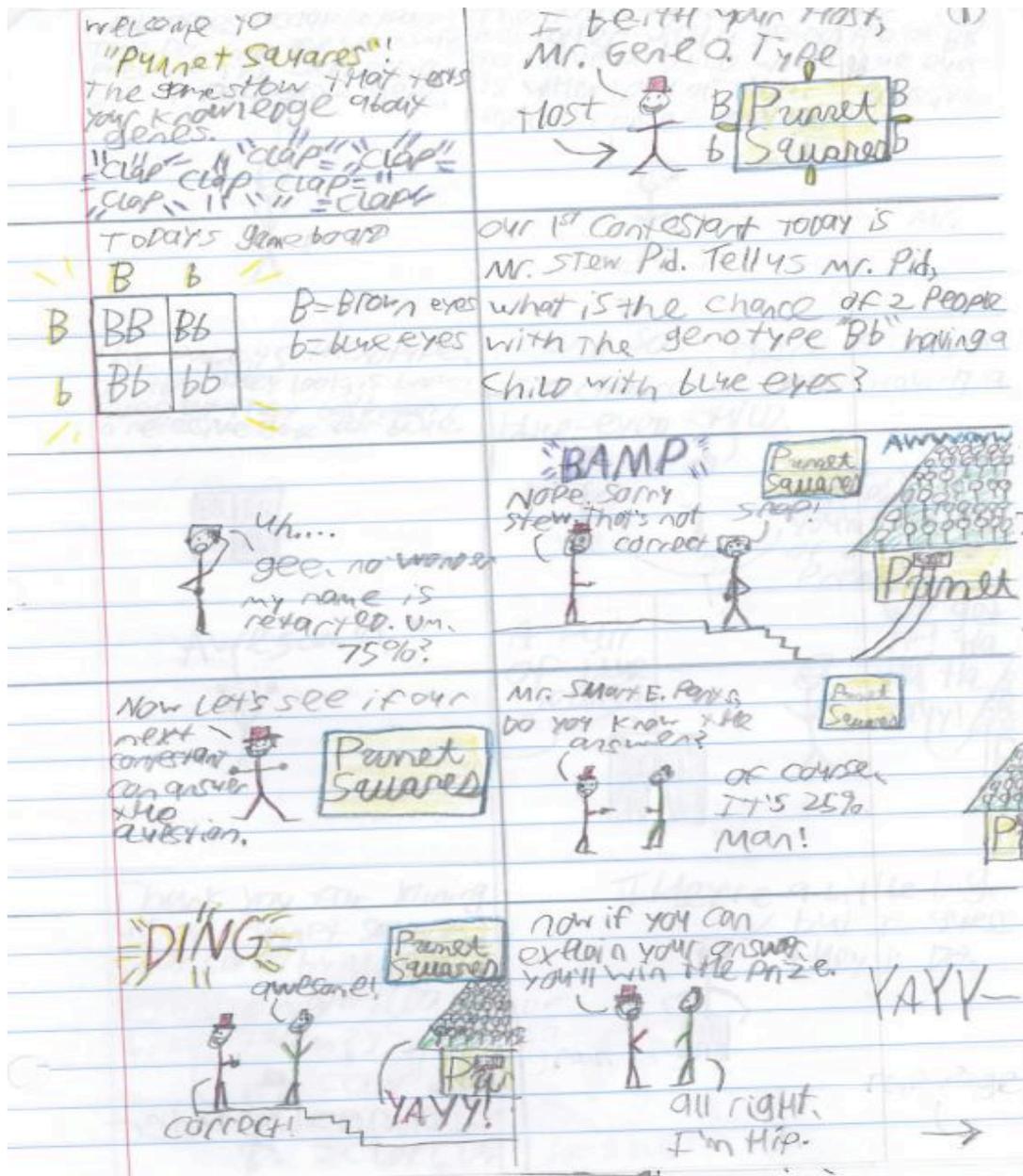


Fig. 6: IEP students and struggling readers were often able to provide me with a more conceptual idea of the content. This student had been identified in the autistic spectrum and I have frequently been told that he is incapable of understanding nuance, sarcasm, or many other literary techniques. However, his self-created comic is scientifically accurate, full of puns, and wildly sarcastic (in a fun way).