The Educational Benefits of Comics: An Exploration of the Medium as an Educational Tool

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When discussing the topic of comic books in the modern era, it is likely that many things spring to mind. Some may think of popular superheroes like Batman or Captain America, others might think of beloved comic strips like *Garfield* or *Dilbert*. Ardent fans of the medium may think of groundbreaking stories like *Watchmen* or *The Sandman*, while more casual fans may be immediately drawn to popular TV shows like *The Walking Dead* or movies like *Deadpool* which are based on comics. What may not immediately come to mind though is school. If one were to bring up the topic of comics and education, it is very likely that the first thing the average person thinks of is some news story of a school banning a comic book or graphic novel.

Despite how popular comics are across all ages, they can be a target of criticism in educational settings due to the belief that they contain material which will have a negative impact on children (Lee; Wertham). These concerns of course echo the principles of Cultivation Theory, which posits that the mass media can transmit and shape the values, beliefs, and actions of those who consume its content (Gerbner, *Cultural Indicators*; Gerbner*, Cultivation Analysis*). Opponents of this medium thus worry that children who are exposed to depictions of violence in comic books may mirror what they are reading and seeing, leading to increased aggressive behaviors in those children (Burton).

However, while the discussion around comics as a source of controversy in the U.S. educational system due to various political differences, their content, and the so-called "culture wars" can be a prominent one, it is not the focus of this specific body of work. We mention these discussions not to contribute to either side of the debate, but rather to stress that when discussing this medium in an

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educational context, there is a tendency for this singular aspect of the conversation to dominate the focus of fans of the medium and casual observers alike.

The purpose of this work is to highlight how this genre of reading material has great value and potential as an educational tool (especially in elementary education), attributes which may be overlooked or lost in the noise being generated by current debates centered around censorship and comics content. This focus speaks directly to one of the key benefits of popular culture studies, in that it provides a way for society to understand the things that permeate our lives (Reinhard), while also providing an opportunity for the public to analyze how and why we construct our reality through the creation and consumption of popular texts. This body of work contributes to this approach by examining how an incredibly prevalent and popular form of media (comics) can be used to contribute to the understanding of our present reality via the traditional learning environment.

To achieve this goal, we examine how comics have been used to have a tangible positive impact on student learning outcomes, why comics are such a useful educational tool, and provide examples of methodologies and approaches which used comics to successfully achieve a variety of positive educational outcomes. We seek to then build on these findings by providing suggestions of additional comics which could be used in similar interventions, introduce some ideas for teachers who are looking for innovate ways to integrate comics into their curriculums, and to put forward a new comic-based teaching approach which we believe is worth exploring further in future works.

Types of Comics

To examine how comics can be used in the classroom, it is important to first understand that the comic medium is by no means homogenous. The most common forms of this medium are the single-issue comic book, graphic novels, trade paperbacks, and manga (Belton). A single-issue comic book refers to the magazine-style format book that most people think of when they hear the term "comic book" (Van As). While these publications can be single stand-alone issues, they tend to be part of a serialized story. Comic strips are a series of drawings arranged within sequential panels which tell a story. Comic strips are

traditionally associated with being found in newspapers and are often later bound together into larger collections like the *Peanuts* books by Charles Schulz.

A trade paperback (TPB), "is a collection of comic book material which has been published in other formats previously and bound into one book" (Van As 1), and usually is made up of multiple single-issue comics. Graphic novels are a comic format, and the term "graphic novel" is sometimes used as an interchangeable description for a trade paperback. However, while both graphic novels and trade paperbacks are collections of comics, they are not technically the same thing, as unlike trade paperbacks, the original graphic novel (OGN) "is a long-form comic that contains original material, which hasn't appeared anywhere else" (Van As 1).

Manga refers to the popular Japanese style of comic which are often first produced in serial format (usually in black and white) and are then collected into a trade paperback or graphic novel. Manga tends to be read right to left, and while many of these stories do contain adult themes and content, there are a wide variety of this style of comic, many of which are suitable for a younger audience (Belton). Osamu Tezuka's *Astro Boy* series is a prime example of child friendly manga, and it is important to make note of this type of comic as it is one of the fastest growing comic genres amongst young readers (Clark). Beyond providing greater insight into the medium, it is important to talk about these distinctions, as certain comic genres and formats are better suited to achieve specific educational goals than others.

Growth of the Comic Book Industry. While the comic industry has experienced peaks and valleys of popularity and sales over time, the last few decades have seen the industry experience a great deal of financial success and increased cultural prominence. This popularity is tangibly reflected by its sustained financial growth over the past decade. In 2021, the North American comic book industry set a new annual record of $2.075 billion in sales (Clark). This number continues a trend of almost uninterrupted sales growth for the industry over the past nine years, which included earning an estimated $1.28 billion dollars in sales in the U.S. and Canada in 2020, despite many industries suffering major financial losses due to the COVID-19 pandemic (Griepp and Miller).

In fact, since North American comic book sales totaled approximately $805 million in 2012, the comic industry has seen an increase in year-by-year sales in every year except 2017 (Griepp and Miller) and is predicted to continue this trend

through 2030. This financial success is by no means limited solely to North America, as evidenced by the 2014 worldwide industry figures produced by Diamond Comic Distributors, which found that, "overall sales of comics and graphic novels increased by 4.39% year-on-year in 2014 (comics were up 4.03%, with graphic novel sales rising by 5.18%)" (Virtue 1). This continued the trend of industry growth from 2013, in which overall comic sales growth rose by 10% (Virtue).

Part of this growth has been thanks to the massive critical and financial success of comic-based TV and movie franchises like, the Marvel Cinematic Universe, Warner Brother's *Dark Knight* trilogy, and Amazon Prime's TV series *The Boys*, which has inspired an increased and renewed interest amongst the public in the comics which they are based on (Buesing). Another contributing factor to these increased sales has been the growth and diversification of the comic book audience over the past several decades with many new series aiming to attract a more 'mature' and older reading audience (Our Culture Mag & Partners).

However, while superhero-based comics and an expanded reading audience have certainly played a major role in the recent success of the industry, children and young teens remain major consumers of this media (Gonzalez; Alverson; Barnett). An in-depth look at the record comic sales which occurred during the past few years of the COVID-19 pandemic show that a large part of this growth has been driven by increased interest in manga and children's graphic novels (Clark). The works of children's comic authors like Dav Pilkey and Raina Telgemeier have routinely topped U.S. best-selling charts over the past decade. For example, in September of 2019, the number one and number three best-selling books in the U.S. for the week were Telgemeier's *Guts* (76,216 units) and Pilkey's *Dog Man: For Whom the Ball Rolls: From the Creator of Captain Underpants* (44,863 units), meaning that two of the top five best-selling books (not just children's books) in the country were graphic novels aimed at young readers (MacDonald). These numbers are by no means an anomaly either, as Telgemeier's autobiographical graphic novels have sold over 18 million copies worldwide and have been credited with transforming the children's graphic novel market (Alter), while Pilkey's 2021 children's graphic novel *Dog Man: Mothering Heights* was the best-selling print book in the United States that year (Maher).

Integrating Comics into the Educational Realm. Putting aside the arguments surrounding the "appropriateness" of the material in certain comics, the use of

comics in an educational setting often faces several other common obstacles. Some educators have been hesitant to use comics partially because of the misconception that these stories are too simplistic as, "comic books have historically been stigmatized as a lowbrow medium among scholars, parents, and educators" (Branscum and Sharma 430). Other critics have worried that children will use comic books to replace other more "educational" or "wholesome" reading materials. However, contrary to these fears, several studies have found that children who read comics end up reading as much, or more, than non-comic readers, "It has also been reported that among middle- and lower-income youth, when compared with non-comic readers, child comic-readers engaged in significantly more pleasure reading, and report greater enjoyment for reading" (Branscum and Sharma 431).

When looking at the many successful uses of comics in an educational setting, this association between reading and pleasure is noted far too consistently to be considered a simple coincidence. While there are many different reasons to integrate comics into educational curriculums, it is the opportunity to harness a child's preexisting interest in comics to stimulate learning which serves as the key advantage this medium has other more traditional educational materials. For example, when examining the integration of *Archie* comics into school curriculums, Bonny Norton found that when elementary students were reading for fun, they took a greater amount of control over the reading process than when they were "studying" a literary text. Norton found that many students associated traditional literary texts with being boring and a chore that had to be completed before they could have fun, while getting to read *Archie* comics was viewed as a 'reward' and something to look forward too. Beyond simply being more "fun" to read, using *Archie* comics as a reading tool allowed students the opportunity to "construct meaning, make hypotheses, and predict future developments" (143). Based on her findings Norton argues that this interest presents an untapped opportunity for educators to increase student engagement in their literacy efforts while also better preparing students for the many semiotic modes which they encounter in their everyday lives beyond the written word.

Building off this Norton's findings and the idea that reading for fun generates greater student engagement and educational ownership, it therefore makes sense for educators to integrate more comics into class reading materials. This basic but key first step would help to lay the groundwork for some of the more inventive and complex interventions we explore later and would help to erode some of the

stigmas attached to the comics medium. Some potential materials could include the *Owly* graphic novel series by Andy Runton, which has won an Eisner Award for best publication for a younger audience. The *Owly* series is a great tool because the series is composed of a variety of different reading formats including graphics novels, single-issue comics, and several traditional children's books, allowing educators to utilize the series in many ways. Another option is the graphic novel *El Deafo* which uses anamorphic bunnies to tell about the story of author Cece Bell's loss of hearing and can introduce children to a variety of important life lessons about overcoming adversity, accepting differences, and building friendships.

Comics as an Educational Tool

While the ability to increase interest and engagement in reading is certainly a beneficial trait, comics also provide more educational use and value beyond simply serving to encourage reading. They are an incredibly multifaceted educational tool which can be used to impact several different aspects of childhood learning. The key to their use as an educational tool lies in part in the unique way in which comics combine the visual and narrative elements of reading and storytelling. This combination is helpful for younger readers because, "Comics can help younger struggling readers, or those of any age learn English, by combining pictures and words, giving visual cues as to what the text is explaining" (Branscum and Sharma 431). When children view the images in comic books the deductive process that they employ to determine the meaning of the images and the information being transmitted by those images is the same process by which they determine the meaning of the written word:

> Visual literacy is exactly the same kind of process as what you need to do to be able to make sense out of words. You use inference, you use deductions, you make connections in your head you predict the future you empathize with the characters. All of those things are what reading is. Reading is not phonic; it's actually constructing a story in your head. (Bringelson and Glass 23)

It is in this way that comics can be used as the first steps in a child's development of their literacy skills and abilities. Image forward graphic novels like the *Noodleheads* series by Tedd Arnold offer a great opportunity for young readers to practice developing the deductive process that they will utilize when moving on to

more advanced reading material. Because "The first things the youngest readers often look to when connecting letters, words, and narrative are the accompanying pictures…Clear, well-honed imagery can even allow these readers to expand the complexity of the narratives they tackle" (Karp 1). A more simplistic series like the *Noodleheads* can thus serve as a gateway to more complex comics and other reading materials.

In addition to providing an opportunity for children to pair words with pictures (a benefit which can just as easily be accomplished by providing early readers with picture books), the seamlessly integrated nature of text and image in comic books, as well as the left-to-right sequential nature of their stories, provides a benefit for early learners that picture books and novels with illustrations do not. The tendency for comic panels and pages to be set up in this very formulaic left-to-right sequence is critical to aiding with the development of reading skills, "Although we are conditioned to read from left to right, early readers are still getting this training. With a left-to-right sequence (the action and order of the word balloons within the panel) within a left-to-right sequence (the order of the panels themselves), a comic book reinforces sequences like nothing else" (Karp 1). Furthermore, the use of word balloons and narrative boxes, combined with the visual nature of the comic book, forces readers to critically think and analyze the information that is being presented to them, "Readers must learn to identify the differences between pragmatic features – the particular shapes of word balloons signifying characters' utterances versus the meaning of visual cue; speed lines to indicate motion; and how the content of panels help readers understand the larger story" (Rapp 64).

The inclusion of these elements (which are not present in many traditional educational reading materials) provides many benefits, including offering an "appealing way for students to analyze literary conventions, character development, dialogue, satire, and language structures as well as develop writing and research skills" (Schwarz 58). More importantly, "they offer a new kind of text for the classroom, and they demand new reading abilities" (Schwarz 63) making them potentially better suited for the modern student who increasingly require fluency in multiple literacies to succeed in a world which no longer relies purely on text-based communication.

Comics and Vocabulary Development. In addition to helping advance the development of general literacy skills, comic books can also expose children to a wide range of new and high-level words and concepts. This exposure in turn

assists with the overall development of their total vocabulary. Furthermore, studies have found that on average comic books contain greater rates of higher-level words and concepts then the average children's book and, "five times as many than the average conversation between a child and adult […] If a child read one comic book a day, over the course of a year they would be exposed to approximately 500, 000 words, which is half the average reading volume of most middle school children" (Branscum and Sharma 431). This statistic is of particular importance, as it helps to refute the stereotype of comic books as glorified picture books. In reality, the images in these stories are only half of their content, and the narrative aspects of these stories can range from simple to quite complex.

The use of comic books to build reading and vocabulary is further supported by studies of interventions which used comics books as an educational tool in elementary education. One such intervention found that the incorporation of graphic novels into a Tier 2 Response to Intervention (RTI) program for struggling elementary aged readers helped participants in the program to develop a multitude of word recognition, vocabulary, and reading skills, and ultimately resulted in increased progress for student' fluency as measured by DIBELS (Smetana and Grishman).

In the study, students who lacked substantive prior experience with print and had a vocabulary that was restricted to Tier 1 words (words that are found in spoken vocabulary) were placed into an intervention program that provided graphic novels to support the traditional materials of the program. As the study progressed students were then given graphic novels to use in a less structured manner to support their learning. Prior to engaging in the program, the students involved in the experiment were reading between 75 and 83 words per minute as measured on the DIBELS passages. Following their participation in the program with the use of graphic novels, students' scores increased on average by 25 words per minute, and their fluency rates increased by 15 percentiles (Smetana and Grishman 195).

Students in the program also noticeably started to incorporate some of the vocabulary they had read in the graphic novels into their own work, as well as added visual elements, text, and sketches into their essays. This observation is important because it shows that students were using the format that they had witnessed in the graphic novels a method of translating their thoughts and ideas into written language, which in turn helped them to further develop their reading skills. The teachers also observed, "that students were also completing a larger

percentage of their classroom reading assignments. They were able to more rapidly decode multisyllabic words and they recognized the need for an authors' choice of words" (Smetana and Grishman 196).

The Benefit of Serialized Storytelling. Another major benefit that comics offer as an educational tool is their ability to help develop critical thinking skills due to the serial nature of the medium. Because a variety of different comic formats (including TPBs, OGNs, and single-issues) tell continuous stories which are spread across multiple issues or volumes, "To comprehend such events, students must consider how stories are going to advance in ways that single-volume texts normally ignore or avoid" (Rapp 64). Unlike many other text-based mediums, which usually end after a few stories at most, many comics present stories and characters which have gone on for decades, providing educators with literally thousands of issues to use in the classroom. Not only does this encourage children to continue to engage with the medium, but it also gives students a chance to "to evaluate cultural context, story innovations, character development and so on. These are complex literacy practices that complement traditional classroom activities" (Rapp 65). Furthermore, while even long running literary series like *The Hardy Boys* or *Harry Potter* eventually come to an end, because comic book characters are not reliant on a single author or even a single series, educators can be fairly confident that these characters will continue to grow and develop for years to come.

Another added benefit of the serialized nature of comics is that publishers can take characters and story arcs and adapt them to suit a variety of different ages and reading levels. The ability for students to engage with characters and interconnected storylines across a multitude of reading levels, is a truly unique one, and could with planning, be used to great effect when developing multigrade reading plans. For example, rather than introducing students to disparate reading material as they move from grade to grade, schools can incorporate comics across multiple grades and levels of reading, meaning that as students progress in their studies, the characters they are reading about will progress with them, serving as a constant source of engagement and interest. For example, young readers could be introduced early in their education to the *Tiny Titans* comic series which was produced by DC Comics to introduce elementary school aged readers (typically grades 1-3) to the Teen Titans superhero group. When students move on to grades 4-5, they can be introduced to more challenging graphic novels like *Batman and Robin and Howard* which features several characters from the *Tiny Titans* series.

Readers in grades 6-7 can start to read DC Comic's *Lil Gotham* series which features the main characters in the DC Universe in an art style which will appeal to children of this age. *Lil Gotham* serves as an excellent bridge for readers from the more simplistic stories in *Tiny Titans* and *Batman and Robin and Howard* to DC's line of young adult comics like *The Lost Caravel: A Dick Grayson Graphic Novel* and *Gotham High* and which are excellent sources of reading material for students in grades 7-9 and 10-11 respectively. This reading development plan can even be continued into high school if so desired, as educators can now introduce students to DC's main line of superhero titles. Through this approach students are introduced to characters like Batman and Robin as beginning readers and continue to read stories about them which develop in complexity and difficulty as their reading skills progress. While the above example uses superhero comics as an example, there are several different comic lines which can be used in this approach.

The Benefits of Creating Comic Books

The educational benefits of that comics can offer are not limited solely to the skills and tools that young readers can develop from reading these stories. The creation of comics can also offer several educational benefits. Because comic books are a popular and easily accessible medium, when students are "Given the opportunity to create and share their own comic books, students engage in greater literacy exploration than they otherwise would" (Morrison et al. 759). Creating comics allows students to be more creative in their writing and storytelling and engages them in a more holistic learning approach (Morrison et al.). Furthermore, when designing comics students can build both their linguistic intelligence and their visual spatial intelligence (Morrison et al.; Gardner).

Creating comics also helps students to build their instruction skills and develop comprehension strategies as they must, "determine what is most important from their readings, to rephrase it succinctly, and then organize it logically" (Morrison et al. 760). Students must also exercise their research skills when they are designing a comic book. When tasked with creating a comic book or graphic novel students must gather information for the story, and then identify what pieces of information are most important to the story so that they can then, "present this information in a visual manner that both informs and entertains" (Morrison et al. 760). While the idea of asking students to create their own literary

works is by no means a new or original idea, because of the unique combination of text and image that is required of a comic, using this medium for these types of exercises provides many additional educational benefits.

Notable Interventions and Findings. There are several notable projects which have sought to examine and quantify the impact that creating comics can have as an educational tool. One of the first of these programs was the Comic Book Project, which was created by a faculty member at Colombia University's Teachers College and focused on students who attended high need schools that lacked the supplies and resources needed to provide art instruction. The goal of the program was to provide students with the opportunity to, "plan, write, design, and produce original comic books based on themes that connect to their everyday lives" (Sloan 1). A key outcome from this program was that it showed that having children work as a group to create a comic book not only taught them artistic skills, but also helped them how to develop valuable problem solving and compromising skills. Furthermore, the project also helped the children to develop their language arts skills, as the creators of the project, "observed students who were struggling to keep up in their language arts classes pour over each sentence of their stories, continually refining punctuation syntax, tone, and grammar" (Sloan 2). Through the combination of learning and play, this program provided students an opportunity to develop their language arts and writing skills in a non-traditional setting, which ultimately helped the program to succeed and achieve the desired learning outcomes as the students did not feel as confined or restricted as they did in a more traditional academic setting.

The Comic Book Project is by no means the only program to use comic book creation as an educational tool. Nancy Frey and Douglas Fisher took this concept in a related direction by focusing mainly on using comic books as a language and writing development tool. Frey and Fisher had members of the class read excerpts of Will Eisner's graphic novel, *New York: The Big City* together and then discuss the word choice and vocabulary that was used in the excerpt. Students were then given excerpts from graphic novels as writing prompts and were told to develop endings for the story. As the study progressed, the researchers were able to identify tangible growth in the student's writing abilities by measuring the increased use of complex sentences and multiple ideas within the students' writing over time (Sloan).

At the end of the program the researchers concluded that using comic books and graphic novels as part of writing exercises "provided a visual vocabulary of

sorts for scaffolding writing techniques, particularly dialogue, tone, and mood" (Sloan 3). Most importantly, the educators noted that their "students became not only better writers but also more knowledgeable consumers of ideas and information" (Sloan 3). They concluded that using comics as an educational tool, "can engage students in learning across content areas, particularly when projects allow students to illustrate their own lives or see communities from a different perspective" (Sloan 7).

A Suggestion for Future Studies. While these programs share many similarities, there are two key differences between the programs which could serve as the basis for another approach to using the creation of comics as an educational tool. The Comic Book Project had students create a comic book based on their own ideas and interests, which does not necessarily require the students to read and then build onto an existing comic. Frey and Fischer's program required students to read comics and extrapolate what they read to formulate potential endings and new chapters but did not require the students to work in groups or create an actual comic depicting their ending.

While both programs were effective, it does raise the question, if could they be even more effective when combined? In this type of program students would be given a series of comics or a graphic novel to read as a group and then be provided with the assignment to create a follow up comic or sequel graphic novel to what they had read. This approach would theoretically allow students to develop their reading and literacy skills by reading comics, their teamwork, problem solving, and visual literacy skills by working as a group create to create their own comic, and their critical thinking and writing skills by having to create a narrative and story based off the comics they had read which makes narrative sense. Furthermore, this approach would allow educators to take advantage of the serialized nature of comics as there are numerous storylines and characters for them to have their students develop and try to fit into the larger existing narrative world. At the same time, this approach continues to allow educators to take advantage of their students' preexisting interest and engagement in the source material (which as we noted is a key benefit of using comics in the educational realm) and reaps the rewards of providing students with the opportunity to engage in the learning process in a non-traditional and "fun" manner.

Comics as an Educational Tool for Non-Native Speakers

One of the major benefits of comics is their ability to achieve a variety of educational goals. In addition to being able to help with the development of critical reading and writing skills, comics also have great potential to serve a key tool for teaching non-native speakers the English language. While this is still a developing use of the medium, educators who have started to use comics in this manner have found them to a versatile and effective tool.

In one successful case study using this approach, a teacher working with a class of English Language Learners (ELL) used comics books like the Hulk and Spider-Man as the texts in her English as a Second Language (ESL) literacy workshops. Spider-Man comics were used to teach students how to recognize the central problem of a narrative story and how these problems are then resolved later in the story, while comic books featuring the characters like the Hulk and Wild Girl were used to draw "attention to the gendered representations of the characters within the comics" (Ranker 299) and thus develop student's critical media literacy skills.

A major benefit of using comics (as opposed to other texts) to teach ESL students is that it allows educators to take advantage of the combination of text and images that make up comics. The images in comics serve as critical representations of the dialogue and story, which is hyper important when teaching non-native speakers because, "When second/additional language learners do not have the relevant target language readily available for comprehension, nonverbal cues to meaning are invaluable" (Ranker 304). The images in comic books serve as sources of these nonverbal cues for their readers and can be a major benefit for students as they try to decipher what they are reading, since they add meaning to the text through visual representation (Levie and Lentz; Tang). The contextual information that the images in comics provide to the stories that English-Language learners are trying to decipher can help these learners with their understanding of the English language and how to use it (Hornberger and Skilton-Sylvester).

The popularity of comic books, as well their potential to present diverse identities also works in their favor as a tool for English-language learners. Just as native English-speaking students benefit from the use of comic books because they find them to be an engaging and interesting tool, "For ELL students, their increased engagement can facilitate their entry and apprenticeship into important social networks that amplify opportunities for academic success in mainstream classes" (Chun 144).

Chun points to the graphic novel *Maus: A Survivors Tale* as a prime example of how comics can create more engagement with ELL students because it provides, "intellectually engaging content realized through its visual narrative strategies of representing history" (147). With its interesting story and captivating images, *Maus* can capture student's attention and imagination. The multilingual nature of the characters in this graphic novel can also help ELL students to connect with story, and need for the characters in the story to wear masks of different animals to remain undetected often strikes home with these students, as "This visual metaphor of the need for people to adopt different guises in daily interactions with people will be noted by students who are learning how to navigate in a new society" (Chun 149).

One of the major benefits of comics are the numerous topics which they cover, meaning educators can tailor their lessons to the interests of their students to ensure optimal chances of educational success, rather than a using a standard text for every class. While *Maus* is a great example of how a graphic novel can be used to assist with the development of the language and literary skills of non-native English speakers, it is just one of many potential options. For example, because the subject matter that *Maus* deals with (World War II and the Holocaust) is fairly serious and mature in nature, it may not be the best tool for younger ESL students. However, a collection of *Calvin and Hobbes* comic strips on the other hand would be ideally suited for younger readers. Because the series originates as a comic strip it is easily digestible for beginning learners, and since the main character (Calvin) is elementary school aged, many of his experiences and adventures will likely be relatable to students of that age which in turn can help with their language comprehension skills. G. Willow Wilson's *Ms. Marvel* comic series is another great option for ESL students as the titular character's struggles with her heritage, religion, new superpowers, and teenage life will likely resonate with many ESL students who may feel overwhelmed or out of place at times when trying to learn a new language and new cultural aspects.

Other Potential Educational Uses

One of the major benefits of using comics in the educational realm is how versatile they can be when it comes to promoting knowledge and growth. While we have mainly focused on how comics can be used to teach children various reading, writing, and language skills, it is important to note that one of the reasons

that we believe that comics should be integrated into teaching practices is because they have the potential to serve a variety of topics.

Comics and Health Education. One such avenue is the potential for comics to be used as a tool to promote health education. This is not a new idea in the United States, as the U.S. government has used comic books as a health promotion tool several times over the past century (Branscum and Sharma). These instances include incorporating anti-drug messaging into single issues comics in the 1970s at the behest of President Nixon, and the Environmental Protection Agency's recent develop of comic books whose storylines and content are centered around promoting pesticide safety (Branscum and Sharma).

In addition to these more broad-based government efforts, several non-governmental organizations have also sought to use comics as a tool to transmit health related knowledge and information to the younger generation. In 2000, a group of Chinese researchers developed a comic book geared towards 4th grade children in rural areas who were especially susceptible to contracting schistosomiasis (a parasitic disease) from infected freshwater. The researchers found that the "4th grade children from five villages receiving the video and comic book had significantly more knowledge on schistosomiasis prevention" (Branscum and Sharma 434). Furthermore, the students who read the comic also reported an increased use of safe water. (Branscum and Sharma; Yuan et al.) highlighting the effectiveness of the medium as an educational tool.

The World Health Organization (WHO) took a similar approach when seeking to combat an outbreak of Lymphatic Filariasis (LF) in the Nile Delta region. The WHO, in conjunction with the Egyptian Health Ministry, developed a comic book designed to increase awareness about the drug used to treat the disease and to decrease fear and stigmatization of the disease and its' treatment (Branscum and Sharama; El Setouhy and Rio). The comic book was distributed to 2nd and 3rd grade children, and the researchers found that:

> After reading the comic, children significantly reduced their fear that LF is
> a killer disease, increased knowledge on targeted aspects of LP, increased
> positive attitudes towards LF patients, and fewer children reported they
> would avoid an LF patient. (Branscum and Sharama 435)

While studies examining the use of comics in health education remain limited, the interventions which have been conducted thus far seem to indicate great potential for their use as a health education tool for children, and certainly warrant further

exploration into how they could be adopted and use in elementary, middle school, and even high school health classes.

Comics and STEM Education. There also exists great potential for comics to be used as an educational tool in the STEM fields. One major benefit that comic can offer in STEM education is that they draw on many common tools already used in this field. First and foremost is their use of pictures and images, as illustrations have long played a major role in science textbooks and education (Farinella). Many traditional texts in these courses contain illustrations and visual diagrams which require students to have a high-level of existing knowledge to understand the information being presented, which can make them less accessible to students who are not as proficient with the subject matter. Comics offer a potential solution to this learning barrier because while they use a combination of words and pictures to convey information to the reader like traditional scientific graphics and images, they "also divide the information into panels (McCloud, 1994) which can facilitate the reading experience and highlight important information such as parts and processes" (Farinella 5). Comics also have the added benefit of being able to be arranged in numerous ways to convey information. This allows them to be organized in a traditional linear manner to convey information, and in non-linear ways, which is very similar to how, "science often requires readers to make connections between multiple scales and domains of knowledge, not necessarily arranged in a hierarchical, linear order" (Farinella 6).

Beyond the structural elements of comics which lend them to being an effective tool for scientific education, their heavy use of metaphors (both visual and text based) also makes them uniquely suited for this area of education. Metaphors have long been useful in guiding scientific research and education because, "when writing about science for a general audience,

metaphors can be useful to establish a common ground and allow readers to use their own domains of knowledge to approach new abstract concepts" (Farinella 8). As a fundamentally metaphorical medium, comics deliver narratives which seamlessly combine information and metaphors to the reader in a fully cohesive manner (Wolk). This presents an opportunity in science communication to use this medium to map "abstract scientific concepts on to everyday objects and experiences, helping the public to engage with the material at a more personal level" (Farinella 8), including when developing educational scientific materials for younger students. The potential for this medium to be used in this field

certainly is an exciting idea, and one that deserves more exploration in future studies.

Conclusion

Despite some opposition to the use of comics in schools, this medium possesses great potential as an educational tool and can be incredibly beneficial for educators. There is a growing body of successful studies and interventions which highlight the numerous ways in which comics can be used in children's education, and it fair to say that the true potential of this medium remains untapped to date.

A key benefit of this medium as a tool for advancing literacy and critical thinking skills lies in the way comics combine images and text to tell a narrative story. Unlike many of the traditional tools used to develop literacy, vocabulary, and other educational skills, comics provide multiple sources of information to convey meaning. This combination of text and image provides both native and non-native English-speaking students with multiples sources of information to decipher the messages and content of the "text" which they are learning from, and thus can be more effective than traditional educational approaches. The multimodal nature of this medium also makes comics especially well-suited for the modern learner who increasingly needs to be able to fluent in multiple forms of communication. The use of this medium as an educational tool is further strengthened by its variety, as comics can serve readers of numerous reading levels and diverse interests. Table 1 provides a compiled list of the comics noted previously in this body of work which helps to reinforce this point, as these are but a mere sampling of what the medium has to offer.

Furthermore, using comics as educational tool has been found to generate increased student engagement by taking advantage of their preexisting interest in the stories and characters. Because comics are still considered a non-traditional tool for education, they also do not carry the stigma attached to some traditional tools, i.e., the "boring old textbook", and can create greater levels of excitement amongst students when they are used to supplement or replace these more traditional learning apparatuses.

The use of comics as reading materials and the creation of comic books as an educational activity have both been found to be beneficial in an educational setting. These benefits include helping to increase the literacy rates and vocabulary levels, as well as assisting with the development of critical thinking

and artistic skills. Comic books have also been found to be an effective tool in helping ELL students to develop their abilities to read, write, and comprehend English. Here again, the incorporation of images in these stories provides valuable contextual information for these readers. Also, due to the incredibly diverse nature of the medium and the stories told within these them, comics provide the opportunity for ELL students to learn using stories which relate closely to their backgrounds and personal experiences.

Another major benefit of using comics as an educational tool lies in their versatility. Not only can comics help to develop literacy and reading skills, but they have also been found to be a very effective tool for conveying health information to children. Comics have also shown great potential as a science education tool and could provide a solution to some of the challenges currently facing teachers seeking to increase student interest and engagement in STEM related subjects.

Comic	Grade Level	Topic Matter
Noodleheads	1-2	Humorous stories of twin noodle brothers who get into misadventures and shenanigans
Tiny Titans	1-3	Tells of the adventures of the superhero team the Teen Titans which is composed of the sidekicks of famous DC Comics superheroes
Owly	K-5	Focuses on the good deeds of the titular character and his friends
El Deafo	2-5	Memoir focusing on the author's experience losing her hearing as a child
Batman and Robin and Howard	4-6	Damien Wayne (Robin) gets sent to a new school where he learns the value of teamwork and friendship
Archie Comics	4-7	Variety of adventures of teenager Archie and his friends
The Essential Calvin and Hobbes: A Calvin and Hobbes Treasury	4+	A collection of comic strips depicting the real and imaged adventure of a young child (Calvin) and his best friend a stuffed tiger (Hobbes)
The Lost Carnival: A Dick Grayson Graphic Novel	7-9	A story of magic and young love centered around future superhero Dick Grayson during his time as a carnival performer
Spider-Man: Miles Morales Vol 1	7-10	Follows the adventures of the teenage superhero Miles Morales as he battles crimes as the new Spider-Man
Ms. Marvel Vol. 1: No Normal	9-12	Introduces a new Marvel character (Kamal Khan), a Muslim teenager who must learn how to navigate being a superhero when she is unexpectedly given extraordinary powers
Gotham High	10-11	A reimaging of iconic Batman heroes and villains as high school students at Gotham High School
Will Eisner's New York: Life in the Big City	10-12	Contains a series of short stories encapsuling a variety of aspects of life in New York City

Table 1. Suggested Comics for Educational Use Identified with Corresponding

Grade Level and Topic Matter[1]

Comics have proven to be an enduringly popular form of entertainment for people of all ages. While these stories continue to be valuable source of leisure reading and enjoyment for younger readers, they also have the potential to be a valuable educational tool as well. As popular culture studies theorist Ray Browne notes, popular culture is the likes, dislikes, habits and attitudes of society, and helps to democratize society (Browne, 1997). Incorporating comics into educational curriculum speaks directly to this idea of taking something that is of great value and interest to the public and integrating it into one of the formalized structures of society (i.e., the educational systems) thus helping to contribute to the democratization of information, communication, and learning. Current research on their use in this manner provides both theoretical and practical support to this claim. However, the existing research on this subject is more limited than is ideal. This lack of exploration may be attributed to several factors, including a possible lack of awareness of their potential in the educational realm. With that in mind, the need for further exploration of their use in this manner is well warranted. The potential that has been demonstrated by comic books as an educational tool is incredibly exciting, and should future research support the findings of the studies highlighted in this body of work, could offer teachers another incredibly effective and versatile tool moving forward.

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[1] Grade levels are based on recommendations from Scholastic Teacher's catalog and Amazon book guides.

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