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Cover Page Footnote

I want to thank Mr. Brian Fies for his book Mom's Cancer and authorizing the use of images from his book for the manuscript. A special thanks to Ms Rosemary Brown, Rajesh Nayak, PhD, Caroline Fuchs, MA, Ms Sherri Alarcon, Claire Kolar, PharmD, Kristin Janke, PhD and the anonymous reviewers for their constructive feedback and comments on the earlier version of this manuscript.

An Overview of Comic Books as an Educational Tool and Implications for Pharmacy

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ABSTRACT

Objective: To present an overview of comic books as an educational tool and discuss the use of comic books in pharmacy education.

Literature Identification: This research is comprised of a narrative literature review and critical analysis of the information retrieved. Key words included: comic(s), graphic novels, and pharmacy education. News articles, dissertations, theses, books, and scholarly articles from peer reviewed journals were selected and reviewed for inclusion in this article.

Results: Comics have been used as a pedagogical tool to motivate students to read, help them remember the content, and make the whole learning process fun. They have been used as supplemental readings in biochemistry, physics, and business ethics. Comic books have been used in educating patients about the challenges of dialysis, promoting health, and informing consumers about diseases such as AIDS and cancer.

Conclusion: In today's media rich environment, comic books could be a visually interactive and innovative educational tool. Pharmacy faculty could use comic books or graphic novels as stand-alone texts or as part of a larger curriculum. Comic books could help students learn pharmacy-relevant content while enjoying the reading.

Keywords: Comic(s), graphic novels, education, pharmacy, graphic medicine.

INTRODUCTION

In many cases, an instructor's teaching effectiveness and the student's learning depend on the medium of communication employed by the instructor. Visuals and text have been the two major media used as instructional aides in courses. The usage of these media has been backed by an abundant amount of research supporting the contention that presenting visuals and text together positively affects student learning.¹ Compared to information presented in a non-illustrated text, coupling of visual information with verbal explanations has been found to positively influence students reading performance,³ information retention ability,² and creative problem solving skills.^{1,4}

One of the most popular, yet underused, forms of media combining visual images with text is comics. Comic books, often called "comics" for short, are diverse in content, genre, appearance, and the reading audience as any other type of medium. Although "comics" refers to the medium itself and not a specific object such as "comic books" or "comic strips", the two words (i.e., comics and comic books) are used interchangeably by individuals who use this medium or read

these books.⁵ Nevertheless, comic books appeal to a wider audience across all age and ethnic groups because they employ an everyday language that is almost universally understood and can be concurrently instructive and entertaining.⁵ A sophisticated yet simple use of visuals and text in comic books in generating a clear narrative for the information to be presented gives comics the potential to go beyond the traditional textbook for teaching and learning.

Scholarly articles assessing the use of comic books as a pedagogical tool have found they engage students in the topic being covered, motivate them to read, help them remember content, and make the whole learning process fun.⁶⁻⁸ Before pharmacy educators decide to use this medium in their classes, it is important for them to have background information on the definition of comic books, their strengths and weaknesses, and how have they been used successfully in other fields such as science, education, and business. The purpose of this article is to present an overview of comic books as an educational tool. Specific objectives of this paper include providing an overview of the: (1) definitions and characteristics of comics; (2) history of comic books and the rise of the term "graphic novels"; (3) use of comic books in other disciplines such as education, business, and basic sciences; (4) use of comic books in medicine; and (5) discuss the use of comics books in pharmacy education.

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LITERATURE IDENTIFICATION

This research consists of a narrative literature review and critical analysis of the information retrieved. Search criteria were limited to English language and human studies. Keywords used for the search included comic(s), comix, pictures, graphic novels, education, medicine, graphic medicine, science. Data sources searched included indices such as Academic Search Premier, PubMed, Business Source Premier, Communication and Mass Media, and Google Scholar. A variety of sources such as news articles, dissertations, theses, books (e.g. *Understanding Comics* by Scott McCloud, *Mom's Cancer* by Brian Fies) on the topic of comics, graphic novels, and scholarly articles pertaining to comics from academic journals, such as *Journal of Educational Sociology*, the *Journal of Aesthetics and Arts Criticism*, and *Journal of Graphic Novels and Comics* were selected and reviewed for inclusion in this article. Data extraction was done by the author.

RESULTS

Comics – Definitions and Characteristics

Comics are an art that is generally visible in daily and weekly newspapers, and provides ideas for movies and television programs. Proponents of comics have supported their use as a medium to cover a variety of topics, as an aid in vocabulary-building, and as motivational materials in increasing the interest in reading. However, the lack of a precise definition of the word “comics” is one of the reasons for comics being misunderstood and underutilized especially in academic setting.⁹⁻¹¹

Often people think about comics as colorful magazines filled with superheroes and their adventures.⁵ This narrow understanding of the word “comics” has provided an opportunity for opponents of comics to vilify the medium as a stumbling block to literacy and stereotype it as being “kiddie fare” (something that kids like when they are young).^{5,10} The opponents of comics consider comic books as a cheap form of entertainment for children and degenerate teens, a medium that impedes reading comprehension, destroys innovativeness and imagination, and causes eyestrain.¹⁰

A typical comic book is a colorful or black and white book with images and words (either typed or handwritten) in boxes or balloons. These images and words are arranged in a sequence of panels with usually a gap between the panels, also known as gutter (*information on “gutter” is discussed later in this article*). Attempts to define “comics” have resulted in literature consisting of a mix of theoretical debates about sequencing of pictures, the narrative, image, text, genre, and art as well as its relation to other genres, such as television, films, and children’s literature.¹¹⁻¹⁴ Will Eisner, defined comics as “sequential art”.¹⁵ McCloud expanded this definition to make it more specific to the

characteristics of comics, “juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or produce an aesthetic response in the viewer”.⁵

The term “graphic novel” is used interchangeably with “comics”. Graphic novels (*which are discussed later in this article*) are book-length comic books which are meant to be read as one story and include content targeted towards a more mature audience.¹⁶⁻¹⁷ Some have argued graphic novel writers use the medium of comics to discuss more serious topics. For example, graphic novel have been used to discuss the topic of cancer, AIDS, and healthcare reform.¹⁸⁻²⁰

A review article on the use of comic books in science education provides a definition for a genre of comic books available to communicate science.²¹ This genre of comic books is labeled as “*science comics*: comics with one of the main aims to communicate science or to educate the reader about a non-fictional, scientific concept or theme, even if this means using fictional techniques and narratives to convey the non-fictional information.”²¹

The term comic is understood and has been adopted or adapted into languages other than English including: bande dessinée, a neutral phrase in French for “designed strip”; historieta, in Spanish for “little story”; fumetti, in Italian, likening the balloons to “little puffs of smoke”; manga in Japan, a term composed of two ideograms; “man” (meaning ‘executed rapidly, thrown off’) and “ga” (meaning drawing). In Korea it is manhwa and in China they call it manhua.²²⁻²³

Characteristics of Comics

Irrespective of the debates over the definition of comics, there are certain characteristics of comics that are unique to this medium and are agreed upon by experts in this form of art. These characteristics include:

Narrative: Comics are mostly a narrative medium.²⁴ The narrative is either humorous or serious in context and is presented in the form of pictures and text, either of which are quite satisfactory without the other.¹⁴ It is the interdependence of the visuals and text that is comics most distinguishing characteristic.¹⁴ The narratives are essentially pictorial in nature and typically involve a dominance of visuals over the textual information.¹¹ The level of abstractness of the visuals varies between real-life pictures to cartoon images. A unique feature of visuals in comics is even though images get abstract through cartooning, the details of the textual information to be presented still remain the same.⁵ By combining visuals and text, comic books bridge the gap between the media we watch and media we read. It helps readers put a human face on a given subject and build an

emotional connection between readers and characters in the comic book story.⁷

Panels: Narrative in comics is presented to the reader in a sequence of frames or panels. Panels in a comic book act as a sort of general indicator of time or space being divided.⁵ Information found in panels is of four different types: word balloon (the speech or thoughts of the character in the story are presented within the panel); box or caption outside the panel (this sort of information does not convey dialogue, but serves as narration - it is the voice of whoever is telling the story); sound effects (usually occur inside the panel and reflect visually the sound being portrayed); and pictures of words within a panel (when, for example, a street sign or book is depicted).²⁴⁻²⁵ McCloud's book titled *"Understanding Comics: The Invisible Art"* provides detailed explanation on the types of panels and the categorization in panel-to-panel transitions in comics.⁵

Juxtaposition of Panels: An important characteristic of panels in comics is the spatial arrangement of the panels in this medium, which differentiates comics from other forms of media, such as television and films, in which the panels are sequential in time.⁵ That is, in comics, panels are placed next to each other in a way that is spatial, not temporal. Because of this spatial arrangement, readers have control over how the narrative is presented and how it is processed and understood.^{13, 26} Language and visuals in films and animation are time-bound. Whereas, while reading comics, time progresses at the pace of a reader.²⁷ This strength of comics is also termed as "visual permanence" i.e., the reader is able to stop, return to the panel he read, continue from the same panel where he stopped, and jump to the panels on the next page. Space does for comics what time does for films.²⁶⁻²⁷ Time progresses only as quickly as the eyes of the reader move across the page.

Gutter and Closure: Comic books include interplay of visuals and text presented in panels juxtaposed throughout the pages of the medium. The space between the panels is at the very heart of comics. This space between the panels in comic books is called "the gutter."⁵ Reading a comic book requires an active, though largely subconscious, participation on the part of the reader because it is between two panels that the synthesis of information occurs.⁷ The reader's imagination combines the visuals and text in the adjacent panels and transforms them into one single idea. This process of observing the parts in the panel, but perceiving the whole, is what McCloud terms as "closure."⁵

Figure 1, from Brian Fies's book titled *"Mom's Cancer,"* helps illustrate the idea of "gutter closure," and readers' active participation in the information presented. In Figure 1, Panel 3 shows a woman saying "Pull over." Panel 4 provides visual

representation of a sound "slam." In the space between the panels the reader assumes the person who said "pull over" got out of the car and closed the door very hard. Although the reader is not the one closing the door, the words in the second panel decide how hard the door was closed. In the experience of comics, the reader gets a better and full understanding of the narrative by engaging in the activity of closure, which is achieved by filling the gutter between the panels.¹³

History of Comic Books and Rise of the Term "Graphic Novels"

The roots of comics can be dated back to the graphic storytelling of ancient cave paintings and Egyptian hieroglyphics.⁵ Some researchers claim the Bayeux Tapestry traces an early form of comic strips.^{11, 22} In the United States the history of contemporary comics started with Richard Outcault's single panel cartoon - *The Yellow Kid*.^{16, 22} *The Yellow Kid* became popular by attracting new readers, increasing readership, and increasing the sales of newspapers.²⁸

It was the publication of Action Comics #1 in 1938, introducing a new hero, *Superman* (a fictional character created by Jerry Siegel and Joe Shuster), which caused the medium of comics to explode.¹⁶ Superman was followed by a number of patriotic superheroes, such as *Batman*, *Captain America*, and *Wonder Woman*. During World War II, the United States military supplied the armed forces with comic books as entertainment and to increase patriotism among soldiers by showing "Captain America punching Hitler in the face."^{16, 28} Until World War II, superheroes stories were popular because they included plenty of adventures. After the war, however, the impetus of the storylines in comic books fizzled because superheroes did not have any genuine enemy to fight. Historians writing about the history of comics agree the years 1930-1950 are considered as the "golden age" for the medium of comics.^{16, 28}

In the mid-1950s, the comic book scene changed dramatically. Entertainment Comics (EC Comics), formerly known Educational Comics, changed their focus from educational, children-oriented comics to stories about death and violence, and horror stories, such as *Tales from the Crypt*.¹⁶ The stories were "dark" and exposed teenagers to the world of divorced parents and corrupt politicians. This gave an opportunity for opponents of comic books to show the world comics had a bad influence on children.²⁷

In 1954, Fredric Wertham, a New York psychiatrist who had studied juvenile delinquency, published a controversial book about troubled American youth, *Seduction of the Innocent*.^{16, 27-28} He pinpointed the influence of comic books as a motivating factor in youthful disturbance. Comic books, he

believed, were too violent, too sexual, and too bloody. According to Dr. Wertham, comic books promoted racial stereotypes, homosexuality, and incited youthful aggression.²⁷ He noted comic books were found in the rooms of teen suicides and argued the medium would ruin an adolescent's taste for fine literature. What followed were hearings held on comic books and youth by the United States Senate. A new group, called the Comic Magazine Association of America was created and regulations governing acceptable comic book materials, also known as the Comics Code, were set up to control the negative aspects of comic books, such as presentation of crime, scary illustrations, and displays of sex, divorce, adultery, and nudity.²⁹

Wertham and his followers were successful in getting their message out that comic books were not good. Parental concerns over the content presented in the comic medium increased and sales of comic books began to drop. Major publishers of comic books, DC Comics (Detective Comics formerly known as National Periodical Publication) and Marvel Comics (formerly known as Timely Comics and as Atlas Comics), tried to recover from these years, but it was not until the 1980s that the comic book industry seemed interested in reconstructing the genre.

Rise of the Term "Graphic Novels"

The legacy of the 1954 investigation on the negative influences of comic books loomed even in the 70s-80s. Will Eisner, a veteran cartoonist, is credited with coining the term graphic novel. Eisner, in an interview with TIME magazine, told the reporter about how editors hesitated to publish comic books.³⁰ Eisner stated he devised this term as a marketing technique to increase the chances his comic format book might be published at Bantam Books. Bantam declined, but the term was permanently cemented into the lexicon.^{16, 30} Will Eisner's "*A Contract with God*," published in 1978, is generally considered the first graphic novel, though it was not actually the first long-form graphic story nor the first use of the phrase.³⁰ Nevertheless, Eisner's creation was viewed with renewed interest in the comic book industry.

The pressure on the image of graphic novels in society eased in 1992 when Art Spiegelman's book *Maus: A Survivor's Tale* became the first comic book to be awarded the Pulitzer Award.¹⁶ *Maus*, an extraordinarily complicated narrative of Spiegelman's father's Holocaust experience, was the most public example of a decades-long effort of individuals within the comics community toward publishing sophisticated, mature, rich, literate work.²⁷ *Maus* raised the bar for comic books. A flurry of articles appeared in news publications across the nation proclaiming comics had finally "grown up".²⁷

Graphic novels have increased in both popularity and sales in recent years.³⁰ Micha Hershman at Borders stated, "over the last four years graphic novels have shown the largest percentage of growth in sales over any other book category."³⁰ Nick Purpura, a manager at Jim Hanley's Universe, a comic store in New York City, also reported an annual increase in graphic novel sales.³⁰ The success of films such as Spiderman and X-Men has led to Hollywood directors seeking out other comic-related material.²⁷ As these trends increase the popularity of comic books is expected to grow, taking them back to their "Golden years."

Use of Comic Books in Education and Science

Educators have been using comics in the classroom for over 60 years, but with a mix of appraisals and criticisms from parents, educators, and society.^{6, 9, 31} In 1940's, an estimated 95% of all 8-14 year olds and 65% of 15-18 year olds read comic books.⁶ Comic books have been used as a resource in discipline-specific subjects, such as reading and in social studies for class activities, such as reading exercises and class discussions.³¹ The *Journal of Educational Sociology* devoted 1944's Volume 18, Issue 4 to the topic of comics in education. Instructors who have incorporated comics into their curricula have suggested they be used as supplemental materials to support the curriculum because comics generate increased student interest in the information,⁶ make learning easy,³¹ and motivate children to read.³²

However in 1950s, following the Wertham claims and the Comic Code Authority, criticisms on the educational values of comics increased. Critics of comic books opposed their use in education by saying "education is serious business and should not be approached through levity; comics make learning too easy."³¹ Opponents succeeded in publicly discrediting comic books and brought an end to the research and discussion of comic books as educational materials.^{27, 31} Comic books in education were considered as an unwelcome visitor and enemy of classroom education.³¹ It was not until the 1970's when teachers dared to use comic books again.²⁷

In 1977, Richard Campbell attempted to use comic books as an alternative to other materials in a reading program for fourth graders. Campbell and other teachers noted a positive change in children's interest in reading about their black heritage.³³ The teachers attributed this change to the use of comic books. English professor Rocco Versaci used comics to challenge students to critically examine the very definition of literature.⁷ He mentioned the use of comics energizes students in the respective classes, engages students in the information being presented, and builds their analytical and critical thinking skills.⁷ Gerde and Foster have used comic books in their classroom as a part of discussions on topics ranging from leadership and technology to discrimination and environmental issues.²³ They have argued comic books are a

legitimate literary form for study and could be used to communicate, discuss, and critique issues in business ethics and other social issues in management.²³ Short and Reeves present graphic novels as an attractive medium to communicate business concepts.¹⁷ The authors have explained how and why graphic novels are a useful tool to cover management concepts for business students.¹⁷

Slowly, comic books are finding their way into courses of American higher learning institutions. Today, educators at all levels are designing new ways of teaching through comics. Comics have been used to promote the understanding of science and have been applied in science classrooms to motivate students.^{21, 33} In a series of articles, Carter deals with topics in chemistry, which can be found in comic books.³⁴ Comic books, such as Robert Louis Stevenson's "Dr. Jekyll and Mr Hyde" and Walt Disney's comic stories on "Donald Duck and His Adventures," throughout their history have contained a surprising number of references and illustrations of chemical facts. These illustrations can serve as a basis for initiating a discussion on the various topics in chemistry.³⁴ Carter concludes that while teaching the topics in chemistry, references to comic books tend to generate a great deal of interest among students.³⁴

Keogh et al., use an approach called "concept cartoons".³⁵ In 1991, Keogh and Naylor created this innovative approach to teaching, learning, and assessment in science, mathematics, and English. Concept cartoons feature cartoon-style drawings showing different characters arguing about an everyday situation. They are designed to intrigue, provoke discussion and stimulate thinking among individuals interested in science.³⁵

University of Minnesota professor, James Kakalios, received media attention for his phenomenally popular introductory physics course "*Science in Comic Books*."³⁶ (<http://www.physicsofsuperheroes.com/>) Dr. Kakalios used comic books as a part of a module of an undergraduate physics course. He reported his students prefer comic book problems to oversimplified, out-of-context problems presented in traditional physics textbooks.³⁶ For example, it is more intriguing to determine the power and lift required for Superman to fly than to calculate the effect of friction on a moving block.^{23, 36}

Hosler and Boomer report data suggesting comic book stories can play a significant role in conveying content in a coherent manner and, in the process, improve the attitudes non-science majors have towards biology.⁸ Nagata used panels of manga (Japanese comics) to supplement explanations of biochemical terms and topics in biochemistry classes.³⁷ Their results showed the use of manga helped students learn. Just as other researchers have reported, Nagata found the use of

comics in biochemistry made the classes less serious and increased the number of students interested in the subject.³⁷ The literature concerning science education and science comics has recently been reviewed by Tatalovic.²¹ Tatalovic provides an overview of available comics that communicate science and can be efficiently used for promoting scientific literacy.²¹

Computer technology has changed drastically, enabling the birth of a new comic format. Marianthi and colleagues discuss and present the findings of their research on the new medium of digital comics.³⁸ Marianthi et al presented the concept of hypermedia comic books and the value of digital comics in education.³⁸ Comic creation software, such as the user-friendly "Comic Life," allow the design of digital comic books through dialogue and image-importing functionality, and by providing storage space and the ability to share the produced material. Web Comic Creator (WCC) is another tool for creating enriched hypermedia web comics developed for educative purposes.³⁸

Use of Comic Books in Medicine

Use of the medium of comics in medicine is not a new phenomenon. Depictions of doctors and medical situations in comics have a history several hundred years long.³⁹ Wright described how cartoons and comics have been used to communicate medical science over the past two centuries.³⁹ He examines the background and the appearance of anesthesia and pain-related topics in comics. In August 1946 an issue of *True Comics* included the story of William Morton and ether anesthesia.³⁹ Hansen mapped in great detail highly commercially successful comics dealing with real scientists and medical doctors in the 1940s in a celebratory manner.⁴⁰

McAllister, in his paper titled "*Comic Books and AIDS*," contributes to the literature on the use of comics in medicine by discussing the involvement of comic books in providing information about AIDS.⁴¹ McAllister provides reasons why the medium of comic books is relevant to providing AIDS education. He supports the use of comic books as a relevant medium for study by scholars interested in the sociology of AIDS. McAllister provides a comprehensive overview of comic books or comic book campaigns, such as *The Adventures of Bleachman*, *AIDS News*, and *Strip AIDS USA*, specifically designed to educate different audiences about AIDS.⁴¹

In the 1990s, the New York City Health Department developed a black and white comic strip series called *Decision* that followed characters dealing with HIV.⁴² The strips initially appeared in subway cars and then were compiled into comic book form for handout. When the third issue invited readers to suggest the next events in the evolving story, the health department was inundated with suggestions. *Decisions*, is

regarded as one of the most effective public health campaigns for informing people about AIDS.⁴²

The National Kidney Foundation has used graphic novel to educate patients about the challenges of dialysis.⁴³ In 2007, the National Kidney Foundation developed a graphic novella called "*Hope and Main*" for the dialysis community. *Hope and Main* was funded by a pharmaceutical company through a non-restricted educational grant.⁴³ The primary goal was to use the medium of comics to educate patients about dialysis issues.

Comics have been used for promoting health and the psychological means of coping with childhood diseases, such as cancer and diabetes, including Captain Chemo comics and Omega Boys vs Diabetes.^{44, 45} Publishing companies have produced comics with an aim to provide medical information in a format appropriate for children, such as Medikidz.²¹ The Medikidz are superheroes on a mission to help young people understand illness and medical concepts. Chi, Pump, Skinderella, Axon and Gastro take children on a journey through Mediland, an outerspace planet shaped just like the human body, to explain the diagnosis, investigation, treatment and prevention of different medical conditions (<http://www.medikidz.com/>).

There is growing evidence of healthcare professionals, especially those working in public health, with young people, or with non-native speakers, using graphic novels for patient care and education.⁴⁶ Graphic novels used in healthcare and illness narratives are labeled as "Graphic Pathographies."⁴⁶ It is being suggested these graphic pathographies can be helpful to patients and physicians to learn more about patients' illness and illness experiences by reading about similarly affected people in the community. In 2007, a group of academicians, healthcare providers, artists, and fans of comic books started an online community "Graphic Medicine" to explore the interaction between the medium of comics and the discourse of healthcare (www.graphicmedicine.org).

The Centers for Disease Control and Prevention (CDC) uses *KABAM! Comic Creator* for their program *BAM! Body and Mind* designed for children. *BAM! Body and Mind* gives children the information they need to make healthy lifestyle choices. The site focuses on topics that are important to kids, such as physical fitness, using kid-friendly lingo, games, quizzes, and other interactive features.⁴⁴ *KABAM* presents stories with dialogues and asks viewers to interact with the comic strip by asking for their opinion, which may influence the development of the story.⁴⁴ All these examples highlight the use of comic books as an effective tool in providing healthcare information to patients and providers.

DISCUSSION

Potency of visual aids in education has been well established through extensively published research. Evidence supports the contention that student learning is affected positively when text and illustrations are presented together.¹ A form of visual communication that combines both, visuals and text, is comics. Comic books combine content through the written word and artwork to create a narrative that appeals to readers not only artistically, but also informatively.

As reviewed in the earlier sections of this paper, comic books have been considered as a contemporary and engaging form of literature that tackles topics ranging from business ethics, social issues, environmental issues, to human healthcare experiences, beliefs, and concerns.^{7, 17, 23, 33} Although this is true, there is still resistance to the use of this genre as a pedagogical tool in some circles at the university level. Educators have lined up on both sides of the debate. Most of the resistance is because combination of text and images is considered fine for children's books, but not for college education where students are expected to read "real books." However, the above examples on the use of comic books in covering mature subject matter show their use as supplemental readings in academic settings. The potential of this untapped resource of education could translate well as an effective instructional method in pharmacy courses. The new set of pharmacy education guidelines are emphasizing patient-centered care through improving student understanding of illness and the related caring giving process.⁴⁷⁻⁴⁸ For students to develop into competent health professionals, it is vital for them to understand illness not only through the lens of a biomedical model, but also from a more holistic perspective of the patient, the point of view of family members, and, the vantage point of caregivers. Traditional, text-heavy books might fall short of conveying this message of meaning of illness and care. The comic medium, through a combination of pictures and words, helps "put a human face on a given subject" and appeals to readers' feelings beyond the traditional, objective meanings of the written text.⁷ The format helps students visualize a particular event, person, or place. A number of graphic narratives addressing patient's experience of illness, and family and caregiver burnout can be found in literature.⁴⁹ These memoirs serve as a window into the lives of our patients and their families, providing perspectives that are unlikely to be drawn from text alone. Pharmacy faculty could use these graphic novels as stand-alone texts or as part of a larger curriculum. Muzumdar used one such graphic novel titled *Mom's Cancer* to cover the dimensions of patient-centered care.⁵⁰ Student responses to the reading activity were overwhelmingly positive. The use of colors, brevity of the message, and the interplay of text and visuals in the comic format made students not only find a personal connection with the characters, but also made them

sympathize and empathize with the characters in their own unique ways. The comic format allowed for the integration of concepts, such as empathy, which otherwise may not have been possible through traditional text.

Students who select pharmacy as a major are generally interested in science and courses such as physiology, therapeutics, and pharmacology. It is no surprise that when these students take courses in the social aspects of pharmacy most of them might approach the topic with apprehension and others might show a marked disfavor and disinterest in the information covered. Comic books could be a “fresh” way of presenting the information which could encourage students to read the materials, understand it, and reflect upon it. Students recognize the basic form of comics, but including them in a course could catch students off guard in a positive way, and this distortion could lead students to become more energized and engaged in the given work.⁵⁰

Colleges and schools of pharmacy are responsible for cultivating behaviors related to professionalism, altruism, ethical principles, and attitudes.⁴⁷⁻⁴⁸ The literature in this area is extensive, but mostly theoretical. There has been an interest among academicians to find an effective way of conveying this information to students.⁵¹ Comic books have been used in graduate and undergraduate settings with success in conveying information on ethics and ethical dilemmas.²³ Comic books, such as *X-Men*, *Captain America*, *Captain Marvel*, and *Superman*, have been used in discussion to illustrate ethical dilemmas, ethical principles and, ethical reasoning when faced with complex social issues.²³ Integrating comic books into the classroom is an opportunity for students to identify ethical dilemmas and concepts. For instance, superheroes, such as Superman, illustrate the temptations of using their abilities for personal gain. Upon reading the comic books, students can discuss the characters and how they approached the ethical situation.

Many of today's pharmacy students (also known as Generation 'Y' i.e., children who were born between 1982 and 2003) were raised in an environment filled with interactive visual media. Creative advertising campaigns, iPhones, and video games are filled with images. Owing to ubiquitous visual media, pharmacy students might display less interest with unillustrated, text-heavy lengthy textbooks, and might come to expect to find similar interactive visual characteristics in their educational materials. The strength of comic books is the visual representation of the narrative. The physical form of comic books, which is largely pictorial with limited text, might create a harmony between the student's ongoing life activities and his learning experiences in school, motivating students to learn more about the information presented.

In addition, the format of comic books requires a reader to be involved in the story content and not just see the pictures. This encourages the readers' observational and critical thinking skills in analyzing the story. In fact, selected comic books have been used for story interpretation, character identification, situation analysis, and classroom discussion to enhance team-based learning.^{7, 31} Other benefits of using comic books in the classroom setting include their low cost, ease of portability, familiarity with the format, and use of a language that can be understood by all age groups and across ethnic groups.

The implementation of comic books in pharmacy courses is not without challenges. The first involves the instructor getting the appropriate comic book for the respective topic. The range of comic books is not enough to give a comprehensive coverage of all the topics in the pharmacy curriculum. The effective use of comic books as a supplemental reading depends on both the instructor (e.g. providing the purpose and intent of the reading) and students (e.g. willingness to try a non-traditional reading). The effectiveness of comics as an education tool may be limited, if readers are less likely to take information provided via this medium seriously.

CONCLUSION

Comic books or graphic novels are a creative way to teach and learn about illness, patient experiences, and other related topics. They are a largely untapped source that may be uniquely suited to Generation Y and helpful in cultivating behaviors related to patient-centeredness, professionalism, altruism, and ethics. Comics have value as an innovative tool in pharmacy courses and require further investigation on beneficial uses.

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Figure 1: Explanation of the terms "Closure" and "Gutter"



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