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More Than Panels

Leah Bechtold

Storytelling takes many different forms. From oral tales passed generationally to written biographies, stories unfold in a variety of styles. In order to please many different learning styles, some authors use a mix of both artistic rendering and traditional text. A common example of this lies in graphic novels. Lauren Redniss's graphic novel *Radioactive: Marie and Pierre Curie: A Tale of Love and Fallout* includes many mediums and speaks to a variety of learning styles. Through words, her own illustrations, and original photographs and documents, she chronologically unravels the story of Marie and Pierre Curie's life together and the legacy left in their wake. Similarly, Jim Ottaviani and Leland Myrick's graphic novel, *Feynman*, shares the life of Richard Feynman and his extraordinary accomplishments. However, Ottaviani and Myrick rely on a traditional graphic novel format with panels, gutters, and drawn illustrations in a less sequential and more dramatic retelling of Feynman's life. *Radioactive* and *Feynman* share skillful use of colors and illustration of scientific concepts but vary in other aspects including the use of a chronological timeline and mediums used in production. Each graphic novel effectively balances text and pictures to elevate reader understanding and allows for these pieces to become nontraditional educational tools.

Redniss as well as Ottaviani and Myrick both rely heavily on color to communicate with readers. In *Radioactive*, Redniss notably uses color psychology when she illustrates Pierre Curie's death. In six pages, she carefully paints out Pierre's final moments in blue hues. Of these six pages, only one includes text. Redniss writes, "As he crossed the busy intersection of Rue Dauphine...the physicist was struck by a horse-drawn carriage crossing the Pont Neuf ... viscous matter trickled in all directions in the mud: the brain of Pierre Curie" (Redniss 96). This excerpt overflows with raw facts and real emotion. In the next five pages, however, Redniss allows her readers to grieve Pierre in silence; she offers no additional text. Instead, she illustrates the moment the coachman realized he had struck Pierre and then two figures carrying away a lifeless body. While Redniss could have expressed heartache,

mourning, and sorrow through words, she allows color to speak for itself. Rebecca Withrow wrote in *The Journal of Humanistic Counseling, Education and Development*, “Reactions [to colors] were recorded on the Profile of Mood States, and results demonstrated that blue-violet produced sadness and fatigue, whereas cool green produced confusion and anger” (Withrow 33). This study proves how the human subconscious associates cool tones with less stimulating emotions like depression, fatigue, and sadness. Redniss uses five pages of exclusive illustration to convey one of the most critical deaths in Marie Curie’s life. While eliminating text may seem extreme, from a scientific point of view, Redniss does exactly what she needs to project sadness upon readers.

Ottaviani and Myrick also excel in choosing appropriate color schemes in *Feynman*. Different colors represent different phases and people involved in Feynman’s life. His first wife, Arline, always appears in orange and yellow as well as his sister, Joan. His second wife, Gweneth, always wears blue as well as any mention of his older self. This careful use of color to differentiate characters proves effective and essential as *Feynman* moves between decades from page to page. However, the use of colors does not follow the same color psychology Redniss presented in *Radioactive*. Achim Hescher’s book *Reading Graphic Novels: Genre and Narration* includes insights on additional ways to utilize color. Hescher writes, “Color relates to the form and content of an image, and its use may be formulaic, thematic, and naturalistic ... Also, characters are recognized through color” (Hescher 61). *Feynman* follows this pattern. Specific color schemes surround specific people and follow them through the entirety of the graphic novel. This use of color identifies individuals as well as provides them a theme. Ottaviani and Myrick envelope Feynman’s time with Arline and Joan, the two most important women in his early life, with bright colors. As he reflects on his past self and second wife, darker colors appear more frequently. Hescher proves that this stylistic choice allows readers to recognize characters through colors but also allows for themes to build. For example, Feynman feels deep love for Arline and Joan which the illustrator shows in orange and yellow. Thus, when readers find these shades, they also find these themes. Ottaviani and Myrick used colors carefully to portray the different people and emotions involved in Feynman’s life.

Both *Radioactive* and *Feynman* excel in illustrating scientific concepts for reader comprehension. A clear example from *Radioactive* appears on page 80, where Redniss draws the atomic bomb’s nuclear fission process before detonating above Hiroshima. Redniss uses a consistent color scheme as well as clearly labeled parts. She shows how the first few atoms split which resulted in the split nucleus and released energy. When she reaches the end of the page, she informs readers this chain of events occurs with all remaining matter. *Feynman* explores quantum electrodynamics multiple times. A

prominent example falls between pages 218 and 226. Here, Ottaviani and Myrick draw out how photons and electrons interact and uses a common graph with axes of space and time. The authors even use humorous text and anecdotes to contextualize the information. The authors of both graphic novels share in using a blend of text and illustration to portray a clear, concise explanation of complex topics. Alandeom Oliveira and Kristin Cook's article "Student Visual Communication of Evolution" write:

Integration of artistic drawing with physics was shown to effectively promote student conceptual understandings and to improve students' attitudes toward physics. In sum, evidence exists that visuals can support conceptual understanding...and that use of pictures can foster learning of science (Oliveira & Cook 521).

In their research with students in postsecondary education, students that either drew for their own conceptualization or looked at drawings found physics material far more understandable than before. The choice to illustrate physics concepts in *Feynman* and *Radioactive* follows this logic. When readers have the ability to read text and pair it with an image, the material falls into place. Not only does this allow for a broader audience, but an engaged audience with less frustration over difficult concepts.

While *Radioactive* and *Feynman* share many similar traits, a few key differences emerge. First, *Radioactive* tells the Curie's life story together, apart, and postmortem in chronological order. As readers progress, the timeline follows suit. Redniss begins with Pierre Curie's birth in 1859 and ends far beyond Marie's death in 1934. She moves through each event and discovery as it occurs and allows interviews and photos to interject with either future or past information. Even when these interruptions of flow occur, she returns to the linear timeline immediately following. In *Feynman*, Ottaviani and Myrick take a more dramatic approach. They tell Feynman's life story to the same effect Redniss tells Marie and Pierre Curie's; however, they include flashbacks, Feynman's self-reflection on his past endeavors, and move between multiple decades. Each time they divulge from the linear timeline, they clearly label the shift, date, and even event explored. Both graphic novels label dates clearly and present detailed information, yet the shift in storytelling creates a distinct difference. Elizabeth Schibuk's article "Teaching the Manhattan Project" outlined how she most successfully taught her students at Conservatory Lab Charter School about the Manhattan Project using videos, a graphic novel, and maps. Through the article, Schibuk stresses the importance of maintaining a consistent and linear instructional focus. She explains how she introduces students to the Manhattan Project by watching a video of the atomic bomb dropped on Hiroshima and then the students begin their research of nuclear energy with the Greeks and then journey through the

graphic novel *Trinity* which anchors their discussion (Schibuk). Schibuk proves the importance of allowing readers to follow a consistent pattern in order to learn, yet she understands the need for students to feel interested from the beginning. *Radioactive* takes the first approach by providing readers a chronological retelling of the Curies' lives. *Feynman* tells Feynman's life story, yet keeps readers engaged with new twists, turns, and even reflection periods. Each graphic novel presents its story differently, yet both work well to unpack the lives of complex physicists.

A secondary difference between *Radioactive* and *Feynman* lies in the use of materials. Redniss boldly uses various mediums to present the Curies while Ottaviani and Myrick rely on the traditional graphic novel style with panels and gutters. This stylistic choice works less with the biographical information presented, and more with the reader's journey through each piece. Picking up *Radioactive*, readers immediately feel the textured cover, observe the letter size pages, and sense a nontraditional style. Redniss allows herself the room and freedom to use full pages only for a few words, splashes of color, or scanned images. On page 199, she leaves an explanation of why she used cyanotype printing for a majority of her illustrations. She writes:

The negative of an image gives an impression of an internal light, a sense of glowing that I felt captured what Marie Curie called radium's 'spontaneous luminosity.' ... Second, because photographic imaging was central to the discovery both of X-rays and of radioactivity, it seemed fitting to use a process based on the idea of exposure. Last ... Prussian blue capsules are approved by the U.S. Food and Drug Administration as a 'safe and effective' treatment for internal contamination by radioactive cesium and radioactive thallium" (Redniss 199).

In *Radioactive*, Redniss allowed her creative voice to interpret the Curies' story both historically accurately, but also in terms of materials. She made many artistic choices and used each one to further the story and allow readers to experience the Curies' journey as if walking along with them over one hundred years ago. *Feynman* takes a more traditional approach but allows readers to experience the same thrill in the dramatic way the scenes unfold and the shifting timeline. Both graphic novels serve as wonderful interpretations of the lives of famous physicists and each take risks in various ways.

In terms of educational tools, both *Radioactive* and *Feynman* showcase the very best of blending text and visuals. This synergistic relationship contextualizes difficult phrases and concepts with images and explains challenging images with text. Alex Romagnoli of Monmouth University writes in his book *Graphic Novels and STEAM*:

The benefits of comics lie in their very structure which incorporates multiple modes of interpretation with which readers interact. The unique combination of visual stimuli with narration and dialogue allows for students to access multiple modes of interpretation and comprehension that might otherwise be missing in a monomodal text” (Romagnoli 24).

Romagnoli proves in his book the critical nature of appealing to as many readers as possible and doing that by making STEAM concepts as accessible as possible. While some individuals may find a biography of a scientist fascinating, perhaps some of the deeper concepts and research becomes simplified. Others may prefer a photo story or a collage of how a discovery came to light but find paragraphs daunting. Herein lies the beauty of graphic novels. Authors marry both and readers of various preferences, backgrounds, and science literacy can all appreciate and enjoy information previously unattainable to them. For science to become more widely known and to increase interest in challenging concepts, graphic novels speak volumes.

Though *Radioactive* and *Feynman* use different methods to explore the biographies of renowned physicists, they share in the methodical use of color and illustration to explain complex physics concepts. The integration of both traditional text and descriptive images allows graphic novels to speak to a larger audience and thus creates a valuable teaching tool. Graphic novels can give individuals a mere look into the STEAM field or can unearth deeper ideas like quantum electrodynamics and the discovery of radioactive materials. As people become more technology focused and place values on appearances and visuals, graphic novels have an opportunity to step into the forefront of nontraditional textbooks bridging images with text. Due to the expansive nature of style and form of graphic novels, they possess the ability to become the next chameleon of educational tools – transforming to whatever subject matter necessary.

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