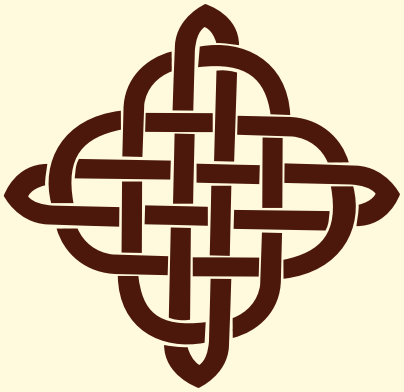

Easily Read, Easily Forgotten:

Reassessing the Effects of Visual Difficulties and Multi-Modality in Educational Text Design

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Final Signatures

Easily Read, Easily Forgotten: Re-Assessing the Effects of Visual Difficulties and Multi-Modality in Educational Text Design, a Thesis submitted to Liberty University for Masters of Fine Arts, Department of Studio and Digital Arts: Graphic Design.

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Dedication

This thesis is dedicated to my mother, Betty, whose legal name is quite regal....Augusta Elizabeth Choflet Mercaldo.

Humbly, she would call herself a homemaker, which is an understatement for her creative work; providing a culturally rich home environment. Instinctively, she understood the power of multi-modality before it was even a term. A woman of deep faith, she exemplified a vibrant love of God and the Bible. Hers was not a religion of legalism, but of freedom. As a result, the atmosphere she created encouraged creativity; rich with music, art and literature.

Early on, she introduced us to children's literature, as she read aloud *Winnie the Pooh, Peter Rabbit* and many other illustrated classics. Her deep love of illustrated children's books was infectious. Later, she continued to encourage a love of literature with an ever growing library that included *The Secret Garden, Anne of Green Gables, The Chronicles of Narnia, Lord of the Rings, The Princess and the Goblin* and *The Little House* series. She provided art materials, costumes (many handmade), piano lessons and a full library of classical music. She not only tolerated, but encouraged a never ending production of unicorn and dragon art. She sat through numerous in-home ballets and plays we would perform, many of these were responses to stories we read. She would visit and have "tea" in the fairie homes we designed in the forest. And at the end of the day, she would cook hobbit meals and cowboy suppers, also inspired by the stories we read.

She did not homeschool us, but she educated us more thoroughly than any textbook or classroom could. I am overwhelmed with appreciation for her unseen and often underappreciated life work. I believe that her dedication, creativity and contentment have resulted in my siblings and myself being the creatives we are today.

Contents

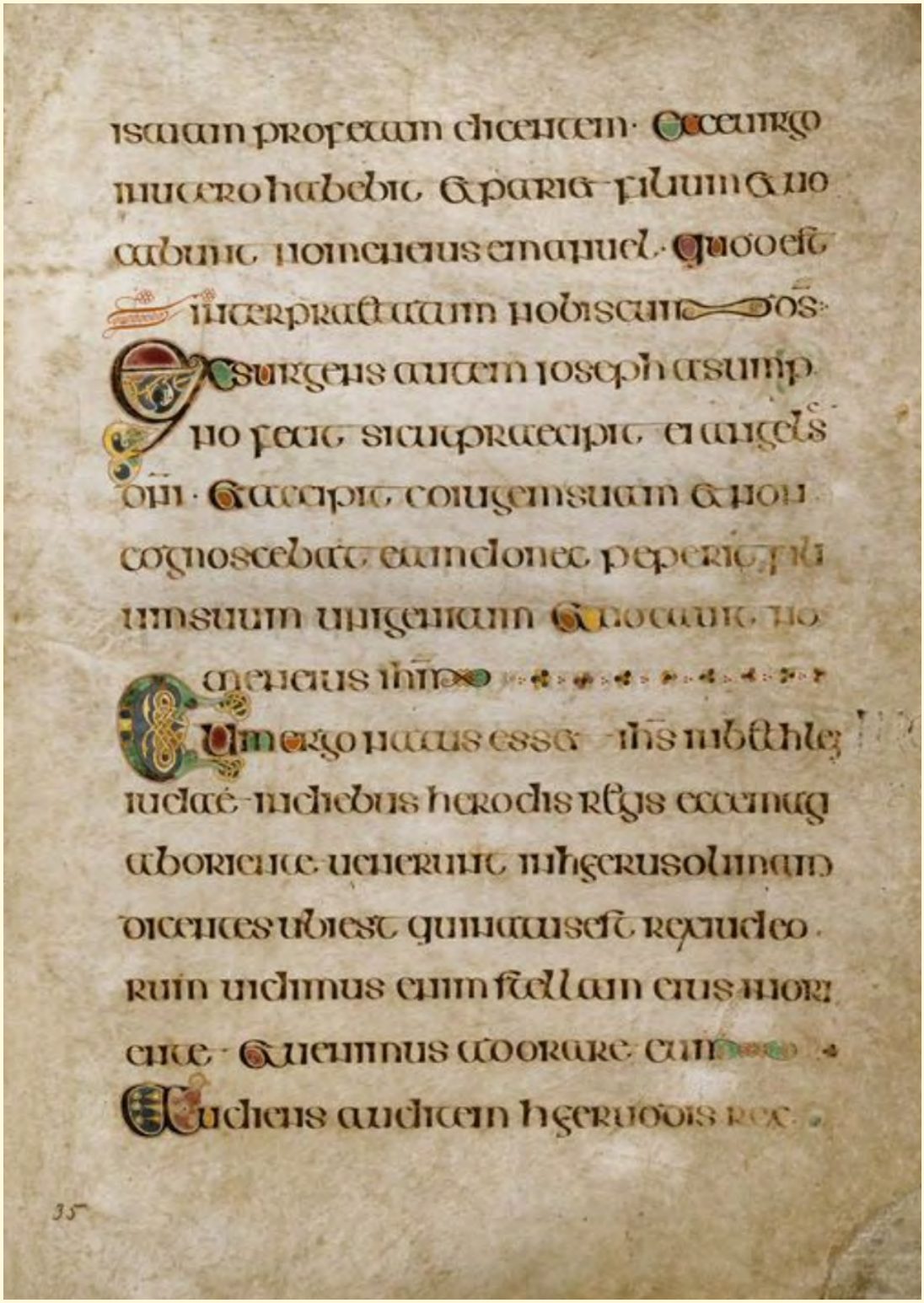
Abstract

The graphic design of a book affects the way the reader receives and processes information. However, design is often focused on aesthetic principles and traditional wisdom, not taking into account how design aspects affect cognitive processes and educational outcomes. This thesis examines the efficacy of page design elements on educational outcomes, specifically disfluent fonts, handwritten fonts and multi-modal design.

The traditional wisdom of typography has maintained that the faster the human eye can read a text, the more suited it is for reading materials. However, recent research suggests that disfluent, or difficult-to-read fonts result in significantly improved reading comprehension and retention (Chih-Ming Chen & Yu-Ju Lin 553; Diemand-Yauman, et al. 114; Faber, et al. 914; French, M. M. J., et al. 301; Geller, Jason, et al.1109; Halin, et al. 31; Oppenheimer D.M & Frank M.D. 1178). This body of research suggests that certain visual disfluencies enhance educational outcomes, improving retention and comprehension by encouraging the reader to mentally process material in a slower and deeper way.

What if texts that are easily read are easily forgotten?

Medieval manuscript design encouraged a reading culture nurtured by deep, contemplative and slow reading methods, enhanced by semiotic images, text and design. The modern book designer, inspired by medieval manuscripts, and their modern incarnation, the graphic novel, can enhance educational outcomes through design that elicits a deep cognitive processing. The aim of this thesis is to present evidence that this inspiration combined with difficult-to-read fonts and multi-modal design can enhance educational outcomes, specifically in the American high school literature classroom.



The Book of Kells. Trinity College. Dublin. Folio 10v

Chapter One: Introduction

The graphic design of educational materials affects the way a student receives and processes information, having a direct impact on educational outcomes. The placement of title and paragraphs, the thickness of margins, the size and weight of the characters, the images and symbols, and even the relationships between these components guide the eyes, affect the mood and create meaning for the reader. Thus I pose the question: Is the traditional format of literary books optimal for educational purposes?

Creating an object that functions perfectly and is aesthetically beautiful is the Holy Grail of art and design. While educational media design has focused on both form and function, it is based on traditional techniques and assumptions that were established before the digital age and from studies decades ago. What if these design practices, including the use of easy-to-read printed letters, are not the optimal ones for students to achieve academic goals? What if there are other aspects about the design of these materials that could be changed to thus improve a student's ability to read, comprehend and remember the content?

Recently, I was studying the effects of writing calligraphy for a project. As an art teacher, I had two students with dysgraphia in my classes. Dysgraphia is a processing difficulty that results in students not being able to write letters legibly. I found that these students, once they overcame their lack of confidence, could learn how to draw. Calligraphy writing is similar to drawing because it focuses on lines and shapes instead of the letter names while one is writing, so I wondered if calligraphy could help dysgraphic students write legible letters. But then I came across some other interesting research.

Difficult-to-read letters (disfluent fonts) may increase reading abilities. This interested me because my own son was diagnosed with dyslexia in tenth grade. He slipped under the radar for many reasons, perhaps due to the fact that while he did have issues initally learning how to read in the classroom, I was able to teach him easily at home once I bought a book titled *Teach Your Child How to Read in 100 Easy Lessons* by Siegfried Engelman. This book utilized special letters that I would consider disfluent and it worked.

Further, cognitive scientists have been intrigued by the effects of letter font on a person's emotions and attitudes. These studies alone could help with the design of books read by students. If a student has an emotional attachment to the text, they could be more likely to read the text. Recently, cognitive studies have begun to explore how different fonts affect memory and brain activity.

The findings are surprisingly contrary to common book design practices.

As I began research for this study, I had the opportunity to visit a Gothic cathedral in Regensburg, Germany. (Fig. 1) The spires rise above the ancient city, guiding visitors to its entrance. The experience of viewing the exterior is awe inspiring, but nothing can describe the moment one enters the interior. The sheer beauty of the place reminded me that these sacred spaces encompass the epitome of form and function. The Gothic cathedral is a place of worship, it's a book, an encyclopedia, a communicator of things beyond the physical and it is among the most beautiful man-made creations on earth. I continued my journey through the cathedral and stepped into the crypt. What I found surprised me!

The foundation had been excavated in recent years, revealing pillars with Celtic scroll-work from the original structure, a Celtic monastery dating to the 9th century (Fig. 2). These were remnants from the Irish monks who brought Christianity and literature to Germany in the early middle ages, and this monastery had a library.

The fact intrigued me that this symbolic “book”, this cathedral, was built on the site of an older library. Celtic scribes created books that encompassed function and form in a seamless, mysterious beauty. Celtic monasteries were schools of literacy, as well as religion. They taught the love of reading and writing, the love education, and the love of books. Could a medieval book, or the culture that created it, impart insight for today’s book design?

Fig. 1-1 Doms Cathedral
Regensburg, Germany

Fig.1- 2 Doms Cathedral
Crypt Foundation

Can a book encourage literacy through its form?

The graphic design of reading material is important for aesthetic value, as well as efficacy of the reading process. However, design is often focused on aesthetic principles and traditional wisdom, not taking into account how the design aspects affect educational outcomes.

What if the font styles we currently choose for reading materials are not the most advantageous for reading comprehension and retention? What if the words that are easily read, are easily forgotten?

The balance of form and function.

This thesis considers the efficacy of using trade book design in the American high school literature classroom. These books are text heavy with little imagery and utilize fonts that have been determined easy-to-read. In my experience, many students who once loved reading tend to lose this love once they enter higher grades. Some feel like they don't read well, sometimes due to underlying learning difficulties or attention issues. Others just lose interest. What if the design of literature could help engage them with the content, and foster better reading comprehension and retention? What if the design could encourage a life-long love of reading and learning?

There are other aspects of page design, besides the font choice, that may encourage engagement with text. Currently, the trend in education is multi-modal literacy. Multi-modal texts combine multiple modes of communication. In physical texts the design combines words with imagery. In digital texts, the format allows additional modes such as audio and video. In elementary reading classes, this has been implemented with picture books and digital texts that include animation, audio and video.

In the high school classroom, the practice of using inexpensive trade books has not changed.

Yet, today's generation of students, the iGen, is the first to be raised entirely in a world of Internet and cell phones. The Internet and plethora of screens students have at their fingertips has changed the way they think and communicate. They have communicated through multiple modes their whole lives.

The aim of this thesis is to present evidence that difficult-to-read fonts combined with multi-modal design can enhance educational outcomes, specifically in the American high school literature classroom. Informing my design solution will be an analysis of current cognitive research concerning these aspects, a historical look at Celtic monastic book design, and an exploration of semiotics within ancient and modern texts. Uniting form and function, the resulting design solution will be an illustrated text of a classic piece of literature designed purposefully for the American high school English literature class. The piece of literature will be presented in both digital and physical form, inspired by the passion and semiotics approach of book design found in *The Book of Kells*.

Chapter Two: Research

Research overview and methods:

I. Literature Review Topics

A. Disfluency Effect Research

B. Reading Handwriting Research

C. Medieval Design Inspiration in Modernity

D. Celtic Medieval Culture and The Book of Kells

C. Semiotics and Multi-Modal Design

D. Digital versus Physical texts

II. Data Analysis of Current Disfluency Effect Research

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Literature Review

Certain visual disfluencies enhance educational outcomes, improving retention and comprehension by encouraging the reader to mentally process material in a slower and deeper way. Medieval manuscript design emerged from a reading culture nurtured by deep, contemplative and slow reading methods, enhanced by semiotic images, text and design. The modern book designer, inspired by medieval manuscripts and their modern incarnation, the graphic novel, can enhance educational outcomes through design that elicits deep cognitive processing.

The Disfluency Effect

Reading is an intriguing and complex process. Letters form words and words form meaning in the reader's mind through a complex series of cognitive actions. To break down the influence typography has on the process, it is necessary to understand the different terms that refer to letter readability.

Legibility refers to the ease of identifying an individual letter form. ***Readability*** is the ease of identification of letter groups during the act of reading. ***Fluency*** refers to the subjective, perceived judgment of ease or difficulty when presented with a text. These three terms are interdependent, but most of the time, fluency and legibility go hand in hand. Fluency can be influenced by the font style, color, value contrast, size, weight, and other aspects of letter design which can cause the reader to perceive an ease or difficulty with reading. For the purpose of this research, the fluency of the fonts themselves will be discussed, and not other disfluencies such as letter scrambling. Two aspects affect fluency; novelty and perceived difficulty. However, a letter may be legible but novel and therefore be disfluent. The clarity of terms are necessary for

the graphic design aspect of this research, but within the cognitive research literature, the terms disfluent and illegible are often used interchangeably.

One of the governing principles of typographic design determines that fonts in reading material should be easily read. Letters that are more difficult-to-read, or disfluent, are thought to be a distraction from the content. While this holds true for material that needs to be read quickly, such as road signs, it is not true for educational purposes.

Traditionally, illegible or disfluent fonts were thought to hamper the reading process, therefore inappropriate for books and educational texts. This assumption was based on research that began in the 1920s. This research focused on the speed of reading, as well as the rate of blinking, indicating eye fatigue (Wang 12). The quicker one read, with the least amount of blinking determined the best fonts for reading. This type of research makes logical sense in today's world where quantity and speed of everything is valued over quality. However, in the educational realm, this has resulted in a method of learning often called "Binge and Purge". Students cram a massive amount of facts in their heads for exams, and once the task is complete, purge the information. They do not retain the bulk of information they learn. What is easily read, is easily forgotten.

Several studies have indicated that disfluent fonts (difficult-to-read fonts) have positive effects on reading comprehension and retention of material (Chih-Ming Chen & Yu-Ju Lin 553; Diemand-Yauman, et al. 114; Faber, et al. 914; French, M. M. J., et al. 301; Geller, Jason, et al.1109; Halin, et al. 31; Oppenheimer D.M & Frank M.D. 1178). This has been called the "disfluency effect" by field experts and contradicts traditional methods of book design (Geller et al. 1109). Disfluent fonts decrease reading speed, one of the reasons why books are printed with fluent fonts.

Researchers have attempted to explain the reason for the disfluency effect. One theory is that the perceived difficulty of the text causes the reader to exert more effort which results in a deep mental processing (Geller et al. 1109). Another theory suggests that disfluent fonts evoke a higher level of mental processing due to the increased textual interaction. In either case, the disfluency effect results in a deep cognitive processing. "It is this deeper processing that occurs post lexically, after a word has been identified, that drives the disfluency effect" (Geller et al. 1109). A direct effect that this deep mental activity has on the reading process is a decrease in mind wandering (Faber 918). Mind wandering negatively affects reading comprehension.

In two groundbreaking studies, Diemand-Yauman, Oppenheimer, and Vaughan analyzed the effect of disfluent fonts (Monotype Corsiva, Bodoni, Comic Sans And Haettenshweiler) on educational outcomes (114). The bold, italicized, and disfluent fonts were found to have positive outcomes for learning when compared to fluent Arial. Their research has "demonstrated that student retention of material across a wide range of subjects and difficulty levels can be significantly improved in naturalistic settings by presenting reading material in a format that is slightly harder to read" (Diemand-Yauman et al. 115). These experiments took place across various high school classrooms and demonstrated long-term retention through improved test scores taken weeks after students were presented with the material with disfluent texts.

In 2014, the effect of background noise while reading disfluent texts was analyzed. Background noise is a deterrent towards the learning process, inhibiting reading comprehension, memory and processing of materials. The study found that background noise inhibited retention and comprehension with the easy-to-read font, but not the hard-to-read texts. The study determined manipulating the task difficulty by using a disfluent font resulted in enhanced reading comprehension

while working in a noisy environment. The author concluded this could have significance for students with ADHD (Halin 36). For a change of this magnitude to be implemented in educational materials, it should benefit all students. Research has indicated students across the ability spectrum demonstrate a significant improvement in retention and recall when presented with information in a disfluent font (French et al. 301). Significantly, French revealed in his research in Britain that students with dyslexia were found to increase their test score by 19% by reading disfluent fonts as opposed to an 11.5% improvement seen in the test scores of students without dyslexia (304).

This does not mean that every type of disfluent letter produces positive outcomes. Some studies conclude that not all types of disfluency are desirable (Geller et al. 1126). Blurred or colored low contrast fonts have not been shown to enhance memory or comprehension. Letter forms that are too disfluent have been found to be a deterrent. There appears to be an optimal level of disfluency.

In 2018, a study by Jason Geller and his colleagues explored the difference that easy-to-read cursive letters versus difficult-to-read cursive letters have on educational outcomes. Due to the variant shape and inconsistent nature of handwriting, it is considered disfluent. According to Geller:

> One novel perceptual disfluency manipulation that is more educationally realistic is handwritten cursive. In a classroom setting it is quite common for instructors to present students with cursive written information, either on the chalkboard/ white board or on the projector. (1111)

Geller's research concluded the disfluency of easy-to-read cursive handwriting enhanced educational outcomes, but if the cursive was

too difficult to read it hampered them. There is an optimum level of disfluency that appears to be the most advantageous for learning,

Australia's RMIT Behavioral Science department set out to find the optimum level of desirable difficulty by creating a font to aid memorization in 2018 ("Remember"). The department created several disfluent fonts and tested the results on 400 students. The resulting letter design was a font they named "Sans Forgetica," an eight degree backwards slant and gaps in the letters, the reader is forced to slow down and fill in the gaps thus engaging the mind in a deeper cognitive process. The study indicated a definite point in which disfluency was no longer desirable. According to the creators of the Sans Forgetica:

> While breaking some design rules creates desirable difficulty without sacrificing legibility, further futzing with the font-like one early prototype that incorporated back-slant, gaps, and asymmetrical letters-caused recall rates to plummet.

Sans Forgetica was created to highlight short texts to be memorized, but this type of letter would be too difficult for longer texts ("Remember"). Conclusions from this research suggest that a font for longer texts should be disfluent, but not as difficult-to-read as Sans Forgetica.

Italicized, bold and cursive letters have a positive disfluency effect by eliciting a deeper cognitive process than fluent letters. Modern designers often lean toward the latest, newest, trendiest, and most "modern" designs and technology. However, a study of the past can often inform better solutions for the future. An evaluation of the past influence of medieval design could lend a direction for a modern model of book design, thus enhancing educational outcomes.

Reading Handwriting

Before the advent of the printing press around 1440 CE, all reading material was handwritten. Great pride and skill was poured into the written letter, whether it was a book, document, or personal correspondence. Handwritten letter-forms are disfluent for today's modern eyes. Not only are we not accustomed to reading them as much as the printed page, but every individual's handwriting varies, creating a slight unfamiliarity that is perceived as novel to the eye. Historically, for readers who only read handwritten letters, the familiarity could have detracted from the disfluency of the letter. In addition, since they had no "standard" set of letters to compare it with, there would be no perception of difficulty, if the letters were written legibly. Printed fonts create uniform letters; every "a" is exactly the same. In contrast, every writer's hand would produce slightly different letters, and even the most skilled writer may have variations amongst their own letters, adding to the novelty of each hand. It would be difficult to prove just how the eyes and minds of those who lived in the past actually processed any type of lettering.

Although research that delves into how the brain responds to font differences is in its infancy, there have been some findings indicating that the brain processes handwritten letter forms differently than printed fonts. Researchers speculate this is due to the traces of biological action present in a static letter (Longcamp et. al. 1256; Qiao et. al.1796).

Qiao's research revealed significant differences in the subliminal deciphering of handwritten letters opposed to printed:

> Compared to printed words, easily readable handwritten words caused additional activity in ventral occipitotemporal cortex,

particularly in the right hemisphere, while difficult handwriting also mobilized an attentional parietofrontal network. (1786)

Interestingly, Qiao's study determined that viewing handwritten (cursive) English activated the brain in a similar way as Chinese and Japanese printed ideographs. The printed forms of Chinese and Japanese are derived from handwritten forms. Additionally, the findings suggest that handwriting is processed similarly to pictorial symbols (Qiao et al. 1797). Although research is scant concerning how fonts that mimic handwriting are processed, this indicates that further research could indicate that fonts that mimic cursive handwriting could be processed similar to a symbolic system of writing.

In Longcamp's research, "What differs in visual recognition of handwritten vs. printed letters? An fMRI study brain," scans revealed significant differences in cognitive activity between the viewing of handwritten versus printed letters. Handwritten letters activated multiple brain areas, including the left fusiform, several posterior brain regions and the right front gyrus, which are responsible for motor functions of the hand and eye. In contrast, the printed letters did not activate these brain functions, and there were no additional brain activities for the printed letters, other than the areas common to both. Longcamp suggests handwritten letters contain evidence of biological movements that the brain recognizes differently than a printed letter (1256). He concludes that the qualitative differences in brain response is due to traces of biological movement inherent to handwritten letters. He did add that some of the additional brain activity could be caused by the less familiar form (disfluency effect) of handwritten letters, however, the activity related to motion, particularly the hand, tends to point to a simulation of creating letters. The area of the brain responsible for hand motion, for example, simulates the action required to make the letter while viewing it. Interestingly, printed letters can be copied and formed by hand, yet

the letters actually created by hand stimulated areas throughout the brain that the printed form did not.

These studies suggest handwritten words elicit a processing that involves multiple areas of the brain that are not activated with printed words. The brain enters into a complex series of actions, signifying a deep cognitive processing. One could conclude that handwriting is simply a type of disfluency, but Qiao's study indicates brain activity that would not be activated by a letter not based on handwritten ones. Although the printed Chinese and Japanese characters in the study elicited a similar response that handwriting did, the printed characters were designed after the handwritten models, mimicking the brush or pen strokes. There is scant, if any, research that has explored the cognitive effects of printed fonts that mimic handwriting.

Although it is impossible to determine what type of brain activity the medieval reader would have had when encountering their familiar uncials, if handwritten letters activate motor areas of the brain in modern man, and are processed on a deeper level, it is logical that biological traces in medieval calligraphy could affect the readers' brain in similar ways, even a thousand years ago.

Medieval Inspiration for Modern Design

Artists and designers have been inspired by medieval art and design in the past resulting in new methods re-imagined for the modern world. During the Industrial Revolution, the Arts and Crafts movement looked to the philosophy and style of the medieval world. William Morris, the father of the movement, called for artists and designers to follow the medieval artisan culture of guild through apprenticeship. He prized authentic artisan workmanship over the inexpensive, cheaply made manufactured goods of the Industrial Revolution. He designed books influenced by medieval design and principles. Morris owned several illuminated manuscripts and used aspects of the design and format in his book printing.

The Bauhaus movement in Germany during the early part of the 20th century hailed back to medieval art and style. The founders called for authentic design and art in everyday life. They believed form and function were of equal importance and they saw the Gothic cathedral as the perfect unity of the two. Although their designs did not look medieval, the concept and spirit of the age were their basis. The modern typography that developed were created by calligraphers who had a firm grasp of elegant medieval letters. In addition, not unlike medieval manuscripts, the posters and typography experiments contained symbols and letters intertwined to form a message.

A study of medieval manuscripts could lend inspiration for modern book design, specifically for educational materials. Medieval manuscripts contained handwritten uncials, elaborate symbolic imagery and intertwined word and image. These aspects resulted in a slower, methodical reading which enhanced and cultivated a deep understanding of the material.

The Book of Kells

Medieval design has inspired and influenced modern design movements maintaining its relevance in today's world. Likewise, a study of medieval manuscripts could lend inspiration for modern book design, specifically for educational materials. Although *The Book of Kells* was a sacred relic meant for display and ceremonial purposes rather than being read, it provides an archetype of medieval Celtic page design. It is indicative of the celebration of word and literacy within the culture. The medieval approach to reading was a slow, deliberate and meditative practice. This practice allowed the reader to ponder and process the meaning of the material. The interaction of word and image delivered meaning to the medieval reader, as the reader slowed down and considers the semiotics on the page.

In Europe, manuscript creation developed in monasteries in Ireland and the surrounding islands by Celtic Christian monks. After Rome fell in 410 CE, European society and literacy was in crisis. Around 432 CE, Ireland converted to Christianity, and simultaneously literacy blossomed. When Ireland converted to Christianity, the once oral culture became literate. The love of books dictated the ways their monasteries functioned in comparison to the archetype of earlier Egyptian monasteries (Jones 9). Irish monasteries were not isolated communities devoted to prayer, but vibrant cultural centers of civilization focused on education and missions, just as much as prayer and penance. Jones, in her study of the production of *The Book of Kells* relates:

> Monastic centers became the nuclei of the first cities or towns in Ireland. Buildings were required to house monks and students, books were needed for study, vessels for the altar, boats or other conveyances for transport, and food for sustenance—all of which were provided by the community. Monastic workshops became the chief centers of craftsmanship. By the beginning of

the seventh century, monasteries became major centers of learning. (9)

The Irish Christian monks copied any books they could find, traveling all the way to Rome to build their libraries. Their most important work was copying the Christian Gospels, such as the *The Book of Durrows* (Fig. 2-1) and *The Book of Kells* (Fig.2-2). During the 6th century, Irish monks left their home, bringing their books with them. They established monasteries throughout the continent of Europe. These monasteries became centers of education. Throughout the following centuries, manuscripts that were illuminated with gold paint, and illustrated with interwoven imagery and texts thrived throughout Europe (Fig. 2-3).

According to Thomas Cahill who wrote *How the Irish Saved Civilization,* "During the height of the Celtic civilization, during which *Book of Kells* was produced, Ireland was the only place in Europe where books were being produced at all" (206). Rome had fallen centuries before, leaving the majority of Europe in the hands of illiterate, barbarian tribes. Ireland was a minute, isolated island in the North; and for the most part was left alone. As the only center for book production during this time, the monks copied scripture as well as Latin and Greek manuscripts they procured from Rome. Some of these pieces of antiquity would have been lost to civilization otherwise. Their peaceful existence was threatened during the 9th century, when Viking raiders took notice of the perceived wealth of the Irish. *The Book of Kells*, whose production had begun in Iona, was transferred to Kells after such a raid. Later it was found buried, and then brought to Trinity College in Dublin in the 1600s. It is one of the most complete Insular Gospel remaining from this era.

Analyzing the page design of *The Book of Kells*, provides insight into the practice of book design of a culture that embraced education in a

Fig. 2-1 *The Book of Durrow,* Ireland, late 7th century, Trinity College Dublin.

Fig .2-2 *The Book of Kells,* Carpet Page, Ireland 800–850, Trinity College Dublin.

Fig. 2-3 St. Gallen, *Evangeliarium,* late 9th century. – early 10th century.

time when learning could have become obsolete in the European west. The insight of how the medieval Irish reader found meaning from the pages and design, through a slow, deliberate method, can aid today's book design through deliberate methods which bring meaning through multiple, interactive components.

Reading, as well as writing and illuminating, were sacred undertakings. Kieran Hayes wrote concerning the Irish approach to literature in his essay "A Light in the Darkness: Theologies in *The Book of Kells*":

> Illuminated manuscripts grew from love of the book and of Scripture, specifically the monastic practice of lectio divina, sacred reading, a slow, prayerful reading of the text, falling in love with it, allowing your life to flow into it. (213)

The practice of lectio divina resulted in a mental "digestion" of the material. "A common medieval image for lectio divina compared the cow chewing the cud to the monk ruminating on the word, drawing out and being nourished by its juices" (Hayes 219). This deep meditative process was not limited to the reading of the words, but writing as well. Hayes continues:

> The writing process itself became a spiritual practice, a meditatio or meditation requiring profound silence, stillness and attention. While a monk would not dare alter a word of Scripture, his transcription was not just a passive act; as with lectio, it evoked a response in the monk both intellectual and emotional. (220)

As a result of the deep spirituality imbued within the task of writing, the imagery was intentional and encompassing more than just intellect.

According to Hayes:

> If the imagery grows out of a deep lectio of the gospels, it is an affective as well as an intellectual response, one which has trickled down from head to the ventricles of the heart. These monk-artists were contemplatives, grounded in stillness and lectio divina, and because of that their scholarship, their intellection, was as alive and dynamic as their illuminated pages. Their learning was not abstract or sterile but infused with feeling and a catalyst for creative and spiritual awakening. Their thinking was an experience that modified their sensibility, as immediate as the odour of a rose. (224)

Scholars before the 1960s assumed the images in *The Book of Kells* were random and "grotesque," merely decorative or having meaning only for the scribe. More recently, research and analysis have revealed deep symbolic meaning within every image and detail of the manuscripts. For the medieval mind, symbols represented a reality greater than the present one. In "Image as Exegesis in *The Book of Kells*," Doyle explains how understanding the manuscript's iconography as exegetical is consistent with the scholarship of its time:

> As Judaism banned direct representations of the divine, creative imagination developed a structure of symbolism as a link to the unseen powers of the universe. The force of religion was central. The spoken word itself was held to be a medium for the act of creation. Numbers and letters were considered to have supernatural significance, not just as numbers and letters but as secret signs, ciphers or codes. The deciphering of these served to open up the mysteries of nature and the supernatural world. The divine realm, something beyond human experience, became real in human imagination. Intellectual fervour sought to comprehend, to visualize, to represent, as well as to believe. (54)

The Book of Kells symbolic method of imagery as a tool of explaining spiritual truths may seem odd to the modern reader since the entwined knots, swirls and strange creatures that embrace the text of *The Book of Kells* do not appear "Christian." Some scholars have assumed this shows the influence of pre-Christian Celtic culture. Karen Ward examined the pagan influences and past scholarly assumptions in her thesis "Margins and the Edge of Reading" concluding that it is a "simplistic" interpretation and Christian iconography always "relied on the mode of visual signifiers that preceded it" (12).

The modern reader may admire the beauty of medieval manuscripts, however the imagery may not enhance the comprehension of the text since the symbolism is foreign to our culture. The medieval readers would have understood the symbolism and how they "spoke" about the words in the text. Hayes maintains that:

> In *Kells,* word and image are responsive to one another, word inspiring image and image commenting on and drawing out the latent meanings of the words. Often letters become images, and images become letters. The imagery is not just superficial decoration designed to make the book attractive. It is loaded with symbolism and deep theological significance. It wants to draw you into its world not just intellectually but visually, viscerally and emotionally. It is immersive and contemplative. (214)

The Book of Kells is the most extravagant example of medieval Celtic manuscripts, and it is the best preserved. Despite its function as a sacred relic used only for liturgy, it exhibits the mentality of manuscript production of the time. Other surviving manuscripts are surprisingly numerous, although many are partial or fragmented. Some appear to be only textual, but the mentality of the Irish scribes did not allow letters to be just letters. Letters were symbols and often their placement and function imparted meaning. The complexity of the page

included symbolic meaning within every aspect that was drawn, as well as the blank spaces and positioning of components on each page.

The disfluency effect reveals that reading comprehension and retention improves when the viewer/reader is prompted to slow down and mentally digest (or process deeply) the meaning of the page. The problem with relying solely on disfluent fonts to initiate this process is that familiarity affects disfluency. Whatever disfluent font is chosen, the effect may wear off after reading a few chapters. This could be balanced with multiple fonts, perhaps each chapter or section could utilize a new font. However, disfluent fonts are only one way to initiate a deeper, cognitive processing during the reading process. *The Book of Kells* reveals insight into a book-making culture flowing from a method of slow contemplative reading. It would be quite impossible for any reader, in any time, to speed read a page that includes such intricate, symbolic imagery that interacted with the text.

Irish medieval manuscripts employed a semiotic multi-modal approach of design that imparted meaning to the writer and reader. Although it is impossible to know the level of reading comprehension or retention that medieval readers of Irish manuscripts had, we know that the result was deep processing of information. Understanding how multi-modal semiotics affect reading comprehension today is important in understanding how similar methods of page design would be effective for today's educational material.

The Graphic Novel

There is a modern genre of text that hails back to the medieval manuscripts in concept. Comparisons have been made by scholars between the modern graphic novel and illuminated manuscripts (Paris-Popa 135). The graphic novel combines fonts that replicate handwriting and images to create meaning and tell a story. Often the two interplay to create meaning that would not be the same in isolation.

Unfortunately in the 1950s, a child psychologist named Frederick Wertham decried the comic book as a detriment to reading. He concluded that since students who did not read well often read comic books, that they encumbered the skill of reading. For decades, comic books and graphic novels were not considered a valid form of literature. "This view that comics were detrimental to children's reading ability persisted for fifty years. Consequently, they were not endorsed by parents, not purchased by libraries, and certainly not used in classrooms" (Abate 66).

Recently, educators and psychologists have analyzed the potential for using graphic novels in the classroom. According to Abate:

> Graphic novels can dramatically help improve the reading development for students struggling with language acquisition, including special-needs students, as the illustrations provide contextual clues to the meaning of the written narrative. (69)

Graphic novels could prove to be a medium that acts similar to medieval manuscripts, where art and image "was a tool for teaching people how to read" (Paris-Popa 135).

With the advent of new learning methods and modes of teaching, graphic novels, due to their multi-modality have been reconsidered as a valid form of literature design. Multi-modality is the use of more than one mode of communication on a page and has been found by educational experts to enhance learning outcomes. “From websites and magazines to video games and picture books, the visual mode of image and the mode of writing . . . are combined in multiple ways to represent and construct meaning” (Abate 66).

Outside of the classroom, today’s students engage in many forms of multi-modality and is a prominent mode of their communication. “Multi-modality is a core element of graphic novels. As a result, it caused the literary worth of comics to be rehabilitated. For the first time, these materials were seen as possessing clear educational value” (Abate 66).

A major criticism of the graphic novel for classroom use lies in the format of all capital letters. “The use of all-caps lettering in these graphic novels visually connects them with a long-standing typographical tradition in comics, but it also makes reading these texts more difficult” (Abate 67). In contradiction to this line of thought, the disfluency of all capital letters could be the reason why the media enhances outcomes. As shown in studies of dyslexic readers who benefit from disfluent fonts, struggling students may comprehend and retain the information in graphic novels due to the disfluency of all capital letters. Other students who are labeled as “poor” readers could benefit from disfluent fonts, as well. The fonts in graphic novels mimic handwriting, thus increasing the cognitive processing of the text. There is a strong argument that the disfluency combined with images allow these readers to enjoy and understand them, although research has not been conducted on the specifics of font choice in graphic novels in relation to comprehension.

Semiotics and Multi-Modal Literature Today

Reading is a semiotic process; a reader constructs meaning by viewing a sign which signifies an object, translating this sign into meaning. According to Roland Barthes, reading would be a denotative sign system, resulting from the union of image and concept. Meaning does not derive from the surface of words or letters alone, but from the intentions of the writer, and most importantly the interpretation of the reader/viewer (Kabuto). Theories of semiotics have been explored by multiple fields of expertise, including sociolinguistics, cognitive science, and linguistic anthropology. According to Kabuto, in his study, "A Semiotic Perspective on Reading Picture Books: *The Case of Alexander and the Wind-Up Mouse*", evaluating the Peircian method of Semiotics provides a way to understand how multi-modal texts convey meaning to a reader:

> The Peircian model, therefore, has the ability to supplement and inform socio-psycholinguistic perspectives to reading picture books. The Peircian semiotic model accounts for the surface features of language and places it in perspective with other meaning-driven relationships within the triadic orientation of the Sign, Object, and Interpretant. Consequently, the addition of the semiotic model generates a space for the discussion of visual images and written text in the meaning making processes of readers' transactions with picture books. (15)

According to Serafini, in his analysis of the interpretation of multi-modal texts through the medium of picture books, "Images and texts mean things because readers bring experiences and understandings of images, language and the world to them when reading" (Serafini 87). Our view of the world, reality, and symbols have been altered greatly since the medieval world. The Enlightenment fragmented our view

of faith and reason and philosophically separated the body and soul of humanity. These concepts may seem beyond the realm of this paper, yet these concepts dictate how we see the world, and in turn, interpret visual imagery. During the past hundred years, technological advancements have further altered our interpretation of the visual. During the past two decades, the world has become a global community, despite the barrier of languages. As shown through the universal usage of sign systems, such as text emojis, certain images and symbols have become a universal form of communication.

Serafini, while demonstrating the need for intentional visual literacy through instruction geared towards multi-modal forms of literature, illustrates the point that text with images is processed differently than text alone by the reader and requires additional classroom instruction concerning interpretation of images (Serafini 86). This seems a relevant point as texts and forms of educational media have become increasingly multi-modal with the addition of photographs, infographics, and graphs.

However, he wrote his paper, "Reading Multi-modal Texts: Perceptual, Structural and Ideological Perspectives" in 2010. Since then, the current generation of students have spent their youth in a world of cell phones, video games, YouTube and social media. These platforms have shaped their understanding of the world, as well as their system of symbols. This generation has "grown up" with multi-modal sources of information and are accustomed to interpreting them. While multi-modal texts that require prior knowledge of specific subjects would benefit from such a strategy, designers of educational media could draw on the existing schema of symbols and references that the students of today already understand and use. This would require an intensive study of today's pop culture, including social media communication, memes, videos, etc. Although intensive research into the current semiotics of today's students are beyond this study, the

importance of communicating with images and symbols familiar to the reader must be considered in any design.

Another consideration concerning multi-modal design is the integration of modes beyond text and images alone. Schiavonne's analysis of current writing composition textbooks discusses whether current texts utilize textual, visual artifacts and multi-modal approaches in ways that scholarship advocates. Additionally, he discusses whether textbooks facilitate both consumption and production of multi-modal material. Traditionally, writing textbooks encourage the production of textual content, however, according to Schiavonne, experts of multi-modal instruction recommend texts that encourage visual artifacts as well. According to Schiavonne:

> Textbooks might create challenges for instructors hoping to teach in ways that engage recent theoretical developments in visual and multi-modal composition. Although these textbooks overwhelmingly privilege consumption of multi-modal compositions, there are still opportunities for these textbooks to be used in ways that engage with theories of visual and multi-modal production, particularly assignments that prompt the production of visual and multi-modal artifacts might best encourage theoretically grounded instruction. (359-360)

The result of her analysis concluded that there is a disparity between multi-modal theory and textbook design. She suggests that teachers should not depend on textbooks as the sole source of instruction, due to these discrepancies. However, she also points out that teachers may not be properly trained in teaching multi-modal practices. This indicates that textbook design that supports multi-modal theory could benefit the modern classroom should include training for instructors.

Digital Books versus Physical Books

Disfluent font research has focused on physical texts. In today's world, digital texts have become ubiquitous in and out of the classroom. Schools offer textbooks on-line in lieu of physical textbooks. While many speculate that physical books may disappear in the future, research suggests that readers still prefer physical books in certain situations indicating that both digital and physical books have their place. According to Bergstrom:

> The printed book is preferred when reading to children and when people want books which can easily be shared with others. E-books, on the other hand, are preferred when traveling or commuting and when people want to be able to get a book quickly.

In the article, "Print versus digital texts: understanding the experimental research and challenging the dichotomies," the argument is made that the majority of research has pitted digital against physical texts, whereas they should be viewed as complementary (Ross et. al). Research has suggested that students who read expository and narrative linear texts exhibit better reading comprehension when reading paper compared to digital (Mangen et. al. 61). It should be noted that while some studies have shown an advantage for print pages in regards to reading comprehension, some studies do not (Ross et. al). Page scrolling, navigation and display have been cited as deterrents in digital screen reading, as well as eye fatigue due to illumination (Ross et. al). These deterrents are not universal among e-reader technology, since there are various modes of digital reading. Specialized e-readers are not lit from the inside and do not cause eye fatigue. Applications and e-readers such as Kindle no longer require scrolling, but with the touch of the screen, a page is turned.

While the tactile presence of a physical book is preferred by many readers and students, the ease and potential of digital books cannot be ignored. “Forms of inscription with greater permanence have often been favoured due to their durability, although by nature the permanence restricts the ability to creatively explore the work’s materiality” (Rowberry).

One of the obvious benefits of digital texts is the ability to change fonts with a click for an entire book. Kindle has several fluent options and a disfluent font developed for dyslexic readers. Additional disfluent fonts could be added into the programming of e-readers, taking advantage of the disfluency effect. Digital formats of texts have the capability of integrating interactive commentaries, videos and animated illustrations, adding meaning to the content in creative multi-modal solutions.

New ways of designing e-books have been explored. “The contemporary debate about the future nature of book content naturally flows into a discussion of how to design the presentation of that content” (Kenna 216). The design of digital books is just as crucial as physical, yet the majority of e-books include scant imagery and fluent fonts, both of which are based on the assumption that the letters should be inconspicuous and easy to read with little to no distraction from other elements on the page. Digital literature can enhance the interaction of text and image in new and inventive ways enhancing educational outcomes, as well as reader enjoyment. “Sophisticated new forms of literature can emerge through the interconnection between the creative expression of natural language and the rigid structure of code” (Rowberry).

A particularly creative and popular e-book created as an Apple application is T.S. Eliot’s *The Waste Land*. Eliot’s poem is a “deep” text. It is poetic, strange, multi-layered and very difficult to comprehend.

The creators of the application sought to make this intense and strange text, often reserved for scholars, accessible to those outside the "scholarly" world. The resulting text is multi-modal, and intertwines word, image, sound and video. According to Kenna:

> From an interactive perspective, the text and sound are also intertwined. If the reader touches a line of the poem while the poem is being read, the audio jumps to speak that line of the poem and continue the reading performance from that point. The effect is – touching any line of the poem in the 'Readings' section will cause that line to be read aloud. The words speak in response to the reader's touch. (216)

Included in the e-book are handwritten notes by the author and his proofreaders, videos of celebrity recitations of the poem, and various other interactive elements, making the application an immersive experience. "The net effect is the seamless interactive integration of text, sound and moving image" (Kenna 215).

Conclusion

Intentional typographical and multi-modal design can enhance the comprehension and retention of the content. Current research suggests that a desirable text disfluency enhances reading comprehension and retention by enabling a deep cognitive processing. (Chih-Ming Chen & Yu-Ju Lin 553; Diemand-Yauman, et al. 114; Faber, et al. 914; French, M. M. J., et al. 301; Geller, Jason, et al.1109; Halin, et al. 31; Oppenheimer D.M & Frank M.D. 1178). Research concerning the cognitive affects of handwritten letters, which are disfluent for the modern reader of English, have revealed a deep process that suggests more than just a perceived difficulty and novelty (Longcamp 1256, Qiao 1796). This interaction of multiple modes of communication, including word and image, has been coined multi-modal design and has been shown beneficial in educational materials (Schiavonne 358, Serafini 85).

A study of Irish monastic culture and *The Book of Kells* reveals a method of design and reading that facilitated a deep, meditative process for the medieval reader, enhanced by handwritten letters, interactive imagery and semiotic page design (Doyle 53; Jones; Pulliam; Ward). The images informed the message of the text in a similar way that modern graphic novels employ text and image to deliver a story (Paris-Popa 133). The design of educational materials and books would benefit from disfluent fonts and interactive imagery, following the philosophy of the *Book of Kells* and aspects of the graphic novel, culminating in a new generation of multi-modal media.

Recent research suggests that disfluent fonts cause the reader to slow down and deeply process reading material, resulting in enhanced comprehension and retention (Chih-Ming Chen & Yu-Ju Lin 553; Diemand-Yauman, et al. 114; Faber, et al. 914; French, M. M. J., et al. 301; Geller, Jason, et al.1109; Halin, et al. 31; Oppenheimer D.M

& Frank M.D. 1178). The difficulty of the font does not interfere with reading as previously thought; it often enhances the outcomes. According to this current research trend, educational reading is more effective when the reader slows down and allows a deeper mental processing, This can be accomplished through using disfluent fonts and through multi-modal page design, combining imagery and text to construct meaning.

In past eras, reading was a slow, contemplative process. Handwritten letters were elegantly arranged with images. While reading, quality was valued over quantity and a deeper interaction with the text resulted. This research and following analysis of the studies mentioned explore the disfluency effect and the role that illuminated manuscripts could have to inspire the design of modern educational texts.

Evaluative Research: Evidence Based Design

The evaluation of credible research concerning the Disfluency Effect reveals font characteristics that have shown positive results for reading comprehension and retention, as well as aspects of fonts that resulted in a null Disfluency Effect. Since some studies have not shown a positive effect, there has been criticism towards the theory. A visual graphic organizer has been created that clearly depicts the results from published studies.

The graphic organizer (Fig. 2-4) depicts the effectiveness of the variables and fonts from various studies and the results. By visually organizing this information, certain disfluencies can be easily distinguished. A positive Disfluency Effect was found in studies with fonts that mimic handwriting (Diemand et. al. 114; French et. al. 301; Lee; Weltman & Eakman 156; Eital et al. 57; Seufert et al.). Grayscale above 50% did not seem to affect the disfluency effect. Haettenshweiler was used three times and does not mimic handwriting, but had a positive effect. This could be due to the added difficulty of the bold letters and large size variance of strokes, creating an unfamiliarity of the font. Paper was used the most, but compared to the negative reports, paper versus screens do not seem to affect the results. Easy-to-read handwritten (by teacher) cursive was found to be effective, but it was not disclosed if the students had the skills of handwriting cursive, which is an important factor since the disfluency of cursive may surpass the threshold of positive outcomes if the students have never learned to write in cursive.

A negative disfluency effect was found in several studies (Rummer et al. 57; Eitel &Kuhn 107; Magreehan et al. 35; Lehmann et al. 1). These studies used a very light grayscale or fonts that mimic cursive. Magreehan conducted five studies, all of which did not show a

positive disfluency effect. However, Magreehan's fonts were light gray and displayed pairs of unrelated words on a computer screen. The participants were asked to recall the paired associate, three of the studies included over 60 word pairs, two included 32 word pairs. The Magreehan studies did not evaluate comprehension, but retention of a plethora of unrelated words, and the difficulty of the task may have impacted the results.

The comparison and analysis of the existing disfluent font studies revealed consistent findings. The studies that did not find a positive disfluency effect utilized light gray fonts (less than 50% grayscale) and difficult-to-read cursive lettering and fonts. The studies that found a positive disfluency effect consistently used fonts that mimicked handwriting, such as Monotype Cursiva, and when a grayscale font was employed more than 50%.

The conclusion of this analysis suggests that fonts that mimic handwriting (not cursive) are the most conducive for reading outcomes. The letters in these fonts are medium weight and medium spaced. The commonly confused letters, such as b and d, tend to be differentiated and the lower cased a is closed like the handwritten form: *a* instead of a.

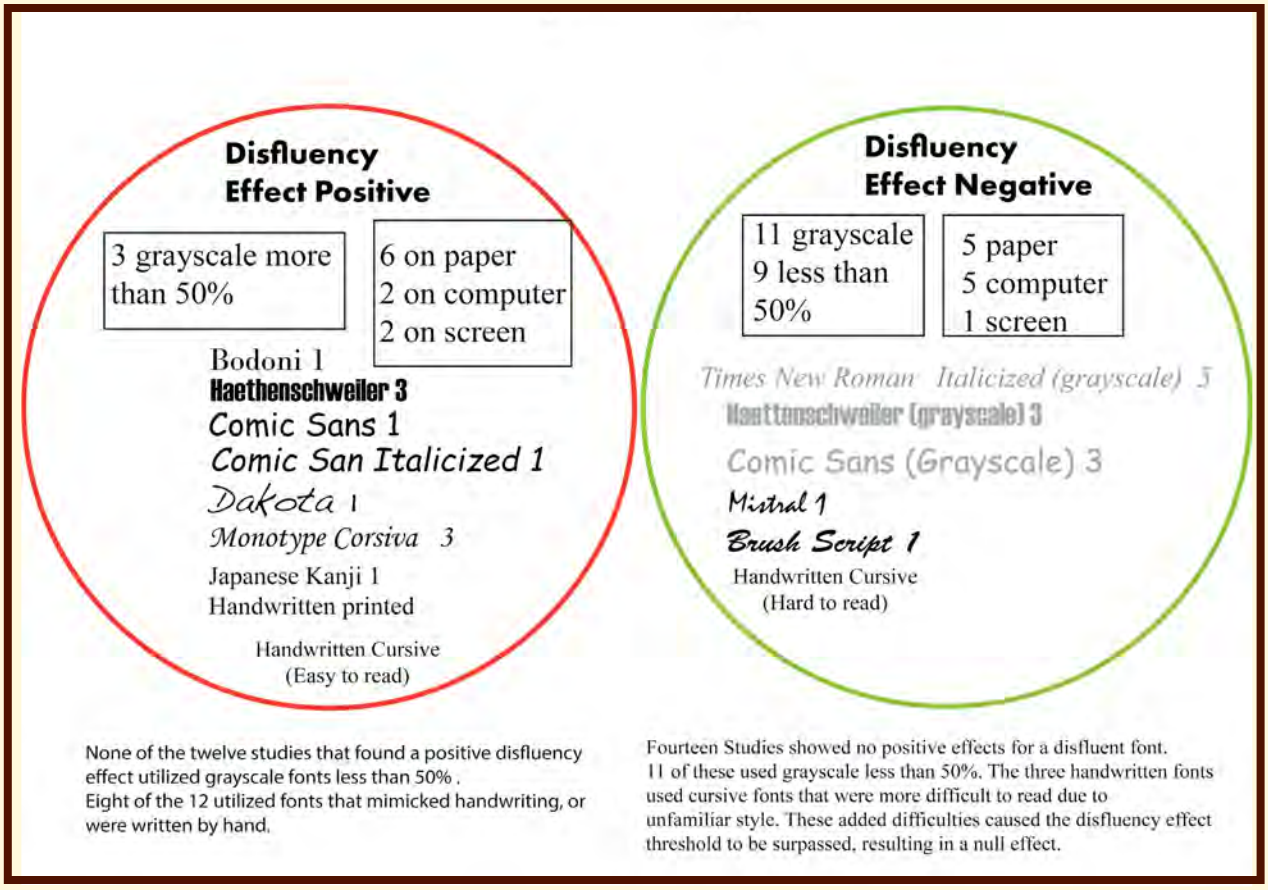


Fig. 2-4 Results of Disfluency Effect Studies

Secondary Research: Multi-Modal Teaching Instruction

Multi-modal texts require instructors knowledgeable about how to teach and implement the materials in effective ways. Although academia prefers plain alphabetic text design, the inclusion of muli-modal text in the classroom has gained attention and popularity (Goodling 561). Multi-modal texts are a common mode of information for high school students outside of the classroom, advanced strategies for processing the texts can encourage further discussion, enhancing the classroom experience. Not all instructors are knowledgeable about teaching literature through multi-modal texts at the high school level (Walsh 211). At its core, multi-modal literacy includes both the usage of multi-modal texts and multi-modal production by students as a response to the text.

The first aspect of evaluating secondary research of multi-modal teaching is to inform the design of the text, both printed and digital. The second is to consider how a well designed multi-modal text can be used in the classroom in the most effective way, thus informing the content of the teacher's manual.

According Frank Serafini, "It is through widening our analytical lenses and expanding students' interpretive resources and repertoires that we will support the development of literate human beings in our classrooms" (86). He describes three perspectives to consider when "reading" a multi-modal text. The first is the perceptual analytical perspective which considers the text as a visual object. As a visual object, the focus is on the visual aspects and the meaning intended and constructed. This includes borders, text placement, fonts, imagery, and how they interact with each other.

The second perspective is the structural analytical perspective. This lens focuses on text as a multi-modal event. The text is constructed in a particular time and space, and the intentions of the designer and interpretor vary accordingly.

The final perspective is the ideological analytical dimension which considers text as a sociocultural artifact. The lens of the creator and viewer are dependant on culture, gender, and power status. These perspectives change the way that the text is read. Analyzing a text from these angles shift the "reading strategies" of the classroom. Instead of focusing primarily on the word meanings, the text is analyzed in a similar manner that paintings and visual artifacts are analyzed in a fine arts classroom.

An instructor who teaches multi-modal texts must use these strategies when planning literature lessons. The activities and discussions that the instructor facilitate need to be guided by these perspectives. In practice, this can take many forms and has unlimited possiblities. The beauty of multi-modal literacy instruction is that students of all learning styles can engage with the texts easily.

While analyzing the text, students may chart the visual aspects, discuss the origin, and journal. During the reading of the text, audio readings and videos can complement the visual reading. As a response, students can create plays, dances, stop-motion videos, powerpoints, paintings, comic strips, storyboards or engage in a Socratic Seminar. These examples give a few practical solutions for instructors, yet they are no where near exhaustive. Each class has its own dynamics, learning styles, and talents. Multi-modal instruction should be open-minded enough to be flexible to accommodate these variables.

Multi-modal texts incorporate semiotics in multiple modes of communication, utilizing sound, image, video and hyperlinks. The designer of multi-modal texts should be aware and knowledgeable about the modes that current students utilize to communicate and build on their experience and knowledge. At the same time, the designer needs to focus on how to incorporate excellent design through these modes. Students today interact multi-modally on a daily basis outside the classroom and this has changed the way they read and process information. For example, reading webpages and iphone screens have resulted in a radial reading as opposed to a traditional linear reading, which can have bearing on design aspects. According to Walsh:

> The challenge for literacy educators is to consider to what extent digital technologies can be incorporated within classroom literacy programs without reducing the importance of the rich, imaginative and cultural knowledge that is derived from books. (211)

And that is the crux of this design project. The value of the written word must not be sacrificed for technology, however, technology and design can be used to illuminate the beauty of literature, and encourage a love for literature within students.

Proposed Outcome

The proposed outcome of this thesis design project is to enhance educational outcomes through graphic design aspects of text materials. Since the confidence of the students will improve, this intentional design will encourage the love of reading and produce life-long learners.

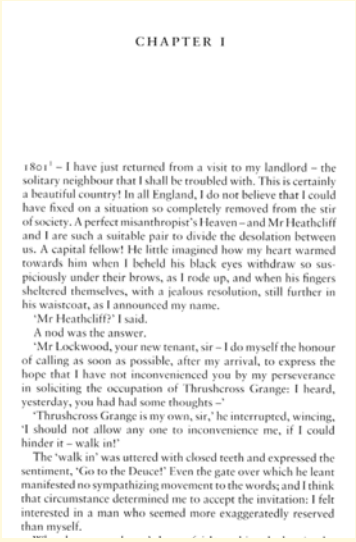
Target Audience

The target audience for this design project is multi-faceted. Primarily, the focus will be American high school English literature students who would be utilizing the project material in their studies. The design, aesthetics and usability must work well for the student. The teachers in these classrooms must see the value in the design and the research, in order for the designs to be implemented. Publishers of high school curriculum are a third target group.

Key Competitors

Classroom teachers rely on trade book publishers for literature that is read in class. These books are inexpensive, mass-produced paperbacks. The key publishers of trade books used in the classroom are HarperCollins, Macmillan, Penguin Random House, and Simon & Schuster. While evaluating their page design of literature, two main aspects were noted in the physical formats. Times New Roman is the fluent font and the design is simple and plain. Most trade books from these publishers have a kindle option. The kindle editions give the user options to change design aspects of the page, including font, page layout and colors. Depending on the title, there are around ten font choices which are fluent fonts similar to Times New Roman and Arial (Helvetica). A font designed for Dyslexic readers is an option as well, which is a disfluent type. The Kindle editions of the classics reviewed

are designed simply, with little to no ornamentation and imagery. While publishers of educational materials have begun to offer Online, digital, multi-modal editions of literature for elementary school, this is not common among the publishers of high school curriculum. Examples of page format and fonts (Figs .2-4, 2-6) depict general layouts of literature books read in high school.



CHAPTER I

1801.—I have just returned from a visit to my landlord – the solitary neighbour that I shall be troubled with. This is certainly a beautiful country! In all England, I do not believe that I could have fixed on a situation so completely removed from the stir of society. A perfect misanthropist's Heaven – and Mr Heathcliff and I are such a suitable pair to divide the desolation between us. A capital fellow! He little imagined how my heart warmed towards him when I beheld his black eyes withdraw so suspiciously under their brows, as I rode up, and when his fingers sheltered themselves, with a jealous resolution, still further in his waistcoat, as I announced my name.

'Mr Heathcliff?' I said.

A nod was the answer.

'Mr Lockwood, your new tenant, sir – I do myself the honour of calling as soon as possible, after my arrival, to express the hope that I have not inconvenienced you by my perseverance in soliciting the occupation of Thrushcross Grange: I heard, yesterday, you had had some thoughts –'

'Thrushcross Grange is my own, sir,' he interrupted, wincing, 'I should not allow any one to inconvenience me, if I could hinder it – walk in!'

The 'walk in' was uttered with closed teeth and expressed the sentiment, 'Go to the Deuce!' Even the gate over which he leant manifested no sympathizing movement to the words; and I think that circumstance determined me to accept the invitation: I felt interested in a man who seemed more exaggeratedly reserved than myself.

Fig, 2-5

Brontë Emily. *Wuthering Heights.* Penguin Books, 1995.

This is an example of a trade book page that is typically used in the classroom, published by one of the main competitors, Penguin Books.

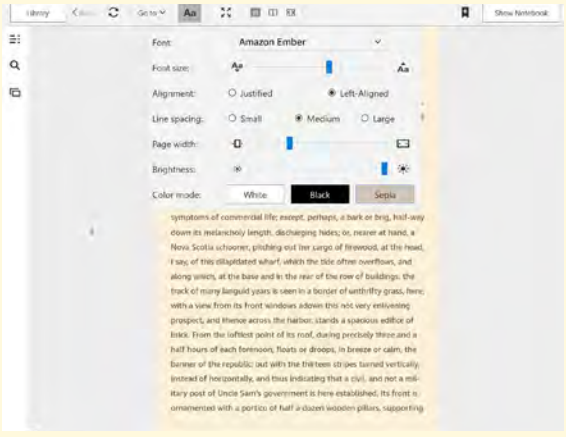


Fig. 2-6
Screen shot of Kindle design options that a user has including font size, type, page width, line spacing and color choices Hawthorne, Nathanael. *The Scarlet Letter.* Kindle. 2018.

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Market of Graphic Literary Novels

Although comic books and graphic novels are not commonly used in the high school classroom, there is a niche for literary graphic novels. These literary graphic novels range from modern books, such as *The Handmaid's Tale* by Margaret Atwood to classics such as Sir Arthur Conan Doyle's *Sherlock Holmes*. Some use the unabridged text, others use revised versions to fit the format better, or to use language that is easier to understand.

During my visual research of classic graphic novels, I came across an anthology of Edgar Allen Poe's poetry at my local library. Interestingly, each poem contained a different font, which is a strategy that could be used to build on the disfluency effect since it would combat the loss of novelty for a disfluent font. This book introduced me to the work of illustrator Gareth Hinds. (Fig. 2-7)

Fig. 2-7. Gareth Hinds. *Poe: Stories and Poems.* Candlewick Press. 2017.
POE: A GRAPHIC COLLECTION. Copyright © 2017 Gareth Hinds. Reproduced by permission of the publisher, Candlewick Press, Somerville, MA.

Gareth Hinds has illustrated several literary graphic novels based on classic narrative poetry. These include *King Lear, The Odyssey, The Iliad and Beowulf.* His use of various mediums, styles and lettering combine to create stunning visual literature geared towards the high school student. His work is an excellent example of utilizing disfluent fonts with interactive imagery in literature for students in the higher grades.

Fig. 2-8. Page from *Beowulf,* Gareth Hinds, Self Published. 2007.

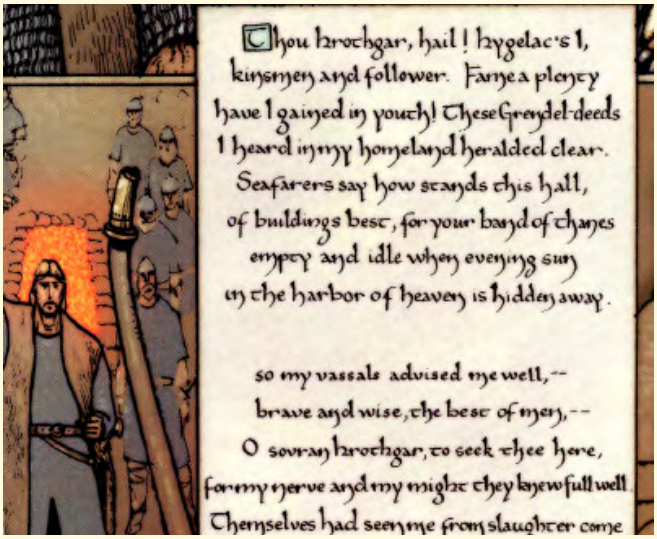


Fig. 2-9. Hand lettering for the text of *Beowulf,* Gareth Hinds, Self Published edition. 2007.

Visual Solution

I decided to illustrate Robert Browning's ballad poem "The Pied Piper of Hamelin" for my visual solution. Although known as a "children's story," the vocabulary and language is rich and the story is in-depth. It is a good example of a classic poem that could be read in a high school literature class room. While text books across the curriculum have begun to utilize multi-modal design, high schools rely on mass-produced trade books for literature. The addition of disfluent fonts has not been incorporated in educational texts. This is a relatively untapped market for books with both aspects included.

Physical Text

The template for the physical text booklet designed with disfluent fonts and interactive imagery is the size of a comic book.

The size and format of a comic book lends semiotic meaning to the book purely from its association with comic books and graphic novels. Additionally, the proportions of the page provides an excellent canvas for illustrative design elements. The other aspect of the comic book format is that it is an inexpensive option. It is more fragile, however, than other formats. Originally I wanted something formidable, strong and beautiful, something students could value. Practically, that just wouldn't work in today's classroom. The high cost would be prohibitive. But comic books ARE valued in our culture. Many adults hoard them in boxes, protected by plastic sleeves. They are prized possessions. Among teenagers this tradition has continued. Surprisingly, something fragile and inexpensive has become a physical relic that is treasured. Although I cannot predict whether they would be treasured in a classroom, or last a year, the price would make it affordable for each student to have their own copy to keep.

Digital Book

The digital edition is a multi-modal text with identical imagery and fonts as the physical booklet. However, this format will explore the potential of digital text, with an extra page containing hyperlinks to a documentary, and an audio reading, The dimensions will be altered to accommodate an iPad.

Teacher's Guide

The instructional guide will give guidance on how to teach multi-modal literacy skills using the text. It will be designed to give the instructor strategies to fully utilize the potential of both the digital and physical multi-modal texts in the classroom. The main focus, however, will be on visual analysis since most literature teachers have not traditionally needed this skill set. This will be a digital manual in PDF form.

Design Considerations

Durability is an issue with classroom materials. Many school districts have limited funds and the cost of replacing classroom materials and texts can be a detriment to the budget. The traditional text book can last years. Although costly, the cover is durable and paper is thick. Trade books seldom last longer than a few readings, but the cost of a trade book is a fraction of a text book or even a hard cover copy. When determining the cost of an illustrated physical text, the time and skill of the designers need to be considered, pushing the cost above a trade book. If the school district and curriculum developers understand the value of such texts, the cost can be justified.

The constraint of the digital book is the platform decision and the consideration of what would be most beneficial for a high school classroom. The size format of the various tablets, computers and phones that students use dictate the size of the design. To have one illustration work for multiple formats, clipping may occur, altering the composition.

The constraint of the teacher's guide is understanding how the multi-modal semiotics could be interpreted by both the teacher and the students. There is a generational gap between the instructor and students, which can result in various interpretations of symbols and images. Additionally, classic literature often references literature and art that may not be known by the modern reader.

Solutions for Considerations

The physical component is the dimensions for a comic book. The cost of printing comic books is a feasible option to lower the cost, despite the lack of durability.

The digital text for this project will be formatted with a 4 by 3 proportion, the proportion of an iPad screen. Apple has long been the favorite choice for many educators. However, the illustrations have a thick black border, which may be clipped slightly to accommodate other formats without a major compromise of composition.

The content of the teacher's manual focuses on existing aids for multi-modal literacy. This enables the practical use in the classroom to be as optimal as possible. The main focus, however, is on the visual analysis of the text, since this is the area that literature teachers may have the least skills.

Chapter Three: Pre-Process

Decisions

The choice of literature was extremely important because it would determine my visual outcome, style and methodology.
This was not an easy choice.

I searched for a classic piece of literature, either a short story or ballad poem, which was common domain property and short enough to illustrate within a few weeks. To keep within the inspiration of Celtic bookmaking, I wanted either something written during or about the medieval era. However, I explored other options, including Robert Service poems about the Alaskan frontier of the 1800s, T. S. Eliot's poetry and Victorian short stories by Sir Arthur Conan Doyle.

The medieval prose and poetry I originally explored, including *Beowulf*, *Sir Gawain and the Green Knight* and *Le Morte D'Arthur* were too long to finish illustrating within a semester's time. I then explored the idea of using a fairy tale or a folk tale. Although many consider such stories to be appropriate only in the elementary grades, I would disagree.

My decision process led me to "The Pied Piper of Hamelin" by Robert Browning. This ballad poem is based on a German legend based on true events. It is just the right length, has challenging vocabulary, and vivid verbal imagery. It is also a part of the public domain. Another interesting fact about the author is that he wrote the poem, "Childe Roland to the Dark Tower Came", this later inspired Stephen King's *Dark Tower* series, a currently popular book series and television show.

There was another aspect that interested me about the Pied Piper. Most legends follow a basic structure. Joseph Campbell, in his book *A Hero of Ten Thousand Faces*, discusses how throughout history, the structure of myths across the world are consistent. There are twelve stages with a resolution of a victorious hero at the end. At first appearance, the Pied Piper legend does not seem to follow this structure. However, after close analysis, I realized that the story has many components of the hero cycle, including a cave experience. When you consider the betrayal by the townspeople and the outcome of the story, perhaps the Piper was a hero after all. The story is open to interpretation. The cave experience has philosophical implications and can easily lead into a discussion about Plato's cave allegory.

The other critical decision was the font choice. The font needed to have a positive disfluency, yet stylistically appropriate for the text and illustrations. After an analysis of the studies that resulted in a positive disfluency, I wanted to choose a font with letters that are close in style and form to the positive results and that are based on handwriting. As I analyzed the existing studies and the characteristics of the fonts that enhanced educational outcomes, I decided on a font based on calligraphy with a slant.

Previously I had studied Edward Johnston's resurrection of calligraphy in the early 20th century. Johnston created several fonts, all based on the forms of classic calligraphy. One of them is quite modern and is recognizable when you use the public transportation system in London. Another font, Foundational, was used to teach calligraphy writing to art students. It has a classic feel and beautiful proportions, and was inspired by classic Carolingian and Uncial lettering. The italicized version looks similar to Monotype Cursiva. When I considered other aspects of the letter, I was convinced that Johnston's Foundational Font was the text font for the project. For the titles and headings, I chose an Uncial-based font to complement the medieval story.

Brainstorming and Mood Boards

Once the text was chosen, I began brainstorming and planning the design aspects of the visual solution. I mind-mapped my best ideas. One of the aspects that I realized about the text during this process was how the term "Pied Piper" has become an idiom in our culture, however many are not familiar with the story and only have a loose idea of what the term means.

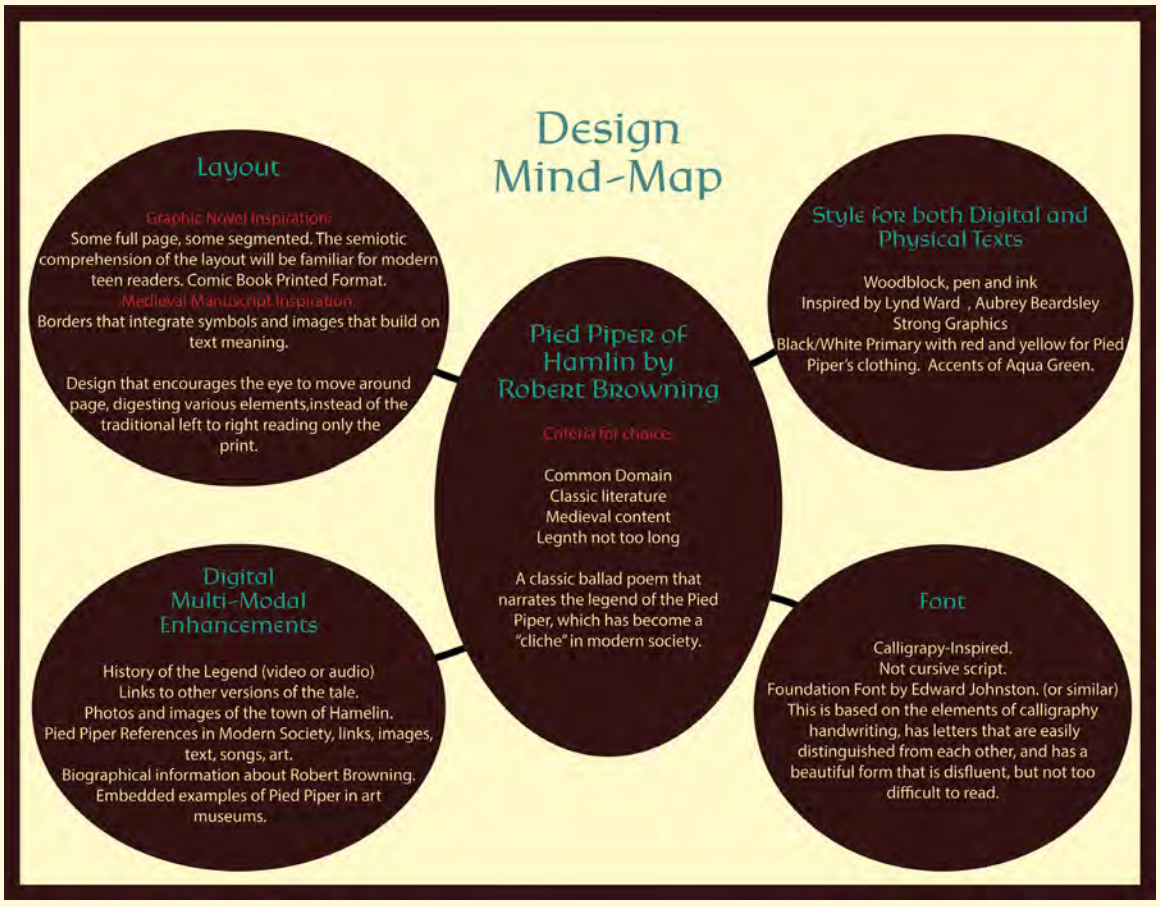


Fig. 3-1 Design Mood Board: Mind-Map

Fig. 3-2 Color and Font Mood Board

Style Inspiration was found in a plethora of sources. At first glance, the styles and sources seem at odds, yet there are common themes and elements. They are all informed with medieval concepts and ideas. The *Book of Kells* inspires an integration of animals and symbols into borders and letters. Lynd Ward's woodcuts were inspired by medieval woodcuts and utilized the "awkward" style to augment his work. Aubrey Beardsley's *Le Morte D'Arthur* was informed by medieval legends as well as medieval art. The Victorian illustrators, Arthur Rackham and Kate Greenaway both illustrated the medieval legend of the Pied Piper, among other fairy tales. At the same time, I researched layouts and styles of several modern graphic novels to ground my style and make sure my illustrations were relevant and able to communicate symbolically with today's readers.

I read through the text a few times and drew a lot of my choices from the text. The choice of colors derive directly from the main character wearing yellow and red clothing. My original idea was to have the illustrations black and white, with the exception of the Pied Piper. This method of color usage would help guide the eye throughout the text, and create focal points.

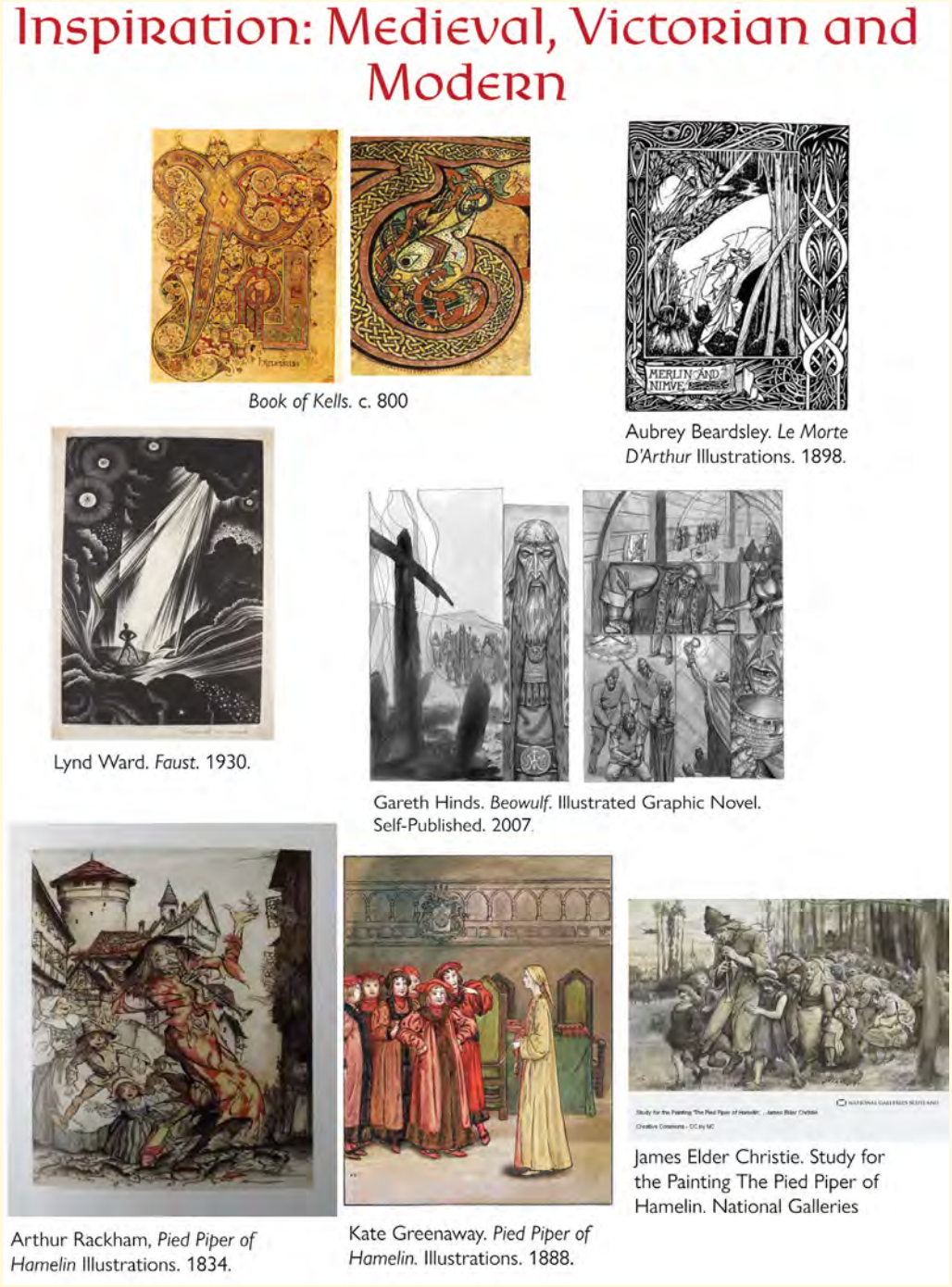


Fig. 3-3 Style Mood Board

Character Design and Sketches

The next step was to sketch and work on the character design of the Piper. Referring to the text, he had yellow and red striped clothing that looked odd and old fashioned to the wealthier townspeople. He was thin and tall. Browning's poem makes him sound like a gypsy or bohemian wanderer. Taking all this information together makes an exciting character to draw.

At the same time as I sketched the character, I experimented with "styles". Below is an example of the style exploration. I wanted to keep a little of the awkwardness associated with medieval wood block prints, yet keep the proportions believable enough to work.

Fig. 3-4 Style Character Exploration Sketches

The Setting

To give a sense of place in the illustrations, I needed to make sure the buildings and architectural aspects worked for a "German" medieval town. Of course during the 13th century, Germany was not a nation, but Hamelin is located in modern day Germany, in the state of Lower Saxony. For the past few months, I have had the opportunity of visiting several German towns and cities, and have photographed as I travel. What has amazed me is how there are still buildings being used that are from the 11th century on. There are also many remains of buildings and castles that are preserved. Not only the larger cities, such as Nuremberg and Regensburg, but many smaller towns have quaint medieval neighborhoods.

I viewed images of Hamelin on the Internet, and at first intended to go there to take photos, but it was far enough away that it could not be a day trip. Since many of the buildings and street scenes I saw were similar to those in my photos, I felt confident they would enable me to create the world of the Pied Piper well. While viewing Arthur Rackham's illustrations of the tale, I was convinced he used the background of Nuremberg.

One issue I resolved while sketching backgrounds was that the "onion" domes that are abundant throughout this part of Germany were built much later than when the story takes place. They may be beautiful, but they would not be authentic, so I had to modify any buildings with those domes in them.

Reference Photos for Setting

Fig. 3-5 Photographs of German medieval architecture. Rebekah Cochell.

Rough Thumbnail Sketches

The thumbnail sketches (Fig. 4-9) revealed to me how some of my ideas were not going to work, and others might. After doing a full set of these, I decided not to pursue the multi-frame layout of a graphic novel/comic book page.

Fig. 3-6

Detailed Pencil Sketches

The next step was to make detailed pencil sketches. During this stage I realized I needed to integrated different views and angles to make the compositions more interesting.

Fig. 3-7 Page 1 Layout

Fig. 3-8 Page 2 Layout

Fig. 3-9 Page 3 Layout

I decided to use two page spreads (the proportions below are the equivalent of two comic book pages), situating the main image by using the golden ratio (Fig. 3-10). This design choice was partly because medieval scribes and architects often used this ratio. The Greeks had termed it as the ratio of beauty. The choice was also pragmatic. Our eyes are conditioned to find these proportions pleasing. For the "pencil" sketches, I moved them into Photoshop, because it was easier for me to situate everything with the guides, as well as play around with the placement of text.

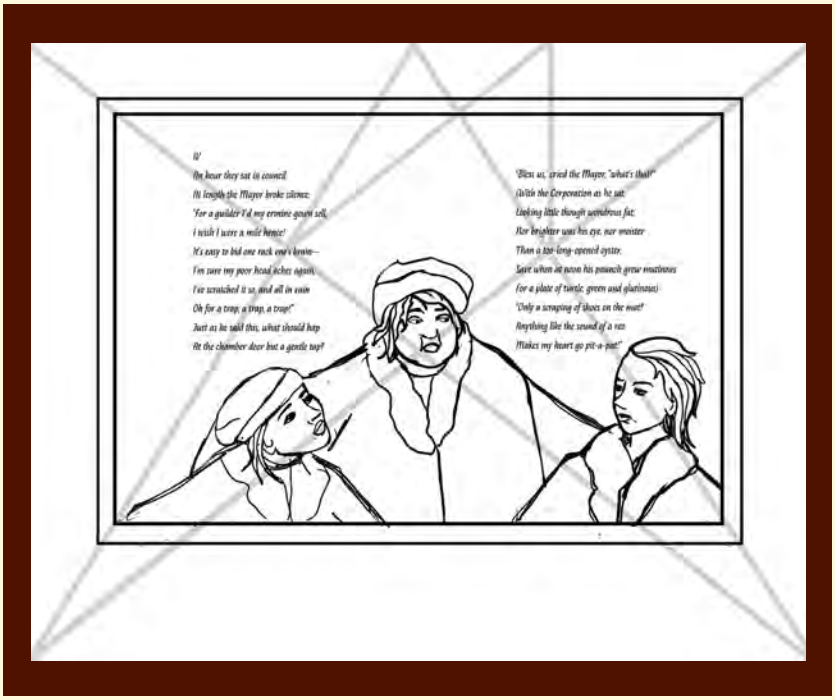


Fig. 3-10 Page 4 Layout with golden ratio grid

Below are a few of the pencil sketches. (Figs. 3-11 through 3-15)

Fig. 3-11

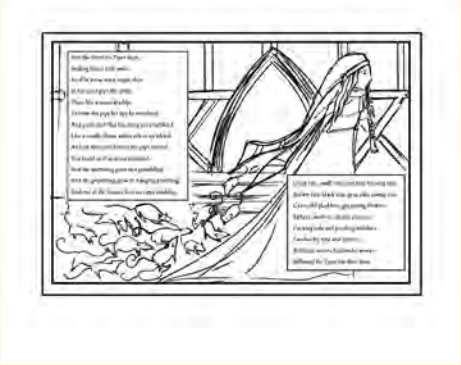


Fig. 3-12

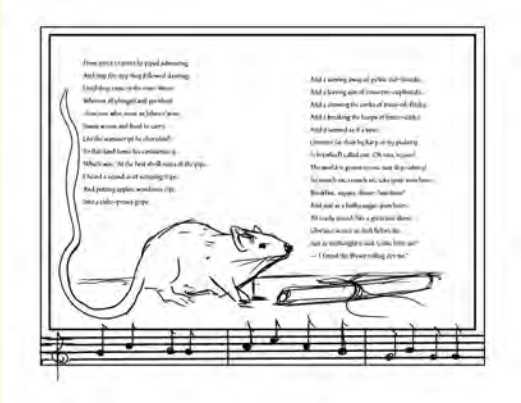


Fig. 3-13

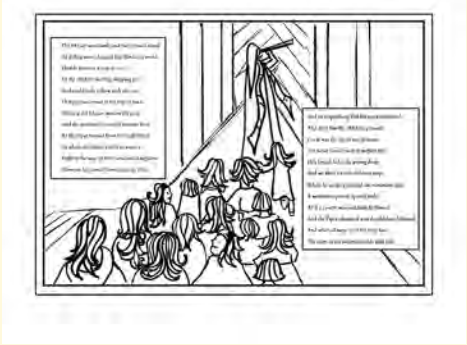


Fig. 3-14

Fig. 3-15

At this point, I was still unsure of how to handle the borders. Originally I had the idea of using intricate borders with symbols in them. I made a couple of different borders to see how it would look.

I was drawn to the borders in *Le Morte D'Arthur* illustrated by Aubrey Beardsley (Fig.3-16)

Fig. 3-16 Aubrey Beardsley. Illustration for Thomas Malory's *Le Morte D' Arthur.* Le Dent .1893.

My goal was to make a border with a woodcut look, Beardsley feel and integrated story elements. I was considering using the same border for all pages. Below is the attempt I liked the most. (Fig. 3-17)

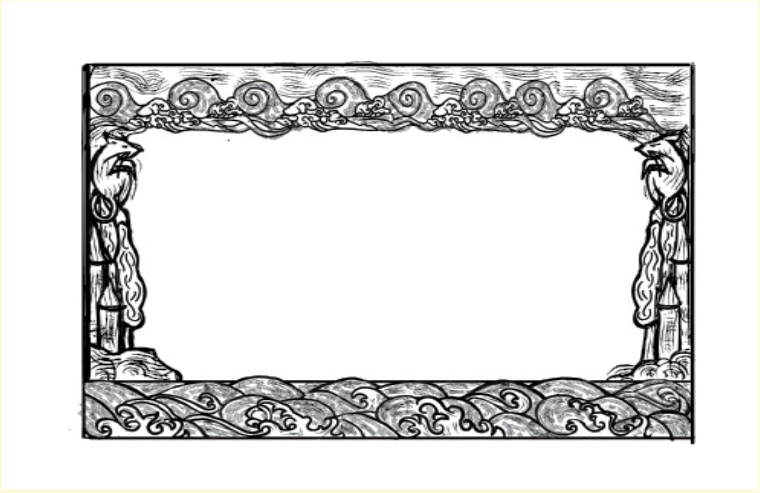


Fig. 3-17

However, once I placed an illustration into the frame, it seemed too crowded and too busy. (Fig. 3-18) The frame would only work for a text only page. The frame itself was made in Adobe Photoshop, but I then brought it into Adobe Illustrator because linocut brushes look better in Illustrator, in my opinion. I kept a smooth version, as well, in case I could integrate the border components later on. I will note that in my final version, I did not use any premade brushes, nor did I create a brush. I created each linocut line individually with a cutting away process using a sharp eraser brush.

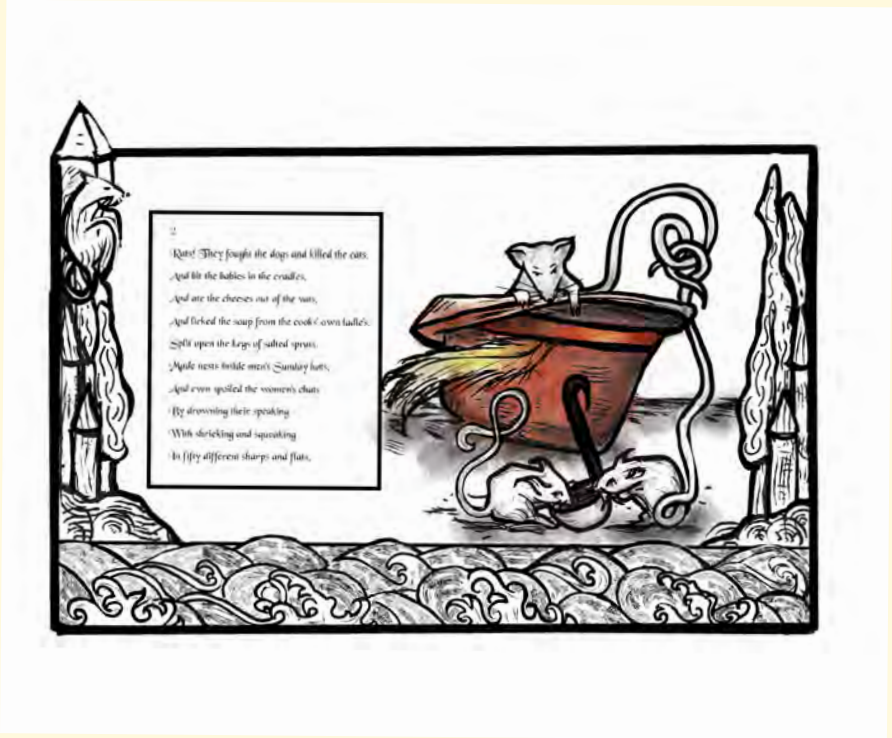


Fig. 3-18

Inking and Refining

Similar to the process of creating any graphic novel or comic book, my next step was to draw "inked" versions of the pages. During this stage, I modified or totally changed several compositions. I made the decision to keep a simple black border, with white frames surrounding the illustrations. Although not rich with symbolic imagery, the box frames enclose the story content, as well as create a focal area with a feeling of formality. I created cover illustrations, as well. The stages of inking and refining brought the illustration and text components together into unity. Other design decisions included using more black space and white lettering for the stanza titles. Below the process of various illustrations are shown as I inked and refined them..

Fig. 3-19 Inked Front Cover

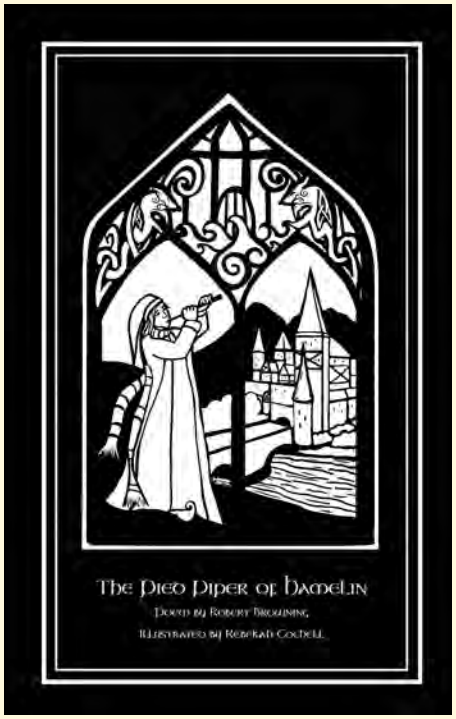


Fig. 3-20 Front cover further refined.

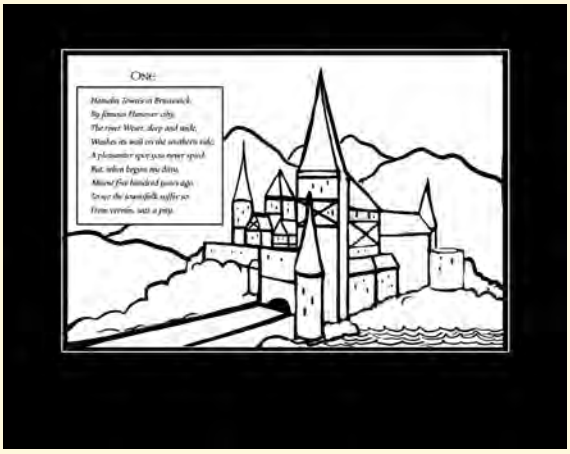


Fig. 3-21

Fig. 3-22

Fig. 3-23

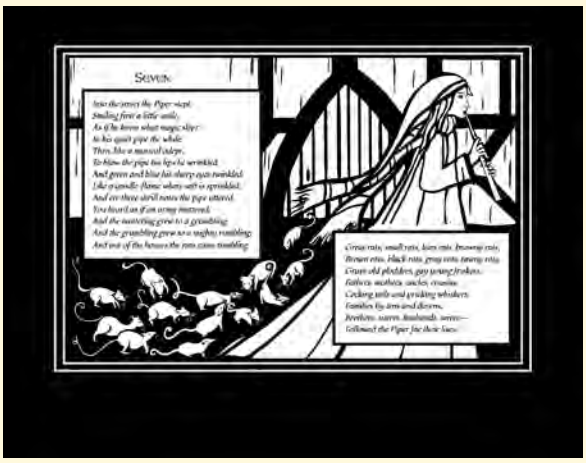


Fig. 3-24

Fig. 3-25

Fig. 3-26

Color and Further Refinement

The next stage was adding color. My initial idea was to have a limited color palette, mostly black and white with color being added only for the Piper. However, the result did not look as good as I thought it would. I made three versions of further refined illustrations and compared the results. I considered keeping the pages black and white, but the full color version worked as well. Below is an example of one of the pages with the three variations. (Figs 3-27, 3-28, 3.29)
Some other refinements included text spacing, shadows, and line work.

Fig. 3-27

Fig. 3-28

Fig. 3-29

In this layout example, I added some texture to create the feel of a woodcut. (Figs. 3-30, 3-31) I went through all the pages and made sure the frames and text style were consistent and that all the lines were clean.

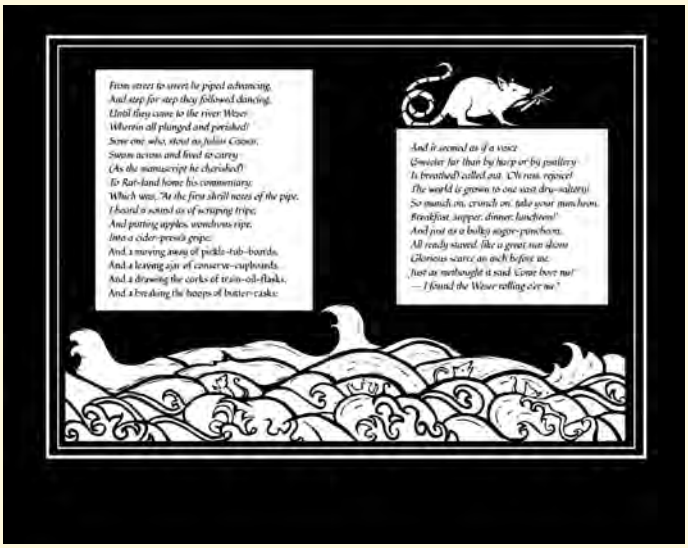


Fig. 3-30

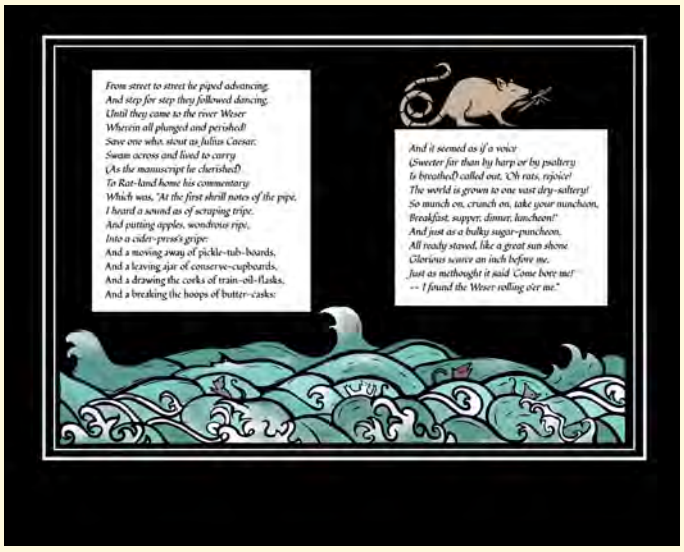


Fig. 3-31

Design of Instructional Guide

At the same time, I was working on the instructional guide to accompany the texts. Using the strategies and recommendations that the literature review and website analysis revealed. I gave a brief overview of what multi-modal literacy is, suggestions for multi-modal student responses and an overview of the types of questions to ask during a visual analysis of the text. I approached the visual analysis from the viewpoint of my own teaching experiences. As an art teacher, I would display a piece of art for the class to discuss. I had them study the piece for a few minutes and then I asked them pointed questions. These questions were meant to engage the students with the art and consider how the principles of design and elements of art were utilized by the artist. I kept the design of the document simple and used the actual illustrations to guide the suggested discussions. Below are examples of the page design and strategies. (Figs 3-32, 3-33)

Fig. 3-32

Fig. 3-33

The Digital Text

While working on the illustrations and writing the instructional guide, I was considering different options for integrating sound, video and internet links into the digital text. One option was for the audio and links to be integrated in each page. However after reading about multi-modal instruction, I took a different approach. I felt that the external links and extraneous materials would be distracting from the text, not exactly interwoven. As far as the audio, as much as I personally think audio books are great, actually reading the text audibly in the class as a group is not only recommended by multi-modal experts, but is an activity that draws students into the text effectively. It is the epitome of interacting with the text as a group. My solution was to create a page at the end of the digital book where internet links to an audio book, a documentary, biographical information on the author and other tidbits can be accessed. (Fig. 3-34)

Fig. 3-34

Chapter Four:
The Design Solution

The digital and physical texts both utilize the same illustrations. The digital text has an additional multi-modal link page and altered covers. The digital text is slightly larger, fitting a 4 X 3 proportional layout that corresponds with an Apple Ipad. The physical text is 19 pages, including the covers. The digital text is 20 pages.

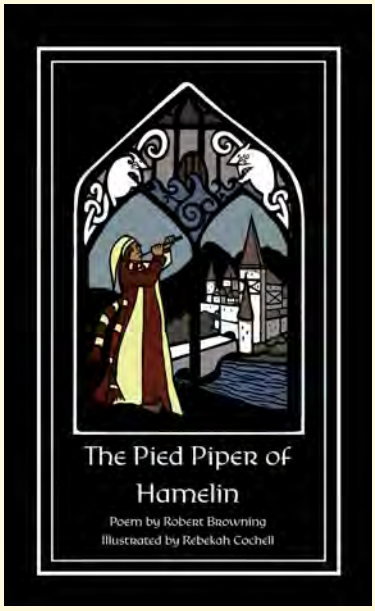


Fig. 4-1
Physical Text
Cover Page

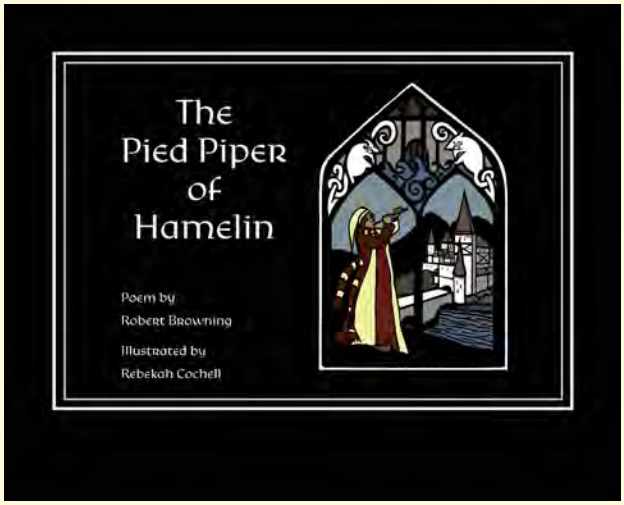


Fig. 4-2 Digital Text Cover Page

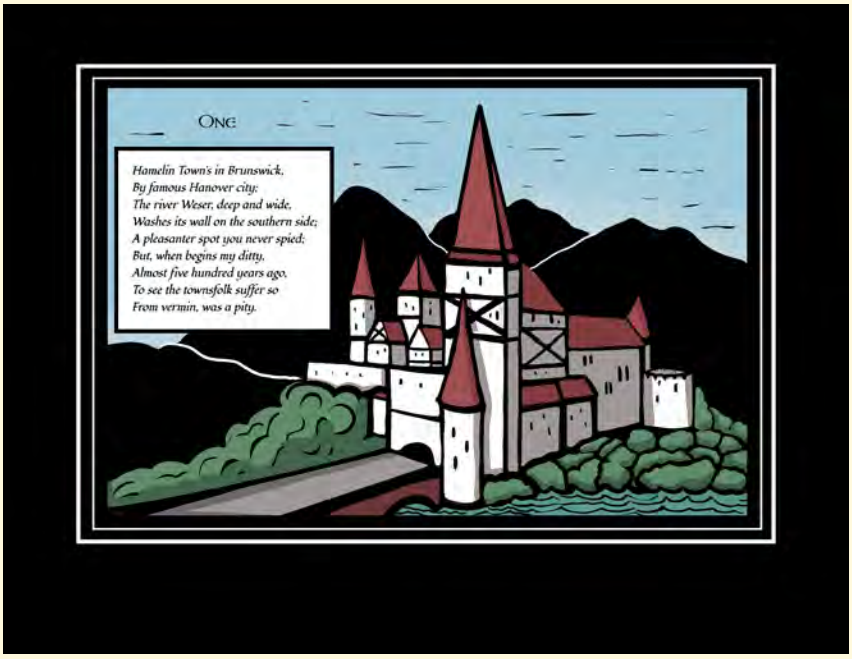

ONE
Hamelin Town's in Brunswick,
By famous Hanover city;
The river Weser, deep and wide,
Washes its wall on the southern side;
A pleasanter spot you never spied;
But, when begins my ditty,
Almost five hundred years ago,
To see the townsfolk suffer so
From vermin, was a pity.

Fig. 4-3


TWO
Rats! They fought the dogs and killed the cats,
And bit the babies in the cradles,
And ate the cheeses out of the vats,
And licked the soup from the cooks' own ladle's,
Split open the kegs of salted sprats,
Made nests inside men's Sunday hats,
And even spoiled the women's chats
By drowning their speaking
With shrieking and squeaking
In fifty different sharps and flats.

Fig. 4-4


Three
At last the people in a body
To the town hall came flocking:
'Tis clear,' cried they, 'our Mayor's a noddy;
And as for our Corporation—shocking
To think we buy gowns lined with ermine
For dolts that can't or won't determine
What's best to rid us of our vermin!
You hope, because you're old and obese,
To find in the furry civic robe ease?
Rouse up, sirs! Give your brains a racking
To find the remedy we're lacking,
Or, sure as fate, we'll send you packing!'
At this the Mayor and Corporation
Quaked with a mighty consternation.

Fig. 4-5


Four
An hour they sat in council,
At length the Mayor broke silence:
"For a guilder I'd my ermine gown sell,
I wish I were a mile hence!
It's easy to bid one rack one's brain—
I'm sure my poor head aches again,
I've scratched it so, and all in vain
Oh for a trap, a trap, a trap!"
Just as he said this, what should hap
At the chamber door but a gentle tap?
"Bless us," cried the Mayor, "what's that?"
(With the Corporation as he sat,
Looking little though wondrous fat:
Nor brighter was his eye, nor moister
Than a too-long-opened oyster,
Save when at noon his paunch grew mutinous
For a plate of turtle, green and glutinous)
"Only a scraping of shoes on the mat?
Anything like the sound of a rat
Makes my heart go pit-a-pat!"

Fig. 4-6


Five
"Come in!"—the Mayor cried, looking bigger:
And in did come the strangest figure!
His queer long coat from heel to head
Was half of yellow and half of red
And he himself was tall and thin,
With sharp blue eyes, each like a pin,
And light loose hair, yet swarthy skin,
No tuft on cheek nor beard on chin,
But lips where smiles went out and in—
There was no guessing his kith and kin!
And nobody could enough admire
The tall man and his quaint attire.
Quoth one: "It's as if my great-grandsire,
Starting up at the Trump of Doom's tone,
Had walked this way from his painted tombstone!"

Fig. 4-7


Six
He advanced to the council-table:
And, "Please your honors," said he, "I'm able,
By means of a secret charm, to draw
All creatures living beneath the sun,
That creep or swim or fly or run,
After me so as you never saw!
And I chiefly use my charm
On creatures that do people harm,
The mole and toad and newt and viper;
And people call me the Pied Piper."
(And here they noticed round his neck
A scarf of red and yellow stripe,
To match with his coat of the self-same check;
And at the scarf's end hung a pipe;
And his fingers, they noticed, were ever straying
As if impatient to be playing
Upon this pipe, as low it dangled
Over his vesture so old-fangled.)
"Yet," said he, "poor piper as I am,
In Tartary I freed the Cham,
Last June, from his huge swarm of gnats;
I eased in Asia the Nizam
Of a monstrous brood of vampyre-bats:
And as for what your brain bewilders
If I can rid your town of rats
Will you give me a thousand guilders?"
"One? Fifty thousand!" was the exclamation
Of the astonished Mayor and Corporation."

Fig. 4-8

Fig. 4-9

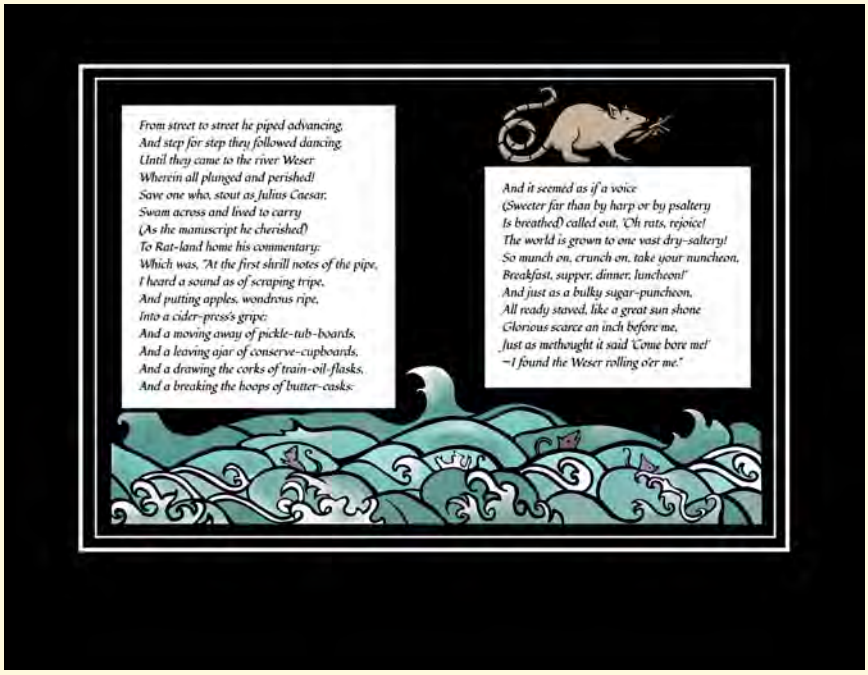


Fig. 4-10

Fig. 4-11

Fig. 4-12

Fig. 4-13

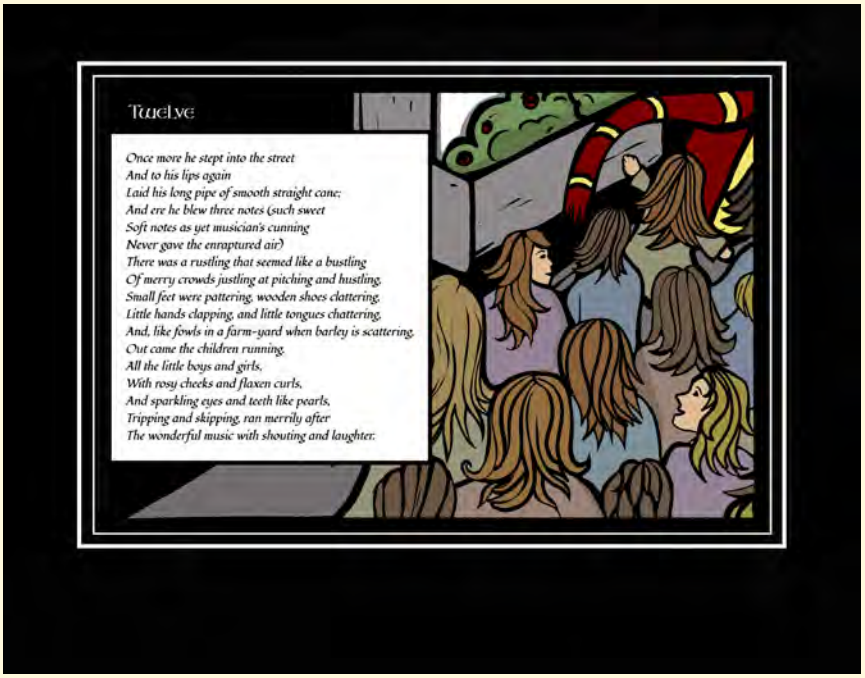


Fig. 4-14

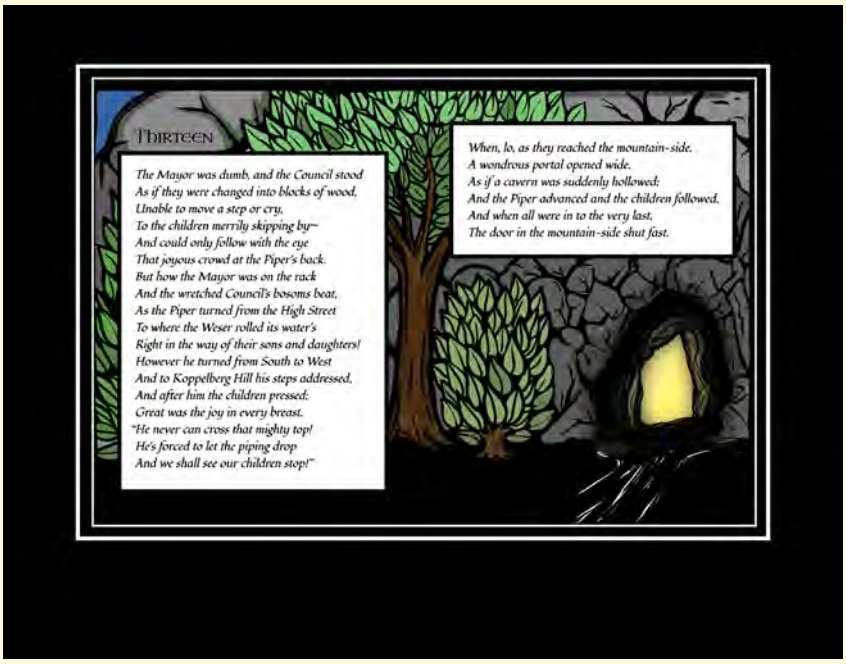


Fig. 4-15

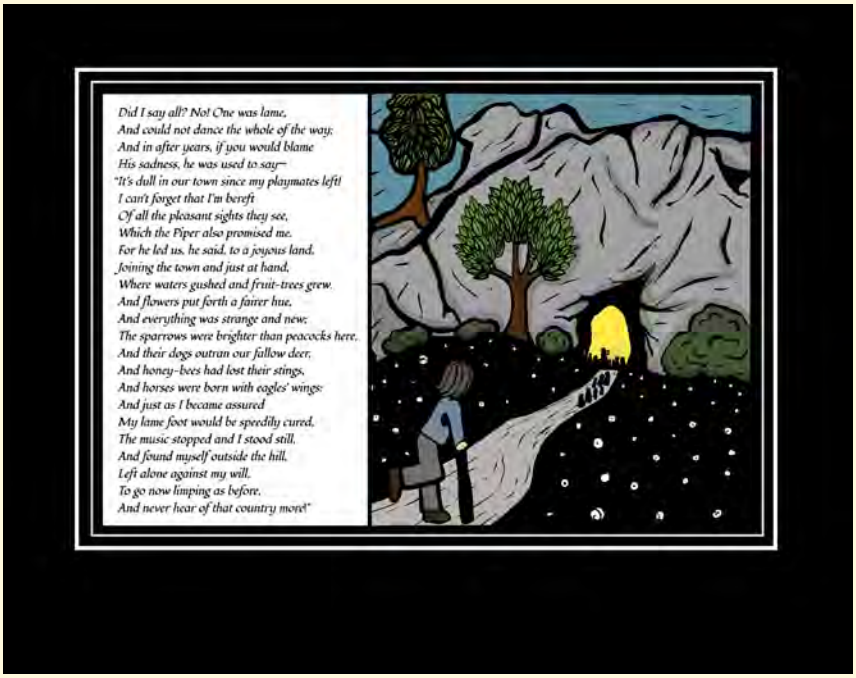


Fig. 4-16

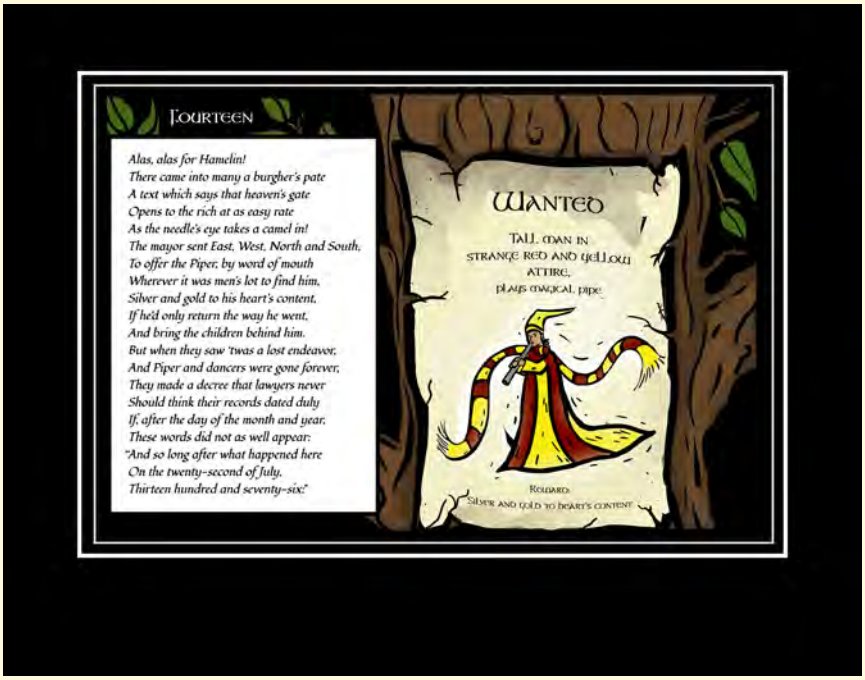


Fig. 4-17

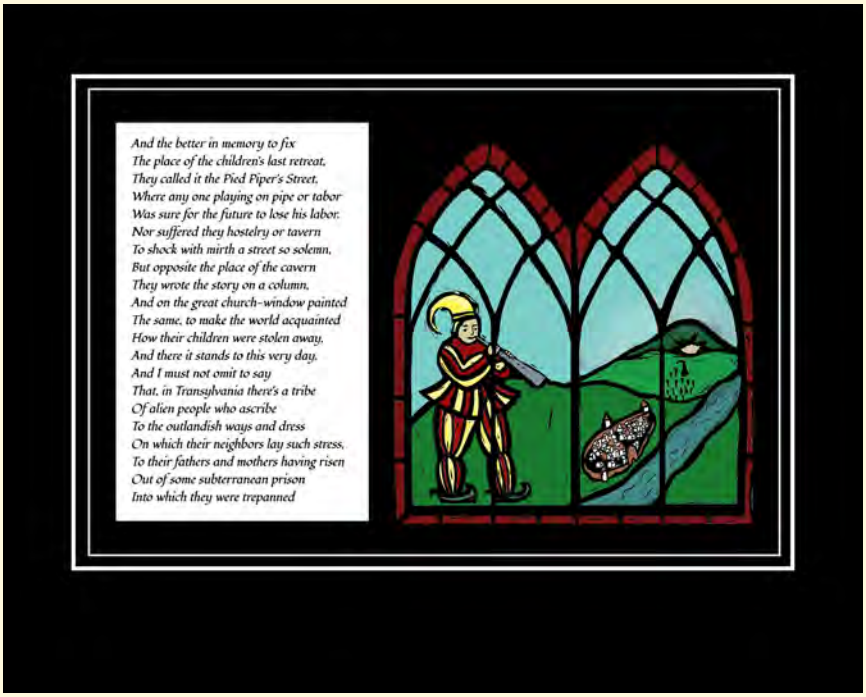


Fig. 4-18

Fig. 4-19

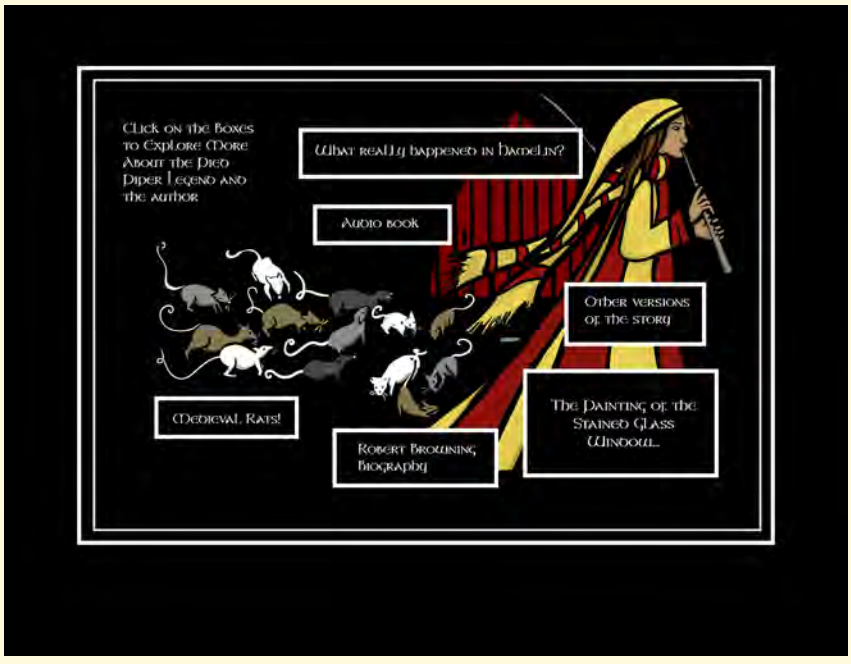


Fig. 4-20

Fig. 4-21 Back cover for digital text

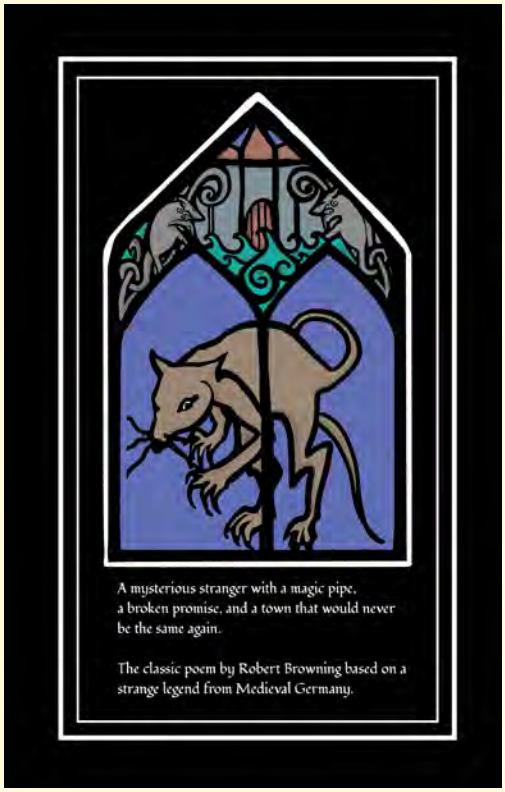


Fig. 4-22 Back cover for physical book

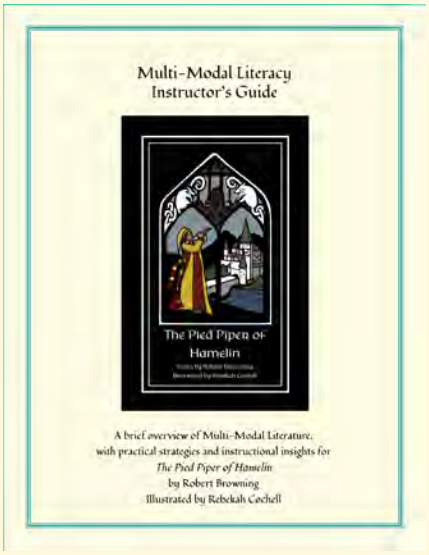


Fig. 4-23

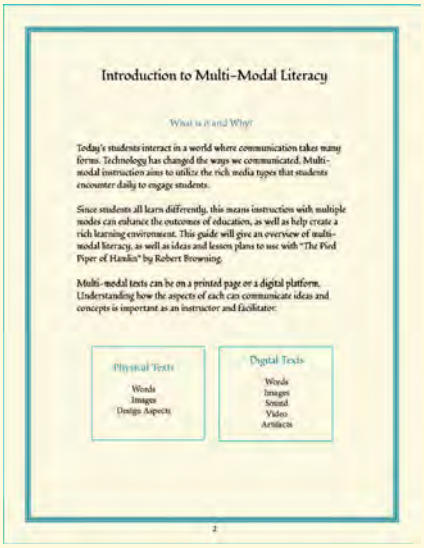


Fig. 4-24

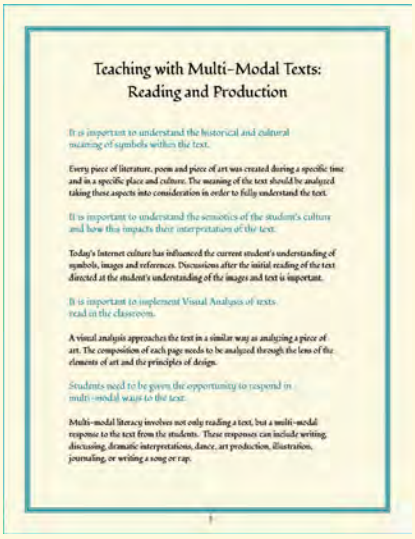


Fig. 4-25

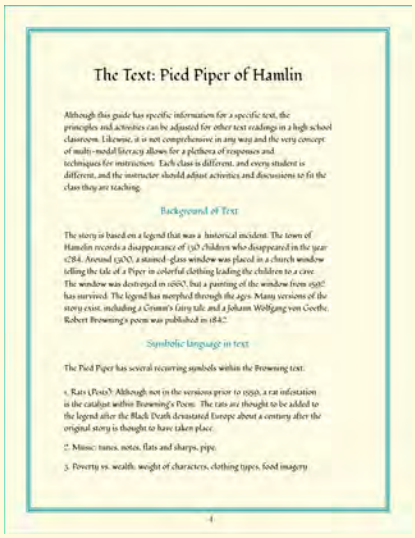
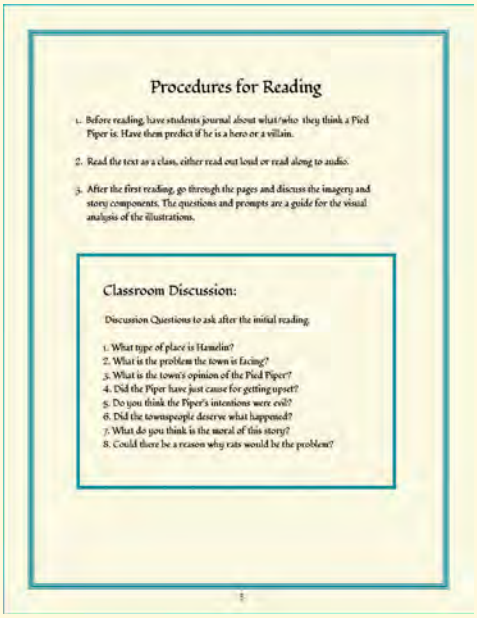


Fig. 4-26



Procedures for Reading

1. Before reading, have students journal about what/who they think a Pied Piper is. Have them predict if he is a hero or a villain.

2. Read the text as a class, either read out loud or read along to audio.

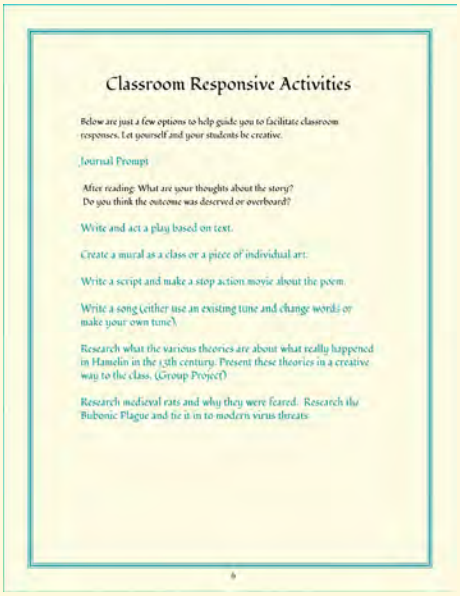
3. After the first reading, go through the pages and discuss the imagery and story components. The questions and prompts are a guide for the visual analysis of the illustrations.

Classroom Discussion:

Discussion Questions to ask after the initial reading.

1. What type of place is Hamelin?
2. What is the problem the town is facing?
3. What is the town's opinion of the Pied Piper?
4. Did the Piper have just cause for getting upset?
5. Do you think the Piper's intentions were evil?
6. Did the townspeople deserve what happened?
7. What do you think is the moral of this story?
8. Could there be a reason why rats would be the problem?

Fig. 4-27



Classroom Responsive Activities

Below are just a few options to help guide you to facilitate classroom responses. Let yourself and your students be creative.

Journal Prompt

After reading: What are your thoughts about the story?
Do you think the outcome was deserved or overboard?

Write and act a play based on text.

Create a mural as a class or a piece of individual art.

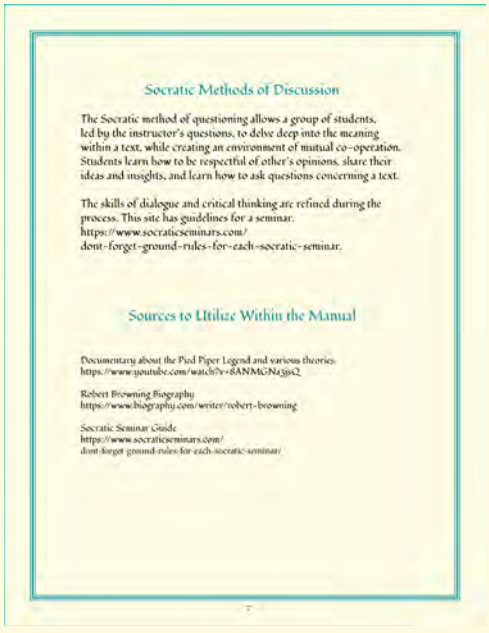
Write a script and make a stop action movie about the poem.

Write a song (either use an existing tune and change words or make your own tune).

Research what the various theories are about what really happened in Hamelin in the 13th century. Present these theories in a creative way to the class. (Group Project)

Research medieval rats and why they were feared. Research the Bubonic Plague and tie it in to modern virus threats.

Fig. 4-28



Socratic Methods of Discussion

The Socratic method of questioning allows a group of students, led by the instructor's questions, to delve deep into the meaning within a text, while creating an environment of mutual co-operation. Students learn how to be respectful of other's opinions, share their ideas and insights, and learn how to ask questions concerning a text.

The skills of dialogue and critical thinking are refined during the process. This site has guidelines for a seminar.
https://www.socraticseminars.com/
dont-forget-ground-rules-for-each-socratic-seminar.

Sources to Utilize Within the Manual

Documentary about the Pied Piper Legend and various theories.
https://www.youtube.com/watch?v=8ANMGNa3jsQ

Robert Browning Biography
https://www.biography.com/writer/robert-browning

Socratic Seminar Guide
https://www.socraticseminars.com/
dont-forget-ground-rules-for-each-socratic-seminar/

Fig. 4-29

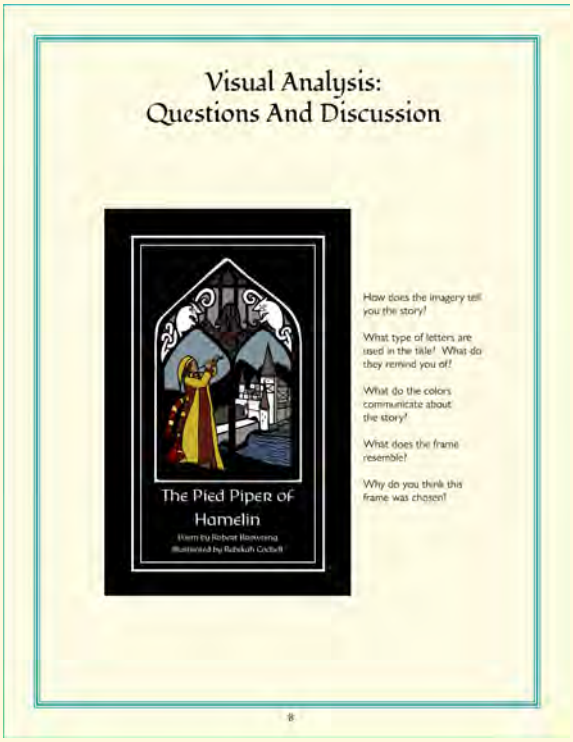


Fig. 4-30

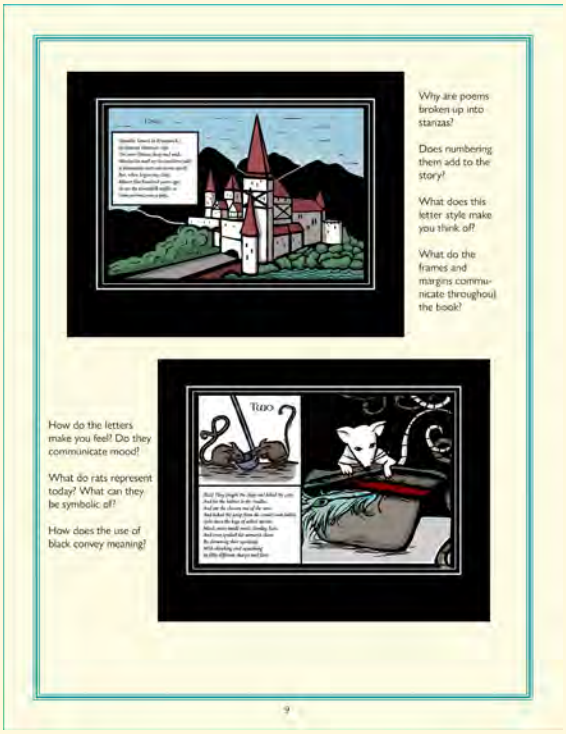


Fig. 4-31

Chapter Five: Conclusion

Sometimes re-examining the methods we accept as standard practice can reveal areas for improvement. The visual solution I have offered within this project is just one way that a re-examination of educational text and book design can lend insight into ways that a graphic designer or artist can impact the educational world.

Disfluent fonts, previously avoided in reading material, can enhance reading outcomes. These same fonts can lend artistry and beauty to books. Before the printing press and modern computer technology, handwritten letters and calligraphy graced the page of every book. With computer technology, we can create books with fonts based on the age old art form of writing with the greatest of ease.

Combined with multi-modal components, such as imagery and rich media, both physical and digital books can be enhanced, not only for the young reader, but advanced students. At an age when many students lose interest in books and reading, these page design components have the ability to engage high school students in a relevant way, as multi-modality has become how they communicate and process information.

Illustrated “picture” books, graphic novels and interactive ebooks have a bright future in the high school literature classroom, as design based on research can enhance educational outcomes. My visual solution is just one example of a style and approach. This thesis and project brings to light the need for more cognitive, behavioral and social research that examines the effects of font, color, illustrations and other page design components on reading efficacy.

Appendix

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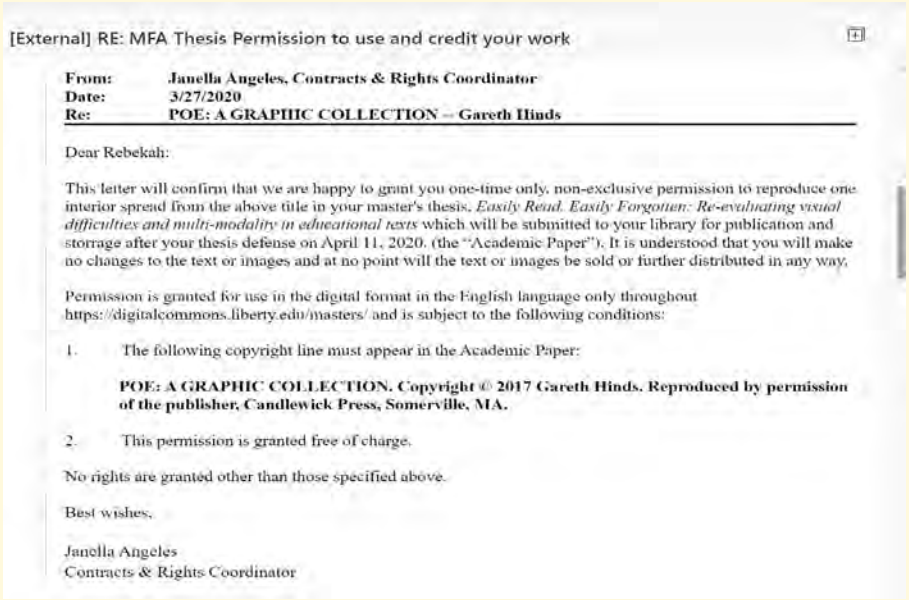

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Bibliography

Abate, Michelle A. "Reading Capital: Graphic Novels, Typography, and Literacy." English Journal, vol. 108, no. 1, 2018, pp. 66-72.

Bai, Qianshen. "Calligraphy. Chichester", West Sussex, UK; John Wiley & Sons Inc. 2015. Web.

Barley, Nena. "Using Visually Disfluent Fonts for Cueing and Increased Reading Comprehension." Order No. 10159411, Old Dominion University, 2016. Ann Arbor: ProQuest. Web. 8 Sep. 2019.

Roland Barthes, *Image/Music/Text*, New York: Hill and Wang, 1977, 33-7.

Baudin, Fernand. "Design and Typography: Central to the Idea of a Book." Logos, vol. 14, no. 1, 2003, pp. 20-21.

Behnke, Yvonne. "How Textbook Design may Influence Learning with Geography Textbooks." Nordidactica, no. 2016:1, 2016, pp. 38.

Bergström, Annika, and Lars Höglund. "E-Books: In the Shadow of Print." Convergence, Nov. 2018, doi:10.1177/1354856518808936.

Cahill, Thomas. *How the Irish Saved Civilization: the Untold Story of Ireland's Heroic Role from the Fall of Rome to the Rise of Medieval Europe*. Hodder and Stoughton, 2003.

Chih-Ming Chen & Yu-Ju Lin. "Effects of different text display types on reading comprehension, sustained attention and cognitive load in mobile reading contexts", Interactive Learning Environments, vol, 24 no. 3, 2016, pp. 553-571.

Diemand-Yauman, Connor, Daniel M. Oppenheimer, and Erikka B. Vaughan. "Fortune Favors the ( ): Effects of Disfluency on Educational Outcomes." Cognition, vol. 118, no. 1, 2011, pp. 114-118.

Donoso, Sergio, Pedro Mirauda, and Rubén Jacob. "Some Ideological Considerations in the Bauhaus for the Development of Didactic Activities: The Influence of the Montessori Method, the Modernism and the Gothic." Thinking Skills and Creativity, vol. 27, 2018, pp. 167- 176.

Doyle, Denise. "Imagery as exegesis in the Book of Kells." Journal of the Australian Early Medieval Association, 2008, pp. 53-63.

Eitel, A., & Kühl, T. "Effects of disfluency and test expectancy on learning with text." Metacognition and Learning, 2016, vol. 11, pp. 107-121.

Engelmann, Siegfried, et al. Teach Your Child to Read in 100 Easy Lessons. Touchstone, 2011.

Faber, Myrthe, et al. "The Effect of Disfluency on Mind Wandering during Text Comprehension." Psychonomic Bulletin & Review, vol. 24, no. 3, 2017, pp. 914-919.

Farr, Carol. "Word and Image in the Book of Kells. Heather Pulliam." Speculum, vol. 82, no. 3, 2007, pp. 752-754.

French, M. M. J., et al. "Changing Fonts in Education: How the Benefits Vary with Ability and Dyslexia." The Journal of Educational Research, vol. 106, no. 4, 2013, pp. 301-304.

Geller, Jason, et al. "Would Disfluency by any Other Name Still be Disfluent? Examining the Disfluency Effect with Cursive Handwriting." Memory & Cognition, vol. 46, no. 7, 2018, pp. 1109-1126.

Gerald of Wales, *The First Version of the Topography of Ireland* by Giraldus Cambrensis, trans. John J. O'Meara, Dundalk, 1951, p. 67. For the Latin text see *Topographia Hibernica*, in Giraldis Cambrensis Opera, ed. J. F. Dimock, vol. 5, 1867, pp. 123–24.

Gil-López, Cristina, et al. "Can Masked Priming Effects be obtained with Handwritten Words?" Attention, Perception & Psychophysics, vol. 73, no. 6, 2011, pp. 1643.

Goodling, L B. "The Multimodal Turn in Higher Education: On Teaching, Assessing, Valuing Multiliteracies." Pedagogy. vol. 14. no 3, 2014: 561–568.

Hahn, Cynthia. "LETTER AND SPIRIT: The Power of the Letter, the Enlivenment of the Word in Medieval Art." Visible Writings: Cultures, Forms, Readings, edited by Marija Dalbello and Mary Shaw, Rutgers University Press, 2011, pp. 55–76.

Halin, Niklas, et al. "A Shield Against Distraction." Journal of Applied Research in Memory and Cognition, vol. 3, no. 1, 2014, pp. 31-36.

Hayes, Kieran I. "A Light in the Darkness: Theologies of the Book of Kells." Spiritus: A Journal of Christian Spirituality, vol. 17, no. 2, 2017, pp. 212-227.

Jones, Roxanne V. The Production and Planning Process of the Book of Kells, ProQuest Dissertations Publishing, 2011.

Kabuto, Bobbie. "A Semiotic Perspective on Reading Picture Books: The Case of Alexander and the Wind-Up Mouse." Linguistics and Education, vol. 25, 2014, pp. 12-23.

Keage, Hannah A. D., et al. "Investigating Letter Recognition in the Brain by Varying Typeface: An Event-Related Potential Study." Brain and Cognition, vol. 88, 2014, pp. 83-89.

Kendrick, Laura. *Making Sense of Marginalized Images in Manuscripts and Religious Architecture.* Malden, MA: Blackwell Pub, 2008. Web.

Kendrick, Laura. "Visual Texts in Post-Conquest England." The Cambridge companion to medieval English culture. 2011.

Kenna, Hilary. "Touching the Text of T. S. Eliot's 'The Waste Land': A Critical Discussion of Interactive Design and Screen Typography for an iPad e-Book." Book 2.0, vol. 1, no. 2, 2011, pp. 207-238.

Kühl, T., Eitel, A., Scheiter, K., & Gerjets, P. "A call for an unbiased search for moderators in disfluency research: Reply to Oppenheimer and Alter (2014)." Applied Cognitive Psychology, vol. 28, 2014, pp. 805-806.

Lehmann, J., Goussios, C. & Seufert, T. "Working memory capacity and disfluency effect: an aptitude-treatment-interaction study." Metacognition Learning, vol. 11, 2016, pp. 89–105.

Longcamp, Marieke, Hlushchuk, Yevhen, and Hari, Riitta. "What Differs in Visual Recognition of Handwritten Vs. Printed Letters? An fMRI Study." Human brain mapping, vol. 32, no. 8, 2011, pp. 1250–1259. Web

Magreehan, D. A., Serra, M. J., Schwartz, N. H., & Narciss, S. "Further boundary conditions for the effects of perceptual disfluency on judgments of learning." Metacognition and Learning, vol. 11, 2016, pp. 35-56.

Mangen, Anne, Bente R. Walgermo, and Kolbjørn Brønnick. "Reading Linear Texts on Paper Versus Computer Screen: Effects on Reading Comprehension." International Journal of Educational Research, vol. 58, 2013, pp. 61-68.

Martin, Bella and Bruce Hanington. "*Universal Methods of Design*". Rockport Publishers, 2012.

Mirzoeff, Nicholas. "Visual Culture." Year's Work in Critical and Cultural Theory, vol. 19, 2011, pp. 286.

Moya Guijarro, Arsenio J. "Engaging Readers through Language and Pictures. A Case Study." Journal of Pragmatics, vol. 43, no. 12, 2011, pp. 2982-2991.

Nakamura, Kimihiro, et al. "Universal Brain Systems for Recognizing Word Shapes and Handwriting Gestures during Reading." Proceedings of the National Academy of Sciences of the United States of America, vol. 109, no. 50, 2012, pp. 20762-20767.

Oppenheimer, D. M., & Frank, M. C. "A rose in any other font would not smell as sweet: Effects of perceptual fluency on categorization." Cognition, vol. 106, no. 3, 2008, pp. 1178-1194.

Paris-Popa, Andreea. "Breaking the Contract between God and the Visual-Literary Fusion: Illuminated Manuscripts, William Blake and the Graphic Novel." American, British and Canadian Studies, vol. 30, no. 1, 2018, pp. 133-152.

Pearson, Jennifer, George Buchanan, and Harold Thimbleby. "Designing for Digital Reading." vol. 29, Morgan & Claypool, San Rafael, California, 2013.

Plato, *Republic*. Harvard University Press, 2013.

Powell, Andrea. "Docs On Demand." Wired, Jan. 2019, p. 11.

Pulliam, Heather. "Opening the Senses: The Gospel Book as an Instrument of Salvation as Articulated by the Minor Decoration and Full-Page Illustrations of the "Book of Kells", ProQuest Dissertations Publishing, 1998.

Qiao, Emilie, et al. "Unconsciously Deciphering Handwriting: Subliminal Invariance for Handwritten Words in the Visual Word Form Area." Neuroimage, vol. 49, no. 2, 2010, pp. 1786-1799.

"Remember this Font." Austrailan Science, Nov 2018: 13. ProQuest. Web. 22 Oct. 2019.

Ross, Bella, et al. "Print Versus Digital Texts: Understanding the Experimental Research and Challenging the Dichotomies." Research in Learning Technology, vol. 25, 2017, pp. 1-12.

Rowberry, Simon P. "Continuous, Not Discrete: The Mutual Influence of Digital and Physical Literature." Convergence: The International Journal of Research into New Media Technologies, 2018, pp. 135485651875504.

Rummer, R., Schweppe, J., & Schwede, A. "Fortune is fickle: Null-effects of disfluency on learning outcomes. Metacognition and Learning," Special Issue "Effects of Disfluency on Cognitive and Metacognitive Processes and Outcomes", 2016, pp. 1-14.

Schiavone, Aubrey. "Consumption, Production, and Rhetorical Knowledge in Visual and Multimodal Textbooks." College English, vol. 79, no. 4, 2017, pp. 358.

Serafini, Frank. "Multimodal Literacy: From Theories to Practices." Language Arts, vol. 92, no. 6, 2015, pp. 412-423.

Serafini, Frank. "Reading Multimodal Texts: Perceptual, Structural and Ideological Perspectives." Children's Literature in Education: An International Quarterly, vol. 41, no. 2, 2010, pp. 85-104.

Seufert, T., Wagner, F., & Westphal, T. "The effects of different levels of disfluency on learning performance and cognitive load. Instructional Science." 2016.

Walsh, Maureen. "Multimodal literacy: What does it mean for classroom practice?." Australian Journal of Language and Literacy, vol. 3, no. 3,2010, pp. 211-239.

Wang, A. H., & Kan, Y. F. "Effects of display type, speed, and text/background colour-combination of dynamic display on users' comprehension for

dual-task in reading static and dynamic display information". International Journal of Advanced Manufacturing Technology, vol. 23, 2004, pp. 133–138.

Ward, Karen. "Margins and the Frame of Reading", ProQuest Dissertations Publishing, 1997.

Weissgerber, Sophia C., and Marc-André Reinhard. "Is Disfluency Desirable for Learning?" Learning and Instruction, vol. 49, 2017, pp. 199-217.

Weltman, D., & Eakin, M. "Incorporating unusual fonts and planned mistakes in study materials to increase business student focus and retention." INFORMS: Transactions on Education, vol 15, no. 1, 2014, pp. 156-165.

Yue, Carole L., Alan D. Castel, and Robert A. Bjork. "When Disfluency is-and is Not-a Desirable Difficulty: The Influence of Typeface Clarity on Metacognitive Judgments and Memory." Memory & cognition, vol. 41. no. 2, 2013, pp. 229-41. ProQuest. Web. 11 Sep. 2019.

Zhao, Suman and Unswerth, Len. "Touch Design and Narrative Interpretation: A Social Semiotic Approach to Picture Book Apps". Abingdon, Oxon, Routledge, 2017. Web.

Zirpolo, Lilian H., and Philosophy Documentation Center. "The Impact of St. Augustine's Writings on the Arts: The Sacchetti Chapel as Exemplar." Augustinian Studies, vol. 29, no. 1, 1998, pp. 83-109.