

Twentieth Century Visual Education: Early American Schools and the Stereopticon

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For the past several decades, educators have devoted much discussion to the word “technology.” Most agree that it can be used as a cognitive tool and a medium of instruction. Yet few have experimented with various ways to use technology in classrooms. The following article by Educational Technologist --- explores the stereopticon, a first-of-its-kind device that used lenses to project a magnified image on a screen. This device profoundly affected teaching because it enabled an entire class to view the same content simultaneously. Professor Ent argues that the usage guide for the stereopticon is the same as that for today’s classroom presentations. Thus, both media should be studied simultaneously.

—Eds.

Introduction

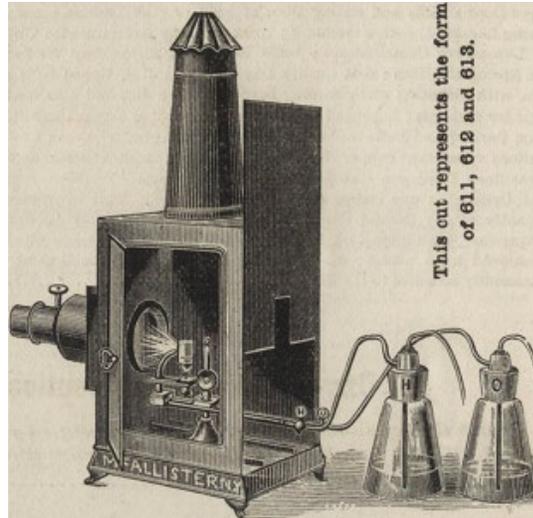
The stereopticon, a device that uses lenses to throw on a screen a magnified image from a transparent slide, was the first of its kind in instructional media. Beginning in the 1900s, the use of educational stereopticons revolutionized instruction and changed instructional delivery forever. Prior to stereopticons, teachers were limited to printed images, blackboards, and whatever object media was available to illustrate their instruction. As such, visual instruction was not included in teacher training. This quickly changed as the stereopticon became the most innovative tool for instruction. The device transformed learning by allowing an entire class to

see the same content at the same time, in its virtual form on a screen. This remains true today as most teachers use slide presentations to accompany their presentations. In most cases these presentations are prepared with software (i.e. Microsoft PowerPoint) and are expected in any setting. Surprisingly, the usage guidelines are entirely the same whether it is a 1910 stereopticon slide lecture or a 2020 PowerPoint! This article explores the instructional development of stereopticons. Included are a brief history of the promotion of stereopticons and their transition into a thriving educational market. In addition, the article explains how stereopticon lantern-slide lectures became instrumental to various American education movements such as adult, museum, and visual instruction.

The Rise of American Magic Lanterns and Stereopticons

Prior to 1860 in England, the term “magic lantern” was used to identify a small projector that used candle or oil light to display an image on glass to a wall (Figure 1). The design of these “magic lanterns” was based on a simple concept: a light is shined onto a concave mirror which reflects through a set of condensing lenses that distribute through a transparent picture slide which is projected onto a screen (Enlow 1926, 453). Prior to electricity, magic lanterns used candles or oil lights. Unfortunately, these were not bright enough for large audiences or the classroom. As a result, the term “limelight” was used when limestone was heated by gas to create an incandescent light source to project a larger and brighter image (Magic Lantern Society 2013, 1). These “limelight” magic lanterns were somewhat dangerous to operate and were used for the entertainment of large theater audiences. The magic lantern is known as the forerunner to all film screens (Holland 2010, 2) and remains very collectable today.

Figure 1: Magic lantern lithograph. Catalogue of stereopticons, dissolving view apparatus, and magic lanterns, c. 1888.



Magic lanterns did not arrive in the United States until 1863 when Philip E. Abel and Thomas Leyland exhibited the device in Philadelphia (Wells 2008, 4). Since several manufacturers of magic lanterns believed the name did not match the sophistication of the device, Abel and Leyland changed the name of their device to stereopticon. The stereopticon was primarily a projector of one side of a stereograph (Wells 2008, 6), thus, the name stereopticon. In the 1860s, Victorians were enjoying Brewster viewers with glass stereographs, (Figure 2), as well as newer cardboard stereographs with more economical Holmes viewers. It was a simple process to cut the glass stereograph apart and make a lantern slide for the stereopticon (Wells 2008, 6). The manufacturers for the stereopticons insisted that viewing the glass lantern images was of superior three-dimensional (3D) quality, even though projecting one side of a stereograph image would not present any depth. The manufacturers attempted to convince consumers and viewers that seeing the large projected image's perspective would be a better 3D experience than images seen with a stereoscope. Many advertisements claimed that stereopticons projected images in 3D when in fact they did not (Wells 2008, 7).



Figure 2: Glass stereograph, Mignon-Stereo Co., France, c. 1890.

According to Terry Borton, showman of the American Magic-Lantern Theater of Kennett Square, PA (2008), American stereopticons were popular in the later 1800s and 1900s in all venues including homes, churches, lodges, halls, and theaters. At this time, lantern showmen would often travel to provide shows for groups of all sizes. Borton (2008, 7) estimates that during the Victorian era, probably between 30,000—60,000 lantern showmen in America provided between 75,000 and 150,000 shows a year. The showman would project slides and provide narration with entertainment as a form of “storytelling.” Typically, a showman was partnered with a musician to provide a “soundtrack” to a show. The audience was often encouraged to make sound effects, playing horns and tambourines, and clapping, cheering, and so on to make the event interactive (Borton 2008, 7). The lantern showmen could make a fine living doing shows if they were considered “professionals” with adequate education. Many showmen were lesser qualified and would moonlight or do shows as a side occupation (Barton 2015, 4). These “professionals” developed the respect for lantern shows in places that attracted elites in that the content was more thoughtful and meaningful. These shows offered effects in which slides would dissolve into the next image and had multiple displays. The more sophisticated the shows, the better for attendance and profit (Barton 2015, 1). The professional stereopticon shows were slowly shifting from simple entertainment to informative displays (Figure 3) which positioned them well for a future in education.

Stereopticons in Education

Around the mid-nineteenth century, with the widespread availability of electricity, the stereopticon transitioned from entertainment to education. With this transition to education, newer stereopticons were being developed and sold under many names such as “balopticon,” “delineascope,” and others (Reiser 2010, 557). Concurrently, many education organizations returned the stereopticon to its popular earlier name “magic lantern.” Stereopticon, magic lantern, and lantern slide projectors were interchangeable in the 1900s (Wells 2008, 16). As stereopticons started to be used widely in education, some issues persisted with the instructional format as well as with the device. The obvious drawback of teaching in the dark and the difficulty of coordination between the lecturer and lantern-operator presented some challenges to a generation of teachers unfamiliar with the new media (Stainforth and White 2013, 1). In order to reduce the training needs, many sets of lantern slides were accompanied with narration cards and manuals to assist students in learning (Figure 4). In the 1920s, daylight screens (rear projection) were developed to help reduce the need for a completely dark room (Dorris 1927, 172) (Figure 5). To use a daylight screen, the projector was placed behind a translucent screen on a tripod in semidarkness. This “rear” projection was slightly better in that the room did not have to be dark, thus allowing teachers to see lecture notes (Dorris 1927, 173). Spencer Lens Company was known for the Trans-Lux daylight screen which was a translucent screen that would free stand between the projector and the class (Spencer Lens Co. 1924, xii).

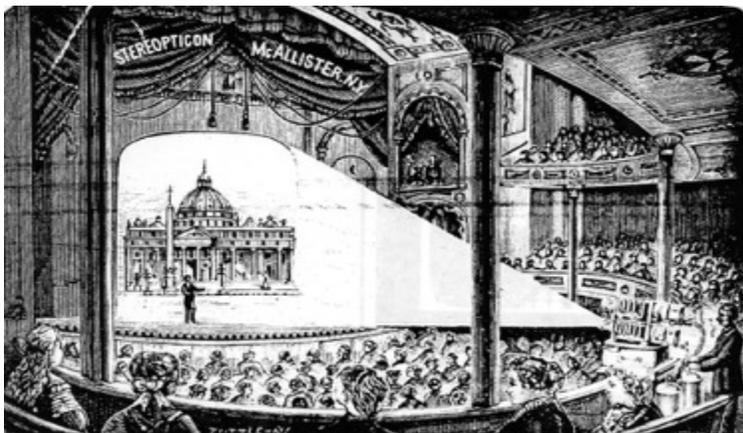


Figure 3: Magic lantern slide lecture on St. Peter's Basilica, 1897. An illustration from the December 1897 Catalogue of T.H. McAllister Co. Manufacturing Opticians, NY.



Figure 4. Narration card with lantern slide. Agricultural Series. c1920, Keystone View Company (KVC), Meadville, PA.

The advertisement is for the Spencer Lens Company's "Daylight Screen". It features a central photograph of a classroom where a screen is being used to project a diagram of the human eye. The diagram is titled "THE STORY OF DAYLIGHT PROJECTION" and includes a large question mark. The advertisement includes a testimonial from Leonard Power, a principal in Port Arthur, Texas, who praises the screen for allowing classrooms to be sunlit. Below the testimonial is a coupon for a free story about daylight projection, with fields for name and address. The company name "SPENCER LENS COMPANY" and address "442 Niagara Street, Buffalo, N. Y." are prominently displayed.

In the Sunlighted Classrooms of Texas

Leonard Power, of Port Arthur, Texas, a leading figure in the National Association of Elementary School Principals, gave a sincere endorsement to Daylight Projection with the Trans-Lux Screen when he said:
 "With this screen there is now no need to darken the room at all.

"From now on we shall go right on with our pictures with better visualization than ever before and with all curtains up and windows open.

"I regard the invention of this screen as one of the big steps forward in Visual Education."

MAIL THE COUPON TO-DAY
SPENCER LENS COMPANY

442 Niagara Street, BUFFALO, N. Y.
 Spencer Lens Co., Buffalo, N. Y.
 Please send me the Story of Daylight Projection and its value in Class rooms.

Name.....
 Address

Figure 5: Daylight screen, c.1928, Spencer Lens Company, Buffalo, NY.

Since the stereopticon and the stereograph were beginning to have an impact on education at the same time, they shared image content. The largest producers of stereographs and slides were

the Underwood and Underwood Company of Baltimore, MD; and in the 1900s, the KVC of Meadville, PA. These companies were known for their large educational production of cardboard stereographs and extensive libraries of images (Hamilton 1949, 24).

Stereographs are two images of the same scene taken slightly off centered to be viewed in a stereoscope. When viewed using the scope and two lenses, the image appears to be in three dimensions (Hamilton 1939, 15). One side of the stereograph negative could easily be used to produce lantern slides (Reiser 2010, 557). Therefore, much of the development of these two visual instructional tools occurred simultaneously. The stereograph companies hired teams of college students to photograph during the summers. Their collections were combined into “packages” that schools could purchase.

Initially, the KVC, Underwood and Underwood, and H.C. White as well as other companies sold sets of images around travel tours to homes, libraries, and so on. They were not organized for use in schools. As the market turned more toward education, Underwood and Underwood and the KVC emerged as the leaders and soon held the market (Hamilton 1949, 17). The KVC began reorganizing images into a “600 set” that was aligned to a course of studies (KVC, 1919, iii). The Underwood and Underwood Company also began organizing “1000 sets.” Both companies had written information printed for teachers and provided lantern slides to accompany stereographs. Vigorously competing for sales, the companies sent salesforces by the hundreds to ascend on schools in order to sell photographs and sets. Eventually, Underwood and Underwood could no longer compete in the narrow market with the KVC. The private and entertainment uses were no longer profitable, and they sold their negatives to the KVC (Hamilton 1949, 23). By the mid-1920s, the KVC was the sole provider of stereographs and lantern slides.

The KVC's "600 set" lantern slide collection was sold in a nine-drawer oak cabinet with 600, four-inch by three- and half-inch glass slides. The cabinet weighed over one hundred pounds. Each slide had an accompanying script to help teachers explain the visual and to provide stimulating questions for class discussion (Reiser 2010, 558). The main selling point for the KVC was its organized education department and manuals. The manuals have descriptive methods. Since the stereopticon was a new technology, having concise direction on its use was very popular.

The "600" set was an atlas, encyclopedia, and archive. It was considered the forerunner of nonfictional documentaries and was used to teach about the modernization of the world (Willis 2015, 298). The set remained a teaching curriculum for decades beyond the "stereo craze" and the lantern's "heyday." This was due to the extensive KVC's education department that promoted the "600 set" as a different medium than film. Since educational film was serial in nature with moving images and a running time, opportunities to study the images were limited. In contrast, the lantern slide was static allowing multiple views and encouraged reflection or study (Willis 2015, 299). Lantern slides were considered tools that assisted recitation as opposed to learning a process or watching a story.

When lantern sets (i.e. "600 sets") were sold to schools, the KVC included, along with slides, individual readings, teacher's guides, stereopticons and stereoscopes, and supplies to make homemade lantern slides. The popular stereopticon projector was a Bausch & Lomb Optical Company Balopticon Model B marketed by the KVC (Figure 6). The projector was standard equipment, having a slide tray and a lens that permitted a 12" focal length. Bausch and Lomb offered this model in two styles for viewers 1) having no electricity (double-jet acetylene burner) or 2) having electricity (250-watt gas filled Mazda light). The projector was given the name

“balopticon” from the Greek word “ballein,” meaning throw or project (Baush and Lomb Optical Co. 1917, ii). These projectors were the most common for traveling lecturers and schools since they came complete with a carrying case.

Figure 6: Balopticon Model B with lantern Slides and narration cards, c. 1920. Bausch & Lomb Optical Company, Rochester, NY.



Making Stereopticon Slides for Instruction

The KVC professionally produced lantern slides, but they also marketed to schools urging teachers and students to make their own. There were several ways lantern slides could be made. The commercially sold lantern slide made from a stereograph negative was created by contact prints. A negative was placed over a piece of light-sensitive lantern glass, and then the image was developed by exposure under controlled light using a wet collodion or a dry gelatin process (USF 2019, 1). Once the photographic process was complete, the glass slides were bound together by tape (USF 2019,1) to protect the image.

The KCV marketed kits with supplies to create one’s own slides (Figure 7). There were two main methods for making lantern slides in the classroom. The first was to use pencil on a satin-finished etched glass, then color it using slide crayons. With etched glass, the images and content could be washed off allowing them to be used again. The second method was to use

carbon paper typed on to cellophane (Hamilton 1939, 31), placed between two glass slides and taped closed. This method was very popular as it enabled the teacher for the first time to project text or numbers on a screen. These could be used over and over as a “tape” hinge glass slide would allow teachers to exchange the cellophane inserts for a new lesson.



*Figure 7: Instructor Outfit Handmade Lantern Slides, c. 1920
Keystone View Company, Meadville, PA.*

As mentioned earlier, the use of lantern slides extended for decades after film was introduced as a static instructional medium. It was common for teachers to continue to create their own slides for their lessons similar to today’s use of Microsoft PowerPoint. According to the instructional 1947 film authored by Mary Esther Brooks of the Audio-Visual Department of Indiana University, six media could be used to create your own slides: 1) etched glass with colored crayon, 2) gelatin coated glass with India ink, 3) frosted plastic and pencil, 4) translucent paper and India ink, 5) cellophane typed with carbon, and 6) opaque paper silhouettes. In the instructional video, each of these methods were demonstrated. The video encouraged students in

the younger grades to create their own lantern slides in order to foster visual skills. While much of the creations were copied or traced images from textbooks, the instructional film encouraged creative work and for teachers to collect and reuse their slides.

By 1900, stereopticons and slides were fully integrated into educational settings, not only because of the availability of stereopticons, but also because this technology influenced American visual literacy across all ages and stages of the learning community. The next section analyzes how American educational movements occurred almost solely due to the use of stereopticons and their widespread availability. Without the stereopticon, American education movements may never have occurred.

Instructional Use of Stereopticon Lantern Slides in America

In the late nineteenth and early twentieth centuries, the pressures of a growing society pushed educators to teach unaware Americans about advancements in commerce, human geography, and much more. It was a time when educators believed Americans needed to become more culturally literate, to develop better communication, and to excel as scientists and agriculturalists. It was clear to many people that the industrial age was booming, and American society needed to remain ahead of its global competitors.

The influence of the stereopticon lanterns slide lectures are best explained by tracing three movements that developed during this time: adult education, museum education, and visual instruction. In each of these movements, the lantern slide served as a catalyst for changing instruction. It was a method to share image content that could not be observed in person.

Adult Education and the Lantern Slide

In the late 1800s, photography and the use of images to teach adults, many who could not read well, were becoming very popular tools. Early adult education emerged from such society forums as the Chautauqua Institute, community public libraries, agricultural extension education, and others (Saettler 2004, 123). The most organized of the adult education efforts were those of the Chautauqua Institute and the Farmers' Institutes organized by the U.S. Department of Agriculture. Both of these education "institutes" made extensive use of stereopticon lantern slide lectures.

The Chautauqua Institute was a large education-entertainment provider using lantern-slide-lecture shows. The stereopticon presentations were first held in the large amphitheater in the State of New York, but soon entrepreneurs began a Circuit Chautauqua (sometimes called "Tent Chautauqua") to attract audiences in small towns (Borton 2013, 3). The institute would set up a large tent and have a salesman schedule a Circuit Chautauqua. The presenters (including bands and other showmen and women) would travel from one town to the next repeating the same lecture show. Each town would have the same schedule that was one or two days behind the previous stop. The attendance of the Circuit Chautauqua at its peak was upwards of 1,000 attendees in each town and over 36,000,000 annual total attendees (Borton 2013, 4). The topics of the stereopticon shows were as follows: travel, adventure, science, nature, arts, social issues, religion, current events, and miscellaneous. Travel and adventure were the most popular. Shows that had elements of danger such as journeys to exotic places, were considered to be adventures (Borton 2013, 8) (Figure 8).



Figure 8: “Circuit” or “Tent” Chautauqua Institute, c. 1910. Odebolt, IA.

In contrast to the for-profit Chautauqua Institute, a non-profit adult education movement called the “Farmers’ Institute” occurred in country schoolhouses in the evening. At the turn of the century, many influential leaders were concerned that farmers were unaware of proper farming techniques and horticulture resulting in loss of productivity, soil erosion, and overall depletion of croplands. While farmer education can be traced to an earlier movement, it was a piecemeal effort and only in some states. The formation of the Farmers’ Institute Specialist in the United States Department of Agriculture in 1903 marked the formal beginning of the Farmers’ Institute (Carney 1912, 87). With the funding of the government, a Superintendent of Farmers’ Institutes was established in every state, and subdivision departments were created for counties. In order to encourage attendance, institute activities were coordinated with those of country schools. Teachers were asked to advertise upcoming Farmers’ Institutes to older children and encourage them to attend the schoolhouse with their parents (Carney 1912, 88). In order to host a Farmers’ Institute, the county department would order a lecture with twelve to fourteen lantern slides, and teachers or county specialists would present the lantern slide lectures (Carney

1912, 90). In many cases, the Farmers' Institutes also included topics for the farmers' wives and daughters. Many times, in larger schoolhouses, two lectures were given in one evening.

The Oregon Agriculture College Extension Service in 1913 was one of the states that provided lantern slide lectures to Farmers' Institutes that addressed agriculture and home economics. Some of the lantern slide lectures were on soil and crop rotation, livestock care, dairying, poultry care, housekeeping, and the dangers of house flies (Hetzel 1913, 4).

Museum Education and the Lantern Slide

Occurring at the same time as the adult education movement, the museums were experimenting with lantern slides made from their collections in the 1880s. The museums of the period were under attack for being storage houses. It was argued that people were not benefiting from locations that took days to travel and visit. To address this concern, the museums began cooperating with the public-school system to develop programs that would bring the exhibits to education (Saettler 2004, 124). This new collaboration spurred the museum education movement which became a prime setting for the use of stereopticon lantern slide lectures for education. The museums would initially offer lantern slide lectures on-site but realized quickly that by providing lantern slides on loan or sending staff to give lectures to outside communities, widespread support for museums grew. This support encouraged schools to have partnerships to encourage museum visits when possible, and when not possible, obtain visuals and resources that could be on loan (Saettler 2004, 125). The most well-known museum for providing materials to schools was the Philadelphia Commerce Museum. This museum would send traveling collections free to the schools (Johnson 1929, 63).

Similarly, the New York City American Museum of Natural History began offering its new collection of lantern slides to city schools. Schools could request a guest lecturer to deliver the presentations on-site. Well known for his slide lectures, Albert Bickmore developed the model lantern slide lending library (American Natural History Museum, 2008 *Picturing the Museum*, Figure 9). Following this model, the St. Louis Education Museum and the Chicago Field Museum also began offering traveling services to schools (Johnson 1927, 63). Soon it was commonplace for museums to have lending lantern slide libraries to offer the community and schools access to their collections without travel.



Figure 9. Sorting boxes of lantern slides for delivery to the Public Schools, c. 1926. New York City American Museum of Natural History Lending Lantern Slide Library.

The curriculum developed around museum provided lectures for children in second, seventh, and eighth grade. For second graders the lecture slides provided examples of moths and butterflies and images of an Indian boy's life. In seventh grade, lectures were more advanced and covered Europe, mammals, and natural resources. Finally, in eighth grade, science topics such as the

creation and use of oils, soap, and lime were provided (Johnson 1927, 63). The museum always encouraged visitation after the lectures to help continue the education process.

Visual Instruction Movement and the Lantern Slide

The museum education movement led directly into the visual instruction movement in schools. In many cases researchers blend the two. In truth, the museum education movement predated the visual instruction movement by roughly ten years. The visual education movement had a “soft launch” between 1886 to 1910. (Saettler 2004, 134). The movement was formally recognized when college credits were awarded for courses, professional organizations were founded, journals were printed, research emerged, and administrative departments were formed at school, university, and state levels for visual education (Saettler 2004, 143). The most progressive visual instruction years were between 1918 and 1928.

During the “soft launch” years, stereopticon lantern slides were the most popular form of visual instruction, and many schools used their collections as indicators of being leaders in visual education methods. F. Dean McClusky conducted a national survey of visual instruction in 1923 that revealed that lantern slides were the most widely used of all visual media (Saettler 2004, 138). Foundational reference books used for visual instruction were Johnson’s *Fundamentals in Visual Instruction*, 1929; Dorris’s *Visual Instruction in the Public Schools*, 1928; and *Keystone View Company’s Visual Education Through Stereographs and Lantern Slides*, 1917. The lantern slide was considered a superior medium for the classroom over all others. This is in part because a large audience can view the same image or content for a sustained period of study. Films were harder to teach from as they would be in continuous motion and stereographs could only be viewed in a “peep-style” (Willis 2015, 299) with one person viewing through a lens. In Johnson’s *Fundamentals in Visual Instruction* (1927), the lantern slide was considered most

valuable when: a) presenting new subject matter relating to remote activities from the classroom in order to provide concrete examples for understanding, b) generating appreciative attitudes toward unfamiliar subject matter, persons, or places, c) when presenting information in which the whole class must attend at the same time, d) reviewing materials and having students complete “slide-work” reducing teacher lectures, and e) focusing attention on a few selected images aligned to the lesson as opposed to using many images which could cause over stimulation (45-46).

Dorris (1928) shares actual examples of how lantern slides are used. She explains how a teacher can show an image of a cultural setting (i.e. cliff dwellers), then display subsequent images of various crafts and items of the culture, and finally project a map of the location where the culture existed. Dorris asserts that this form of directed visual study is effective and assists in learning remote information. As a second method, Dorris recommends using the lantern slide for conveying information to assist in recitation. In this case the whole class examines the image, and selected pupils are assigned to lead a discussion with correct oral expression and pose without the assistance of a text. Dorris cautions through her lantern slide strategies that only a few images should be used. If too many are shown, students will be over-stimulated and have no time for reflection (156-162).

As mentioned earlier, the KVC’s educational materials were influential in the use of lantern slides during the visual instruction movement. In the well distributed manual, *Visual Education Through Stereographs and Lantern Slides* (1917), it is apparent that the KVC desired the teacher to link the stereograph with the lantern slide. The company encouraged students to initially look at images using the stereograph as a lesson orientation and asserts that the stereograph, when used as an introductory visual aid, was superior to any other visual. After this initial three-

dimensional viewing, the teacher should follow the stereograph viewing with the corresponding lantern slides to ensure that the students had understood the visual information needed for instruction in all instances (xviii).

The three visual instruction references mentioned above consistently pushed the advantages of using lantern slides in the classroom. Other than a few cautions presented regarding overuse of images, all three fundamental references agreed that lantern slides and the stereopticon were game-changing technologies that would enhance learning beyond what had been achieved before.

Conclusion

The “magic lantern” or “stereopticon” was the forebear of visual projected media. In many references, the emergence of film is credited to lantern slide shows. The “virtual” projection of images was an entirely new phenomenon in the 1800s and could instantly make a poor showman rich through hosting fascinating magic lantern shows. As technology developed and motion picture became popular, the lantern slide was transitioned to nonfiction content and education. The thrill of watching a well-coordinated lantern display captured audiences desiring to learn new information and experience adventures through the cameras of travelers. As the stereopticon settled in education, it was proven to be superior to film as content could be easily studied, selected, and created by instructors. The ability to have large-group presentations and extensive sets of slides as resources supported the use of stereopticons for decades after newer technologies developed. The lantern slide was pivotal in American educational movements and provided global learning content which developed schoolchildren and adults alike. The stereopticon is unlike other technologies, having remnants of its design and use persisting today. According to Microsoft, there are over six million teachers around the world using PowerPoint

for classroom lectures (Harris 2017, 1). It is sobering to think that projected classroom visual presentations all started from one-half of a glass stereograph placed in front of a lens and a light source. One hundred twenty years later, the methods of using those glass slides have the same use and potential pitfalls today as they did then. Nevertheless, teachers and students continue to benefit from the advancements made by the stereopticon that made learning more engaging and exciting.

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