Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2025 Volume I: Objects, Material Culture, and Empire: Making Russia

Iron Sharpens Iron: Master Blacksmithing

Curriculum Unit 25.01.08, published September 2025
by Kasalina Maliamu Nabakooza

Introduction

This visual arts unit was written for students in grade 8. It is inspired by the artistic process of the master blacksmith Samuel Yellin. I teach K-8 in New Haven, Connecticut, using the languages of English and Spanish at a Title I school. The topic of blacksmithing is a way to bridge different cultures within the classroom. The anchors of this unit are drawing and grit to revise artwork. Students will iterate drawing designs before the development of 3D artworks inspired by Yellin. Tools in a blacksmith's workshop are sized to specific tasks. Drawing is a tool Yellin used that has an important purpose.[1] For example, he uses early drawings to progress through the development of a project to final drawings.[2] According to a biography of Yellin, he often sketched his ideas.[3] The material of wrought iron was very important to Yellin's working process which included the careful documentation of his work, drawings, writing and photographs.[4] Students will be encouraged to revise and add to artworks within the unit. Students will strengthen their observational skills from analyzing objects and construct artworks with new materials after making preparatory drawings. Students will be introduced to Yellin's process of blacksmithing and bridge it to other cultural practices.

Historically, New Haven was a manufacturing city. New Haven also has a history as a port city and our neighborhood school is located in an urban environment near the highway to New York City. While driving toward our school this spring, I noticed the claw of a crane tractor pick up scrap metal from cars. This metal industrial tool led to a drawing lesson for students in grades 3 – 6. In the lesson students drew themselves seated in control of this powerful crane machine that can grab heavy metal materials. Students wrote words in a pile in front of the crane drawing. Then students chose their favorite word to be written inside of the claw suspended in the air. Other teachers have taken students on field trips to the Eli Whitney Museum in New Haven. At that museum students learned about manufacturing locally, railways, and the impact of the invention of the cotton gin.

Teaching about blacksmithing is an opportunity to expand student's understanding of art to bridge global cultural differences through material culture. Researching blacksmithing has caused me to find unexpected cultural connections. For example, the New Haven Museum's exhibition "Amistad: Retold" has enriched the development of this unit. The blacksmith, abolitionist, and escaped fugitive slave James W.C. Pennington advocated for members of the Amistad during their trial in New Haven. His resolve and 'mechanical skill'

helped him escape enslavement.[5]

Material objects produced from the blacksmithing process are influenced by the environment. We live in an age of artificial intelligence where the formation of artworks and ideas is being automated. Through this unit students will begin to confront these new challenges with first-hand learning experiences that change their relationship to material objects beyond this technology. In the region between Côte d'Ivoire and Liberia the Dan spirit-mask, which has iron components made of hairpins and blades, functions as an embodiment of spirits.[6] These might be compared to Danilov Russian bells that when rung sound like they are alive.[7]

In April 2018, I found a spear in the home of my grandfather, Omwami Musa Mukooza. It was as tall as myself and remained in Uganda where it belonged with family. I am a member of the Ente Clan, a royal blacksmithing clan from the Buganda Kingdom in Uganda, Africa.[8] There is a Baganda folktale about a blacksmith named Walukagga who was so clever he was asked to accomplish a virtuosic task by the Kabaka (King) to create a person made of iron.[9] Fearful for his life Walukagga dreaded failure but agreed to what was asked. The task was to create a real person in his workshop for the Kabaka made from iron. A hare which Walukagga had released from a trap returned the favor by giving him counsel that helped him escape a bad fate. The hare advised him to ask for "four huge pots of human tears and four pots of ash of human hair," in order to accomplish this formidable task.[10] For fear of being tortured in the process of being turned into the material needed for this creation, all of the servants ran away. As a result the Kabaka let the blacksmith go without punishment. Blacksmiths in many cultural contexts have connections to practical purposes and divine or spiritual realms as well. In the case of the Buganda Kingdom, blacksmiths were a protected class that could not be executed.

Figure 1, My grandfather's spear, photo taken by Kasalina Maliamu Nabakooza in April 2018

History of Blacksmithing

It is important to understand the enormous geographic scales involved in comparing examples of blacksmithing globally. For example, Africa is the largest continent and the most ethnically diverse continent on Earth.[11] Consider also that the Russia Empire was large enough to contain multiple time zones.[12] At its height, it spanned from Poland all the way into Siberia and Central Asia.[13]

According to early biographies of his life, Samuel Yellin was a Jewish man who was born in 1885 in Galacia, Poland.[14] However, recent publications have also located his potential place of origin as being in Ukraine or the Russian Empire, whose borders have shifted over time.[15] Yellin became interested in blacksmithing as a child and a Russian blacksmith apprenticed him from the age of seven in the village of Mogiler.[16] There he "learned a wide variety of techniques, from making a nail to forging an elaborate piece of armor; at the age of seventeen he was a master craftsman."[17]

Teachers can show students an example of virtuosic Russian metalwork, such as the steel fireplace made by the Russian Imperial Arms Factory in Tula that is a part of the British Victoria and Albert Museum collection.[18] Advances in metalworking enabled the creation of railways crossing great distances that sped up the formation of empires.[19] The Tula fireplace stands out for its British and Russian features, the etching on it and complicated forms made of steel. Tula was a town outside of Moscow that became particularly well known for arms manufacturing in steel and other metals such as gold and bronze.[20]

One of the major concerns of the Russian Empire was unification and it opposed the independence of Poland and was hostile to Jewish people for not assimilating.[21] During the 1830s – 1840s the Russian state was primarily concerned with opposing Polish nationalism and used Ukrainians as archetypes of traditional Russianness.[22] By the 1880s, Jewish academics, business people and artists were emigrating from the Russian Empire to other countries.[23] The year 1905 was marked by an increase in pogroms against Jewish people within the Russian Empire.[24]

In 1906 Samuel Yellin emigrated to the United States of America and enrolled in the Pennsylvania Museum School of Industrial Art.[25] By 1907 he was teaching a program on wrought iron in the Metals Department and by 1915 he received the certification of Master craftsman in blacksmithing.[26] He had his own firm which began in Philadelphia by 1909.[27] I learned about Samuel Yellin from seeing a wrought-iron grille by him in the J.P. Morgan Library and Museum. His first large commission in 1911 was for the J.P. Morgan Estate.[28] His greatest commission for decorative wrought iron was for the Federal Reserve Bank of New York in 1924 'comprising of two hundred tons of decorative wrought iron.'[29]

> The natural uses of wrought iron are as protective devices and restraints. Many consider that a grille for a window is meant to be a security device to keep people out. Yellin saw this in an entirely different way. He stated that in this country, 'iron is used as a barrier not a bridge.' He

> was always concerned with making a visual bridge from the people to the building or place where it used to be.[30]

Yellin experimented with different techniques of forging wrought iron and sought knowledge about the material.[31] A frequent traveler, Yellin collected ironworks and curated his own displays in a drafting room and a library.[32] In West Africa blacksmiths were not typically enslaved but the iron shackles they produced were used in the slave trade and for war in state formation.[33] His firm grew to have a workforce of 268 people by 1928 that included people from other immigrant communities such as West Africans who incorporated designs like adinkra symbols.[34]

Yellin's ironwork in the Manuscript and Archives Room at Sterling Memorial Library at Yale University is described by Kent Bloomer, Professor Adjunct of Architectural Design as virtuosic in how he transformed hot iron into seamless organic forms.[35] Yellin's work on the Yale Campus can also be seen at other locations, such as the Humanities Quadrangle, the Yale University Art Gallery and the Memorial Quadrangle.[36]

Process of Blacksmithing

> Yellin once said: "I love iron; it's the stuff of which the frame of the earth is made. And you can make it anything you will. It eloquently responds to the hand, at the bidding of the imagination."[37]

The materials used in blacksmithing have changed and depend on the environment. In Baganda, Kaggwa writes that "the coal used was from emizanvuma, nonjo, mitampindi, and misese trees."[38] The forges at the Faith and Fire Forge in Wolcott, CT and the Guilford Art Center in Guilford, CT that I used are powered by propane gas instead of coal fires. I also used a blow torch to heat metal to bend and twist it into the shape of a rose. The blacksmith Samuel Yellin used wrought iron. Today steel is used in blacksmithing instead of iron. I learned that local old barns usually still have wrought iron but it is no longer produced because steel is preferred as more affordable and durable.

In April 2025, I made a twisted hook nail in an introductory blacksmithing class. It was constructed from a bar of steel that is about 5 inches long. The color is black and reflects some light when rotated. It has several characteristics: one side of this object is curved under like a small fiddle head. Then in the opposite direction the metal curves into a 1-inch wide hook. From the bottom of this hook the metal twists counterclockwise in the middle of the object for about two inches. Then the metal has a 90-degree angle and the tip of the object is tapered into a point with four level sides. This end is not that sharp however. It is lightweight and fits comfortably inside the hand when held.

The object was created this spring by myself in an introductory blacksmithing class. The metal was produced by a steel supplier. It required one piece of steel that was repeatedly heated in a propane fueled forge to about 3000 degrees until it turned orange. The hot metal was held with tongs to transfer it between the forge, anvil and vise. The tongs were sized specifically for the size of this project. The material was hammered and bent on an anvil and then twisted in a vise. An experienced blacksmith can make this type of object in a

matter of minutes or less. The process of creation took me more time to complete because it was the first time I was making one. At the end of production, the object was placed in linseed oil to cool off before handling barehanded.

This type of nail is multipurpose. It could also be used to hang utensils or clothing from a wall. The perspective of this object would have been of transformation from a raw metal that was formed into a useful object for daily use in the past. When it was completed, I did not put a maker's mark on it. If it were found without documentation, there would be no indication of who made it. This object would have been a common object for British colonial daily life in New England. However, now for me, it is a novelty as an object of contemplation.

The tools of the blacksmith are the hammer, anvil, poker and tongs.[39] Hammers are described in a contemporary book on blacksmithing as acting "as an extension of the blacksmith's body…to meet the requirements of a specific task."[40] (Johnson, 46) One thing I observed taking blacksmithing classes were the various tools that were sized depending on the project at the forge. The anvil itself is shaped to meet the needs of shaping metal and all of the tools serve unique purposes.

The motifs of Yellin's work show influences from European and African metalwork and while the names of the West African workers in his firm may not be known, their cultural impact can be inferred. Black artisans who were formerly enslaved also migrated within the United States and had an important influence on material culture in New Haven.[41] Not only would their names be forgotten in most cases, they would not have benefitted from economic growth during enslavement in the United States.[42]

Cultural Associations of Blacksmithing

How often do we think about the necessity of the material of iron? Our everyday speech has idioms that come from blacksmithing, such as: "iron sharpens iron," "to beat the daylight out of it," "to strike while the iron is hot," "too many irons in the fire" and "to catch my drift," are from the trade. The red cliffs of East Rock, New Haven are colored by the mineral iron. The soil in Uganda, Africa has a bright red color from iron. Humans rely on the essential mineral iron for our health. If our blood does not have enough iron, the sickness of anemia develops. During the 18th century, New Haven was a center of arms manufacturing and produced different types of iron: cast, wrought and pig which supported the formation of the railroad through the city. Artisan blacksmiths like Samuel Yellin used wrought iron. Cast iron was used for large construction projects such as railroads.[43]

> Like art society has form, and like its aesthetic counterpart, social form is complex and difficult for foreigners to decipher…They are chartered by their culture to build, construct, fabricate, create, in a wide variety of materials across a broad spectrum of human situations.[44]

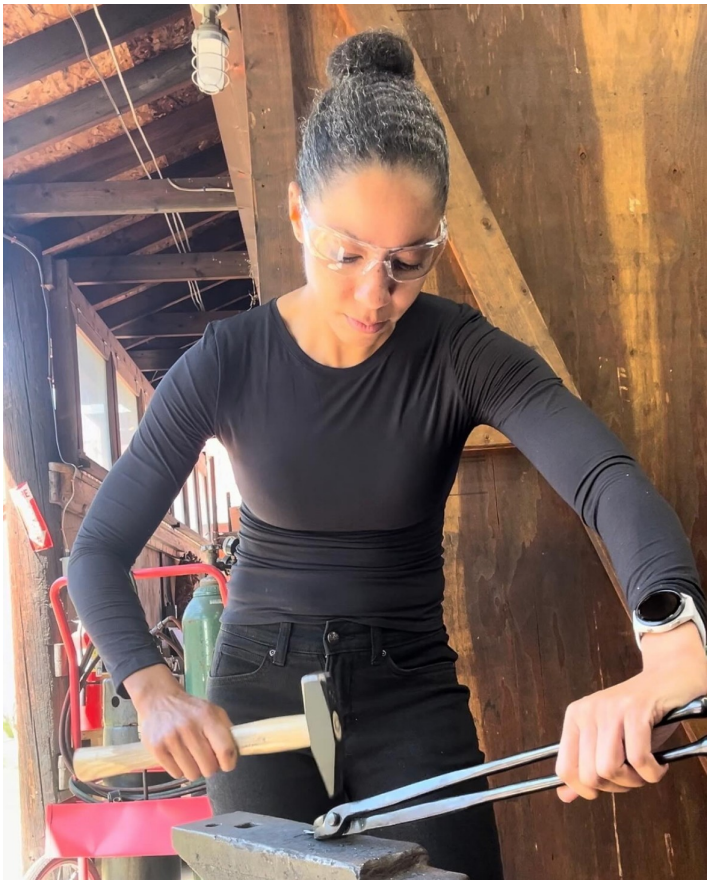
In African blacksmithing knowledge is embodied and the process is as important as the product at the end of creation.[45] "Metallurgical engineers often speak of 'metal memory' as a force to contend with…dedicated practice, day after day, is a blacksmith's only recourse to excel beyond mere proficiency."[46] In Mande

blacksmithing, for example, knowledge is demonstrated in the arrangement of information and materials after the completion of many activities.[47] Articulation through the sculpting of form is part of the blacksmithing process.[48] This sensory experience will be a part of the lessons with students. I want to empower students to feel that their artistic production has weight, durability and strength, like the material of iron.

Almost all African societies use iron technology.[49] There is a wide range of iron production in Africa.[50] Iron is associated with ritual religious power."[51] There is, for example, symbolism in the iron bracelets that parents who have twins wear.[52] West African blacksmiths from Sierra Leone, Côte D'Ivoire, and Ghana used Adinkra symbolism for royalty, in funerary rites and as a bridge to the afterlife.[53] Because such imagery can be sacred, it can also be shrouded in secrecy. In the Greek mythical tradition Hephaestus, also known as Vulcan, the son of Hera, is a young blacksmith when he is exiled by Zeus and his workshop "shines like a star in the night."[54] Like Hephaestus, in the context of Mande culture in Western Sudan, there is a legendary figure named Sumanguru who descended from a lineage of blacksmiths and became superhuman.[55] Mande blacksmiths, called nyamakala, are considered strange and mysterious.[56] In Mande culture people who were conquered or became indebted became slaves, but they could become blacksmiths if they proved capable, so it had a transformative capacity as a skill.[57] In African cultures blacksmiths frequently have additional roles. In Kapsiki society blacksmiths were not associated with a specific clan and were known to travel from one village to another.[58] Their primary products were farming tools, weapons, decoration and religious objects.[59] Blacksmiths bridged the transformation from "earth to iron, from life to death, from sickness to health."[60] Blacksmiths could also be potters, in charge of funerals, music and healing.[61] For example, in the Kapsiki/Higi culture "a smith is undertaker, healer, sorcerer, diviner, musician, and potter as well as metalworker…"[62]

Blacksmithing in the context of Mande culture, which spans the regions of "Burkina Faso, Senegal, Gambia, Guinea, Sierra Leone, Liberia, Ivory Coast and Ghana" is a complex identity which has "secret initiation associations."[63] Mande blacksmiths also have closely guarded "secret speech" and many social and religious roles.[64] Blacksmiths are called upon for ending conflicts because of their power in communities.[65] The spiritual and social complexities of African practices of blacksmithing are not necessarily entirely accessible to outsiders.

In an exhibition catalogue on the iron art of Western Sudan the American art historian Patrick McNaughton examines the Mande myths from the Bamana and the Dogon peoples that are tied to the material of iron. The forms created by Mande Blacksmiths included amulets, musical instruments, hunting tools, farming tools, lamps, staffs and figures. The preface of this book about Mande blacksmiths concludes by saying that further study could shed light on other blacksmithing traditions, such as that near Lake Victoria in Eastern Africa which is where the Baganda are located.[66] He also refers to the ironworking traditions in sub-Saharan Africa and West Africa as well.



Enduring Understandings

Blacksmithing emerged in my research for this unit as a means of physical and mental liberation. In the book *Striking Iron: The Art of African Blacksmiths*, hammers are described as being more than tools. Hammers are "personified, used in rituals of enthronement through which kings were 'forged.'"[82] In Baganda there was a royal hoe tax which facilitated the transformation of farming implements into weapons of war: "The royal blacksmith smelted some of them into fighting weapons such as spears, big knives, axes and such other tools as the king's need warranted. There was always a large stock of fighting weapons in the king's arsenal."[83] Also in the declaration of war, there was a saying that "any man or superman" would be transformed and remade like the needles used to sew the royal shoes out of leopard skin.[84] Through mastery of the processes of design, analysis and revision, students will develop grit and understanding of art.

Lesson Plans With Strategies and Objectives

Unit Summary:

The objective of this unit is that students will create artworks inspired by the blacksmith Samuel Yellin and develop visual literacy through object analysis of ironworks. Students will respond in writing to what they

experience seeing at the Yale University Art Gallery. Students will also be introduced to how the aesthetics of artworks made exclusively of iron or incorporating iron elements are shaped by different cultures and environments.

Lesson Plan 1: Draw and Design 3D Gates

Objective: Students will be introduced to the art of blacksmithing through the gates of the master blacksmith Samuel Yellin. Students will adjust their drawn designs as they translate them to a 3D model, based on their chosen materials and motifs and inspired by examples of Yellin's gate on the campus of Yale University.

Procedures:

1. Students will learn the art term *motif* and how it can be used to create a decorative design pattern.
2. Students will do a motif scavenger hunt and circle as many motifs they can see in printed photographs of wrought-iron gates by the master blacksmith Samuel Yellin.
3. Students will choose 1 – 3 motifs and design gates inspired by Yellin's examples at Yale University using pencil and kneaded erasers.
4. Following a demonstration by the instructor students will collage layered models of their gate designs using cardboard, glue and aluminum. Students will use the skills of measuring and cutting in this lesson. Students may choose to add accents to their gates with acrylic paint.

Evaluation:

Demonstrate willingness to experiment, innovate, and take risks to pursue ideas, forms, and meanings that emerge in the process of artmaking or designing. (VA:Cr2.1.8a)

Extension:

Students can use stencils to draw maps to be oriented geographically where gates of Samuel Yellin are located at Yale University. Students will be introduced to the blacksmith Samuel Yellin and look at images of Russian iron gates and, using a graphic organizer, will describe the characteristics they see. (VA:Cr2.1.8a)

Lesson II: Introduction to Object Analysis with Metallic Rose

This lesson is inspired by the organic forms in gates by Samuel Yellin at Yale University. Students will practice the object analysis of steel roses following the Prown method.[85]

Procedures:

1. Students will have a first-hand experience of object analysis by looking closely at steel roses created through the process of blacksmithing by the instructor.
2. Students will take notes on their observations using a graphic organizer.
3. Then students will learn how to draw a rose using pencil.
4. The lesson concludes with students creating 3D aluminum rose artworks with stems.

Evaluation:

Apply relevant criteria to examine, reflect on, and plan revisions for a work of art or design in progress. (VA:Cr3.1.8a)

Extension:

Students can develop their artistic practice by adding organic rose forms to their gate drawings or collage sculptures from lesson 1 in this unit. (VA:Cr3.1.8a)

Lesson Plan III: Object Analysis with Museum Field Trip

Students will take a field trip to the Yale University Art Gallery and engage in the Prown method of object analysis using notebooks. Students will develop visual literacy by visiting and responding to selected works by Samuel Yellin, African ironworks, and a contemporary artwork by an African-American artist with iron. Below are the steps I propose to take for material study with students.

Procedures:

1. Students will be given a printed handout with an object list of 6 artworks at the Yale University Art Gallery.
2. Students will circle 2 objects and write a sentence for each object about what attracted their attention to them.
3. Students will be put into groups of 2 or 3 based on chosen objects. If certain objects have no one, groups will be adjusted.
4. Students will go to the field trip with notebooks and do object research at a museum.
5. Students will use Prown's method of analysis: moving from description to deduction and speculation.

   - Emotional response to the object: How does this object make you feel?

   - What do you see?: Using descriptive words, explain what the object looks like. Ask students to take note of information in wall labels.

6. Students will analyze the method of production, similarities and differences. This may be an opportunity for students to learn about 3D printing through the imaging of museum objects in an advanced project. Students can invent their own keywords based on their experience that they think would help other people find the object in a database if they looked for it.
7. Students will return to the classroom and pick one of the objects from those analyzed and then create their best reproduction of the object. Before creation, students will use their analysis to predict which material, such as felt, paper, or clay, would best approximate the original.

Evaluation:

Interpret art by analyzing how the interaction of subject matter, characteristics of form and structure, use of media, artmaking approaches, and relevant contextual information contributes to understanding messages or ideas and mood conveyed. (VA:Re8.1.8a)

Extension:

Explain how a person's aesthetic choices are influenced by culture and environment and impact the visual image that one conveys to others. (VA:Re.7.1.8a)

School Field Trip:

Six artworks are listed below, half require request for viewing and the rest are on view. Teachers who are not local can use these artworks digitally in teaching the lesson.

Yale University Art Gallery

1111 Chapel Street at York Street

New Haven, CT 06510

203-432-0600

Artworks to view by request and to highlight in a gallery visit:

1 -

https://artgallery.yale.edu/collections/objects/84444 (by request)

Power Figure (Nkisi N'kondi)

19th–early 20th century

African Art

On view, 1st floor, African Art

Medium: Wood with iron, cloth, mirror, leopard tooth, fiber, and porcelain

2 –

https://artgallery.yale.edu/collections/objects/145239 (by request)

anklet

19th century

African Art

By appointment, Wurtele Study Center

Medium: Iron

3 –

https://artgallery.yale.edu/collections/objects/112298 (by request)

Male Figures Holding a Serpent

12th–17th Century

African Art

By appointment, Wurtele Study Center

Medium: Iron

4 -

https://artgallery.yale.edu/collections/objects/102158 (on view)

Oil lamp (Fitula)

19th century

African Art

On view, 1st floor, African Art

Medium: Iron

5 -

https://artgallery.yale.edu/collections/objects/123346 (on view)

Gates and Transom from the Third Floor of the Old Art Gallery

Maker: Samuel Yellin (American, born Russia, 1884–1940)

1928

American Decorative Arts

On view, 3rd floor, Modern and Contemporary Art and Design

Medium: Wrought Iron

6 -

https://artgallery.yale.edu/collections/objects/219829 (on view)

Shadows of Liberty

Artist: Titus Kaphar (American, born 1976, M.F.A. 2006)

2016

Modern and Contemporary Art

On view, 3rd floor, Modern and Contemporary Art and Design

Medium: Oil and rusted nails on canvas

Teachers Resources

Roberts, Allen F., Tom Joyce, Marla Berns, William Joseph Dewey, Henry John Drewal, Candice Lee Goucher, and Rowland Abiodun. *Striking Iron: the Art of African Blacksmiths.* Los Angeles, California: Fowler Museum at UCLA, 2019.

"The Yale-New Haven Teachers Institute." Yale New Haven Teacher Institute, September 1 2008. https://teachersinstitute.yale.edu/curriculum/units/2008/3/08.03.03/12.

Wattenmaker, Richard J. *Samuel Yellin in context.* [Flint, Mich.]: Flint Institute of Arts, 1985.

Yellin, Samuel. *Samuel Yellin Metalwork at Yale*. Yale University School of Architecture, 1990.

Students Resources

Kalinda, Cranmer, Margaret Iggulden, and Julia Allen. *Walukagga the Blacksmith and Other Stories*. Harlow: Longman, 1995.

Leskov, N. S. *The enchanted wanderer: and other stories.* Moscow: Progress Publishers, 1974.

MacGregor, Neil. *A History of the World in 100 Objects*. Penguin UK, 2011.

Website Resources

"West African Symbolism in Ironwork across the East Coast." Vizcaya, September 26, 2024. https://vizcaya.org/beyond-vizcaya/west-african-symbolism-in-ironwork-across-the-east- coast/.

Yale New Haven Teacher Institute, September 1, 2008. https://teachersinstitute.yale.edu/curriculum/units/2008/3/08.03.03/12., 8.

Bibliography

Andrews, Jack., and Samuel Yellin. *Samuel Yellin, metalworker.* Ocean City, MD: Skipjack Pr., 1992.

Batuman, Elif. "The Bells." *The New Yorker* 85, no. 11 (2009): 22-22.

Beek, W. E. A. van. *The forge and the funeral: the smith in Kapsiki/Higi culture. African history and*

culture. East Lansing: Michigan State University Press, 2015.

Bushkovitch, Paul. *A concise history of Russia. Cambridge concise histories.* New York: Cambridge University Press, 2012.

Elledge, John. *A brief history of the world in 47 borders*. New York, The Experiment, LLC. 2024.

D'Albe, Edmund Edward Fournier. *Hephæstus: Or, The Soul of the Machine*. London: Kegan Paul, Trench, Trubner,[19--?], 1925.

Davis, Myra Tolmach., and Samuel Yellin. *Sketches in iron: Samuel Yellin, American master of wrought iron, 1885-1940.* [Washington, D.C, 1971.

Dubansky, Mindell. "A Book Arts Door by Samuel Yellin." The Metropolitan Museum of Art, August 9, 2017. https://www.metmuseum.org/perspectives/samuel-yellin.

Hoskins, "Agency, Biography, and Objects," *Handbook of Material Culture* (eds. Tilley etal.)

Igumnova, T. G. *Tul'ska͡ia ͡khudozhestvenna͡ia ͡stal' XVIII-XIX vekov: katalog vystavki = 18th- 19th century Tula artistic steel.* Moskva: GIM, 2015

Johnson, *Daniel. Blacksmithing: A guide to practical metalworking, tools and techniques*. London: Amber Books, 2023.

Kaggwa, Sir Apollo. *The customs of the Baganda*. Columbia University Press, 1934.

Kalibala, Ernest Balintuma. "The social structure of the Baganda tribe of East Africa." PhD diss., Harvard University, Department of Sociology, 1946.

Kalinda, Cranmer, Margaret Iggulden, and Julia Allen. *Walukagga the blacksmith and other stories*. Harlow: Longman, 1995.

MacGregor, Neil. *A history of the world in 100 Objects*. Penguin UK, 2011.

McNaughton, Patrick R. *The Mande blacksmiths: knowledge, power, and art in West Africa.* Bloomington: Indiana University Press, 1988.

Pennington, James W. C. *The fugitive blacksmith; or, events in the history of James WC Pennington*. 1849.

Prown, Jules David. "Mind in matter: An introduction to material culture theory and method." *Winterthur portfolio* 17, no. 1 (1982): 1-19.

Roberts, Allen F., Tom Joyce, Marla Berns, William Joseph Dewey, Henry John Drewal, Candice Lee Goucher, and Rowland Abiodun. *Striking iron: the art of African blacksmiths.* Los Angeles, California: Fowler Museum at UCLA, 2019.

"West African Symbolism in Ironwork across the East Coast." Vizcaya, September 26, 2024. https://vizcaya.org/beyond-vizcaya/west-african-symbolism-in-ironwork-across-the-east- coast/.

Wattenmaker, Richard J. *Samuel Yellin in context.* [Flint, Mich.]: Flint Institute of Arts, 1985.

Yale New Haven Teacher Institute, September 1, 2008.
https://teachersinstitute.yale.edu/curriculum/units/2008/3/08.03.03/12., 8.

Yellin, Samuel. *Samuel Yellin metalwork at Yale*. Yale University School of Architecture, 1990.

Appendix on Implementing District Standards

This visual arts unit encourages students in grade 8 to take risks with new art materials following the *National Standards* for creating and reflecting: VA:Re.7.1.8a, VA:Cr2.1.8a VA:Cr3.1.8a, VA:Re8.1.8a. Students will develop tools to analyze material objects to reflect on new ideas and cultural associations with blacksmithing. In this unit students will create explore the form of artworks. Students will also learn about how blacksmithing has shaped cultural aesthetics in art.

Endnotes

[1] Andrews, Jack., and Samuel Yellin. *Samuel Yellin, metalworker (*Ocean City, MD: Skipjack Pr., 1992), 106.

[2] Andrews, *Samuel Yellin*, 106.

[3] Ibid, 14.

[4] Ibid, 5.

[5] Pennington, James W. C. *The fugitive blacksmith; or, events in the history of James WC Pennington*. (New York: James W. C. Pennington, 1849), 34.

[6] Roberts, Allen F., Tom Joyce, Marla Berns, William Joseph Dewey, Henry John Drewal, Candice Lee Goucher, and Rowland Abiodun. *Striking iron: the art of African blacksmiths.* (Los Angeles, California: Fowler Museum at UCLA, 2019), 84.

[7] Batuman, Elif. "The Bells." *The New Yorker* 85, no. 11 (2009): 22-22.

[8] Kaggwa, Sir Apollo. *The customs of the Baganda*. (Columbia University Press: New York, 1934), 160 – 161.

[9] Kalinda, Cranmer, Margaret Iggulden, and Julia Allen. *Walukagga the blacksmith and other stories*. (Harlow: Longman, 1995), 1 - 10.

[10] Kalinda, *Walukagga the blacksmith*, 7.

[11] Elledge, John. *A brief history of the world in 47 borders*. (New York, The Experiment, LLC. 2024), 120.

[12] Elledge, John. *A brief history of the world*, 277.

[13] Bushkovitch, Paul. *A concise history of Russia. Cambridge concise histories.* (New York: Cambridge University Press, 2012), 249.

[14] Davis, Myra Tolmach., and Samuel Yellin. *Sketches in iron: Samuel Yellin, American master of wrought iron, 1885-1940.* (Washington, D.C.: George Washington University, 1971), 8.

[15] Dubansky, Mindell. "A Book Arts Door by Samuel Yellin." The Metropolitan Museum of Art, August 9, 2017. https://www.metmuseum.org/perspectives/samuel-yellin.

[16] Davis, *Sketches in iron: Samuel Yellin,* 4.

[17] Ibid, 4.

[18] Igumnova, T. G. *Tul'skai͡a k͡hudozhestvennai͡a s͡tal' XVIII-XIX vekov: katalog vystavki = 18th-19th century Tula artistic steel.* (Moskva: GIM, 2015) 51 – 59.

[19] Elledge, *A brief history of the world*, 276.

[20] Igumnova, *18th-19th century Tula artistic steel*, 49.

[21] Bushkovitch, *A concise history of Russia*, 251.

[22] Ibid, 262.

[23] Ibid, 260.

[24] Ibid, 285.

[25] Andrews, *Samuel Yellin*, 34.

[26] Ibid, 35.

[27] Ibid, 35.

[28] Ibid, xiii – xiv.

[29] Ibid, 35.

[30] Ibid, 18.

[31] Ibid, 13.

[32] Ibid, 9.

[33] Beek, W. E. A. van. *The forge and the funeral: the smith in Kapsiki/Higi culture. African history and culture.* (East Lansing: Michigan State University Press, 2015), 25.

[34] “West African Symbolism in Ironwork across the East Coast.” Vizcaya, September 26, 2024. https://vizcaya.org/beyond-vizcaya/west-african-symbolism-in-ironwork-across-the-east-coast/.

[35] Yellin, Samuel, and Thomas H Beeby. *Samuel Yellin: metalwork at Yale : Yale University School of Architecture, 29 October-16 November 1990.* (New Haven: Yale University School of Architecture, 1990), 15.

[36] Yale New Haven Teacher Institute, September 1, 2008. https://teachersinstitute.yale.edu/curriculum/units/2008/3/08.03.03/12., 8.

[37] Davis, *Sketches in Iron*, 12.

[38] Kaggwa, *Customs of the Baganda*, 160.

[39] Roberts, Striking Iron, 85.

[40] Johnson, *Daniel. Blacksmithing: A Guide to Practical Metalworking, Tools and Techniques*. (London: Amber Books, 2023), 46.

[41] “The Yale-New Haven Teachers Institute.” September 1, 2008, 8.

[42] Ibid, 9.

[43] Ibid, 7.

[44] McNaughton, Patrick R. *The Mande blacksmiths: knowledge, power, and art in West Africa.* (Bloomington: Indiana University Press, 1988), 147.

[45] Beek, *The forge and the funeral*, 10-12.

[46] Roberts, *Striking Iron*, 114.

[47] Beek, *The forge and the funeral*, 42-43.

[48] McNaughton, *The Mande blacksmiths*, 72.

[49] Beek, The forge and the funeral, 22.

[50] Ibid, 24.

[51] Ibid, 88.

[52] Ibid, 93.

[53] “The Yale-New Haven Teachers Institute.” September 1, 2008, 9.

[54] D'Albe, Edmund Edward Fournier. *Hephæstus: Or, The Soul of the Machine*. (London: Kegan Paul, Trench, Trubner,[19--?], 1925), 9 – 10.

[55] McNaughton, *The Mande blacksmiths*, 3.

[56] Ibid, 3.

[57] Ibid 3-4.

[58] Beek, The forge and the funeral, 48.

[59] Ibid, 88.

[60] Ibid, 22.

[61] Ibid, 25.

[62] Ibid, 21.

[63] McNaughton, The Mande blacksmiths, xix.

[64] Ibid, 43.

[65] Ibid, 65.

[66] Ibid, xxi.

[67] Kaggwa, *Customs of the Baganda*, 160.

[68] Andrews, *Samuel Yellin*, 14.

[69] Ibid, 14.

[70] Rediker, Marcus. *The Amistad rebellion: An Atlantic odyssey of slavery and freedom*. (New York: Penguin, 2013), 75.

[71] Rediker, *The Amistad rebellion*, 75.

[72] Kalibala, Ernest Balintuma. "The social structure of the Baganda tribe of East Africa." PhD diss., Harvard University, Department of Sociology, 1946, 123.

[73] Rediker, *The Amistad Rebellion*, 75.

[74] Pennington, *The fugitive blacksmith*, 76.

[75] Ibid, 99.

[76] Ibid, 86.

[77] Ibid, 35.

[78] Ibid, 62-69.

[79] Ibid 62.

[80] Ibid, 76.

[81] Ibid, 40.

[82] Roberts, *Striking iron*, 45.

[83] Kalibala, “The social structure of the Baganda,” 123.

[84] Ibid, 60.

[85] Prown, Jules David. "Mind in matter: An introduction to material culture theory and method." (*Winterthur portfolio* 17, no. 1 (1982), 1-19.