



**VISUAL LITERACY IN THE VIRTUAL REALM:  
THE BOOK OF SELECTED READINGS 2021**

Edited by

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International Visual Literacy Association

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## Cover Art:

"STAIRS", created by Mila Gvardiol, yielded the 1st place award at the Visual Messages Competition at the 2020 IVLA annual conference.

"STAIRS" are a series of paintings in large dimension. On the canvas, a section of the stairs is presented like a static picture, but for the viewer it is a stimulant of thoughts, movements, and decisions regarding direction. Shall I go up or down?



## About the artist:

Mila Gvardiol graduated at Faculty of Applied Arts - Applied Painting Department in Belgrade and took doctors degree in Digital Art within Interdisciplinary Studies of University of Arts. She is a member of the Association of Fine Artists of Serbia and Association of Applied Arts and Designers of Serbia. She is employed as Associate Professor at the Faculty for Digital Production in Sremska Kamenica, as well as at the Academy of Applied Arts in Belgrade. She took part at 30 solo and over 250 group exhibitions and participates at international Digital Arts festivals and Fine Arts colonies. She was awarded several times for her paintings.



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## ***Selected Readings* Editorial Philosophy**

IVLA is an eclectic organization of professionals working toward a fuller understanding of how we derive meaning from what we see and how we interact with our visual environment. IVLA members represent a wide range of disciplines including the arts, sciences, education, museum, library, communication, business, videography, photography, instructional technology, health, and computer applications.

What makes *the Selected Readings* special, like the members of IVLA who have contributed to it, is that it represents this broad range of interests and reflects some of the most diverse thinking in the field of visual communication.

Each year, members come together at a conference held in conjunction with a college, university or organization to present their ongoing work and to share perspectives in a multidisciplinary forum. Characterized by many different voices, and cross-fertilization of ideas, interests and values, discussion is a lively mix of scholarship, creativity, and applications. Since the founding of the organization in 1968, this dynamic interaction between practitioners and theorists has been IVLA's greatest strength.

This peer reviewed collection of papers is selected from the presentations at the annual IVLA Conference. It is meant to reflect the spirit of the ongoing conversation among its diverse members and to promote new perspectives in its readers. Included in *the Selected Readings* are creative ideas in the making, works in progress that invite further thought and the results of long-term scholarly research. We are proud to present these multi-faceted works for your consideration.

International Visual Literacy Association  
Publications Committee  
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### **Jury Procedure**

This book has been compiled using a peer review procedure to guarantee a high-quality publication. The procedure began with planning the International Visual Literacy Association's annual conference. Part of the conference planning procedure is to appoint a proposal review committee that blindly review papers to be presented at the conference. Authors who have papers accepted at this state of the evaluation are invited to present their papers at the annual conference.

All presenters are then permitted to submit their conference papers for possible publication in *the Book of Selected Readings*. These papers are submitted to the editor-in-chief. The editor-in-chief and editors of *the Book of Selected Readings* are elected by IVLA board members for three-year terms.

The editors blindly review and comment on manuscripts assigned by the editor-in-chief. The rejection rate for this year's publication was approximately 10% based on the number of papers submitted for publication. The rejection rate is considerably higher if you consider the review at the conference level.

Please request further information about the review process from:  
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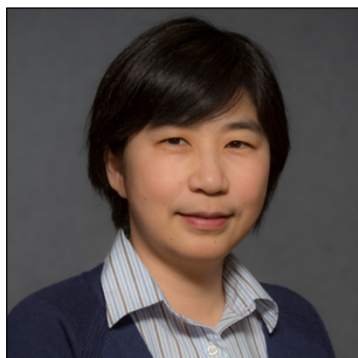
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# The Color Pile: Equitable Self-Expression Through Color and Abstraction

Kathryn de Laszlo

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## Abstract

*The Color Pile is a visual tool transported from the author's art-student context, and builds on the teaching model of Connie Smith Siegel and the Color Contrast work of Johannes Itten. As re-positioned, it offers a novel path to eliciting student narratives and point of view in language-dependent learning settings. Can this playful exercise support the clear articulation of complex ideas and help generate descriptive language? The Color Pile process moves from prompt to reflection to abstract visual composition, and resolves in a verbal, written or drawn reflection. Color and abstraction may help students gain access to their full capacities for complex thought and self-expression. Could this approach provide differently equitable support for student-produced narratives and descriptive language than is afforded by viewing representational imagery? Direct observations of middle school students using the Color Pile suggest the method could be meaningful to a diverse audience of teachers and learners. Its usefulness in a broad spectrum of language-oriented learning settings is considered.*

**Keywords:** Multimodal literacy, personal narrative, culturally responsive teaching, lived experience, expressive color

## The Color Pile & Process Described

Imagine a field of about 50-100 separate color swatches of all hues, lights and darks, and various degrees of saturation spread out in a random arrangement on a large white sheet of paper (24" x 36" or larger). This is *the Color Pile* as inspired by the work of Johannes Itten (Itten & Birren, 2001) and developed by Connie Smith Siegel (Smith Siegel, 2008). The square and rectangular swatches range in size from a few inches to a half of a letter-sized sheet of paper. They are arranged loosely and many color swatches overlap. Care is taken to distribute repeated hues, light and dark colors, and bright and subdued tones. To the casual observer, the arrangement looks arbitrary. The ratio of swatches to students is ideally 10:1 or greater, so that choice of colors is always possible.

Before direct interaction with the Color Pile begins, the teacher/facilitator provides an appropriate visual, written, or spoken prompt for the given community of learners. The prompt may be keyed into specific lesson plans, or it may act as a stand-alone experience. After being given the verbal prompt, the participants are asked to quietly reflect on it for a few moments. Closing their eyes or gazing at their own white workspace is helpful during this visualization. After this reflection, they are free to make selections of roughly six to twenty swatches at their own discretion and arrange them on their oversized white paper, holding their internally visualized response to the prompt in their thoughts as they make their color selections. Their own white paper serves as a canvas for composing. Nothing is ever glued down. The participant's own white paper should accommodate all of their swatch selections, allowing for ample white (negative) space.

The Color Pile builds a community of empathic observers and listeners as each participant shares a verbal narrative response to the prompt and the color interaction, their process, and the meanings they have ascribed to the various color swatches. Finally, time allowing, there is an invitation to draw or write a reflective response to the generated color composition. The entirety of the Color Pile experience can be fit into a one-hour time frame, often allowing for two prompts.

## Teaching and Facilitation Contexts

After engaging with the Color Pile Process as a student of Connie Smith Siegel, I directly supported the Color Pile process in four contexts: among adult art students as a peer and student, with middle school

students as a visual arts teacher, in a curriculum aimed at closing achievement gaps, and with dual immersion teachers. Most recently I have worked directly with middle school students and humanities teachers as well as teachers of English as an additional language.

In order to conform to the budget and the time frame allocated for my middle school visual art students, I had to develop a curriculum that utilized inexpensive portable materials which were compact, tidy and didn't require a lot of technique, skills-acquisition or experience. Colored card stock cut into random sizes, inexpensive pastels and a prompt comprised an affordable kit that could be widely used with a large number of students. In this setting, the Color Pile was aligned with a two-part prompt. Initially, they were asked to use language to write or speak about an invented country in all its dimensions of geography, climate, population, culture, etc. Once they developed a robust description of the country, they used the Color Pile to select four to seven colors that they felt were symbolically appropriate. These colors would be the basis for a flag design. The *Flag identity project* utilized the Color Pile in a much more prescriptive way, nested in a visual arts curriculum, but it taught me a great deal about the potential for this color and composition work to serve as a platform for identity and constructed narratives.

The Flag identity project was an exercise intended to heighten engagement and provide a sense of empowerment. It served to introduce formal Elements of Art, and aspects of design and symbolism. What surfaced was the readiness of students to form attachments to these abstract colorful visual expressions of a formed place-identity. It was the impetus for re-purposing the Color Pile process into language-oriented contexts and academic classrooms where I felt others (both teachers and students) would benefit. I believed this playful non-prescriptive approach to self-expression and agency would be of even greater value in these settings than in our visual arts context. I had seen the impact it had on L2 students' willingness to describe their imagined worlds and I wanted to carry this into contexts where they were actively struggling to communicate.

### **The Nature of the Prompt**

Lived experience should be invoked by the prompt in order to access the equitable and empathic dimensions of the Color Pile. This may be most important when the prompt references an integral part of curriculum studies or lesson plans which might include historical events, situations, figures, or narratives in literature, art or film etc. (Hammond, 2014). The prompt may involve people, places, time, objects, sound, environments or situations. In other words, there is a great deal of flexibility and choice placed in the hands of the teacher/facilitator.

As a direct outcome of invoking the lived or imagined experience of the participants, the facilitator encourages memories, visualizations, aspirations and personal perceptions to surface. In practice, it appears to be important to introduce a prompt that is open to multiple interpretations and not too singular in its cultural or linguistic contexts or content. An example might be to reflect on a time when you were able to do something of importance to you for the first time. We might ask, "What did it feel like? Imagine your surroundings in the moment, think about your mood, the sounds, the time of day..." Just as the optical excitement of the colors acts on the participants' senses, the prompt should set the stage to allow for subjectivity and felt experience as valid components of the participants' responses. A marker of success will be the student's own ability to trust their instincts of choice, composition, and expression. The facilitator's task is to support these intuitive responses at every stage of the guided exercise. As they venture into this abstract field of color, focusing on the subjective qualities of individual experience, the participants may find a freedom of expression and a sense of agency. In her own teaching, Connie Smith Siegel (Smith Siegel, 2008) utilized the framework of Johannes Itten's color contrasts (Itten & Birren, 1970) and applied them toward clearly seeing the express nature of each student through their art. She modelled the potential for visual abstraction in the form of color to act as a reflection of the core sensibilities of the participant, and a path to celebrating the value, and values of the individual in a group setting.

### **Re-arranging Colors to Locate Expressive Identities**

The flexibility in the color selection and composition process suggests and informs a fluid, unencumbered, and intuitive process. Color has powerful associations with culture and identity, yet the Color Pile explorations I have participated in or observed seem to enable participants to engage in a process of re-assignment of meaning. For example, "favorite" colors appear to lose relevance as colors are selected to



align with a participant's internal response to the prompt. It is important to be watchful for settings with stronger cultural color associations, wherein this transposition of different or new associations could be more challenging. The shifting between the visual medium of color and speaking, may serve as a form of translanguaging, (Garcia, 2009) or enabling movement between cultures, identities and languages in a fluid way (Lewis et al., 2012). The actions of shifting the colors, layering them and re-orienting them on the page is a metaphor for, and a concrete visual expression of the concept of fluid selves, and multiple selves (Henry, 2017).

The participants I have observed work steadily and methodically. They make deliberate selections, and do not appear rushed or hesitant in their body language. They rearrange and layer the color swatches instinctively. When they get close to arriving at an arrangement, their activity will naturally slow down. At this point, I like to suggest that the parent color pile is still available to them. As they shift into arranging their swatches on their separate white page they do so freely, and yet they move steadily toward a sense of arrival - they rarely seem to second-guess their choices once they have arrived at this place. The sense of agency afforded by the invitation to invent and realize their own language through color appears to promote confidence and decisiveness. The facilitator's role is to keep the participant circling back to their internal response to the prompt, and wholly trusting their intuition. Smith Siegel (2008) describes the sense of landing in this way: "As you choose color and draw from your inner sensation you come home to your original essence. And when you come home you can do nothing wrong" (p. 58).

### Student Experiences Observed

I recently facilitated student experiences with the Color Pile in person with two students at a time, ages eight to ten. Each pair of students were also siblings, and in one instance, twins. Some prompts were derived directly from sensory experience relating to memory or everyday experience. Other prompts were keyed into the work or readings the students were concurrently assigned for their online language-arts classes. I facilitated these Color Pile explorations during school closures mandated by the COVID-19 pandemic.

#### Emmanuel & Francisco

Emmanuel (pseudonym) has been invited to engage with the Color Pile for the first time. He knows I am going to invite him to try an activity that involves color and his recent experiences. As he encounters a pile of colored card stock parallelograms on the floor in a random-looking pile he says, confidently, "This is my kind of thing. This is going to work for me."

The first prompt was to stand outside and experience a clear day after persistent wildfires affected the region's air quality. The two brothers, Emmanuel and Francisco (pseudonym), stand outside with their eyes closed to sense the whole feeling of this day. As the facilitator, I suggest they focus on the sensation of the air on their face and arms, and the sounds around them. Afterward, they are asked to sit quietly and close their eyes or gaze at their white paper before selecting from the pile (Figure 1). As soon as they are ready, they are invited to make their selections from the pile. Their movements are full of focus and intention.

In response to the first prompt Emmanuel appears very selective as he steadily pulls swatches from the pile (Figure 2). Later, as he reflects on the process he expresses that he was drawn to a wide range of colors.

I don't know really what to pick, sometimes I feel like I'm a rainbow. All the colors at once. So this can be one big rainbow, every color. And then in the center, the last color. All of them mixed together, black, white and a little bit of grey. And I made them look like they're blocks separated until they go, all of them swirl around, all of them are right now in the middle. They all come together. It kinda looks like a vortex (Figure 3).

After generating the color composition, Emmanuel is given an option to write or draw from it. He chooses to draw. The students use oil pastel for its immediacy, portability, and for access to more saturated colors than colored pencil. The resulting image looks like a loose ball of yarn that loops around an open center of white on the page. But during the exercise this is just the sort of visual description I would refrain from verbalizing. It will be left to the participants to mediate their visual constructions with their own language. At

the vortex's center is a series of drawn loops in black and many colors, as if the pastel lines were running around a track. The parallelograms that formed the image are softened here and expressed by Emmanuel's circular motion on the page as he draws these overlapping concentric ovals. I describe it visually solely for the purpose of the reader making sense of his description since the drawing is not pictured.

**Figure 1**

*Emmanuel reflecting on the prompt*



**Figure 2**

*Emmanuel and Francisco selecting from the Color Pile*



**Figure 3**

*Emmanuel's Vortex composition*



**Figure 4**

*Francisco's Time and Days composition*



You know how that is squared? (referencing his composition) I decided instead of making it squared, why not just both? If that's one version of what's inside of me, and this is another one, well, so be it. My imagination can go through many forms. A lot, actually. But now it's instead of just being black, it's showing what it actually

is. But right now, on its outer look it used to look like that now it's turned into a new thing and it looks like this—whole rainbows. Instead of just being one color.

Emmanuel associated the composition with his felt experience using the Color Pile and identified directly with his rainbow vortex. Notably, he shows[s], “what it actually is”, suggesting that the drawing is a concrete expression of the rainbow, and a more exacting expression of his idea. Implicitly, the color composition is a manifestation of one of the many forms his “imagination can go through.”

This actually reminds me of something I've drawn before. One time I made with, actually, it took me a long time to get this correct detail but I made a galaxy looking whirlpool. And I made it look like this, And I don't know how to use an oil pastel but I do it more better in paint. And I decided, why not that just be what represents me? And that should just be me. So if anyone wants to know who I am inside, I guess that's really the best thing to represent me.

When Emmanuel is given an open-ended prompt to consider something he was studying in school which he could also attach feeling to, he describes a school field trip to the local creek to observe the salmon spawning. The resulting composition is a representation of a fish (Figure 5). In using the color swatches in an illustrative way, he can't help but consider what the composition looks like—he had shifted out of the abstract mode even before he began the composition. After reflecting on the color swatch composition, Emmanuel draws a representational fish.

**Figure 5**  
*Emmanuel's Salmon with water and pollution*



I already had this in my brain already. I had this in my vision already. Like, without even a warning my brain already confirmed to me what I'm gonna make. And the exact colors and exact shapes actually that I was gonna need. So I chose the black and red for the snout and the orange to be the neck...or I think it's supposed to be the neck? I'm not sure if fishes do have a neck, but I do know they have gills. The thin strips are actually it's gushing through the water. But the bigger things that are black and grey are also the pollution. So we wanna make sure they get rid of that so the salmon can go live freely without any pollution in the river. So they can go lay eggs and have babies.

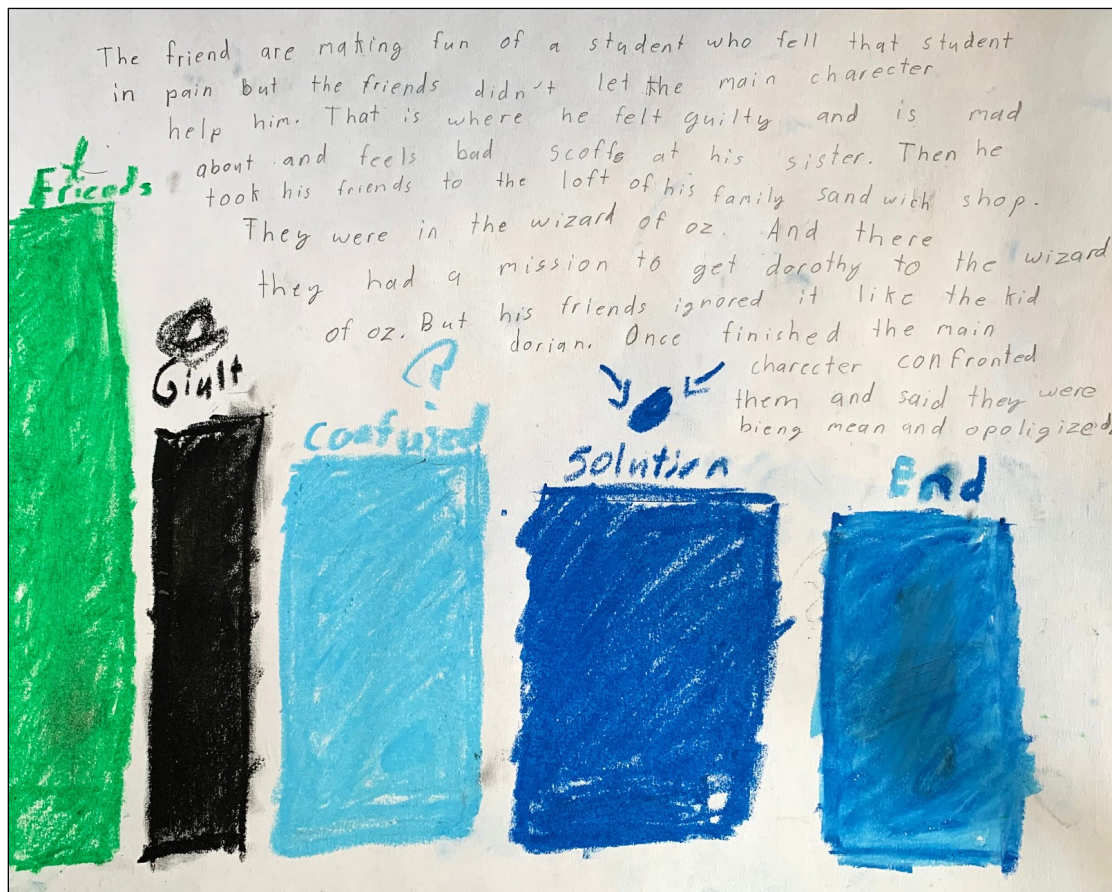
When asked to reflect on a conflict between characters from a story he had read in school, Emmanuel creates a very simple ordered composition. He assigns specific meaning to the swatch's placement by ascribing them the roles of both characters and feelings. This time, after making the drawing, he decides to add text describing both the situation, and the way the composition represents it.



What I think these colors are is the conflict between the characters in the story. The green would be the largest. This would be his friends in the story. His friends make some decisions he feels guilty about. And this is where the guilt comes in. I chose black because I think that would be best to represent it. This is the solution, so I can say it's stairs. So, I think it's all the events leading up to the solution. Many events going up into the end. Emotions and events (Figure 6).

**Figure 6**

*Emmanuel's conflict and solution: a response to a work of fiction*



Francisco was given a prompt to reflect on his experience of the day. He created a structured, map-like arrangement of the swatches (Figure 3). His brother, Emmanuel, comments that “it looks like a city.” Here, Francisco describes his composition:

Technically the big orange piece is when you really have fun in the day. And the red piece is when you feel like you can do more. And the green piece makes me feel like it's a really long day. And the yellow piece makes me think of the year. And the tiny little line pieces, those make me think of like, the time where it's so happy, like it can go on forever. And this tiny little piece makes me think of it's a nice day outside, and it's really shiny. There's a lot of colors. Today feels like it's the orange. The orange? Because today's a Wednesday, so that means—Wednesday on Zoom—that means it's only gonna be 30 minutes. And I'm almost done with all my homework. Like, technically means I have more free time.

### **Ben & Ava**

Ben(pseudonym) is 11. He arrives with his twin sister and their mother. I am meeting the kids for the first time. They are quiet and appear cautiously curious. With gently expressed enthusiasm, they state their

readiness to try it out. The prompt is to simply sit quietly and imagine an experience they had that day, including the feelings, sounds, smells, and sights associated with the experience.

When it's time to make their selections, they work at a moderate pace, in a thoughtful rhythm. What Ben composes is an orderly arrangement. It has a grid-like "mapping" look similar to Francisco's image. Ben uses the swatches to describe a familiar physical space that he experienced that day, carefully overlaying some swatches to reduce the visible size of others as he works. When asked if he wants to write or draw in response to his composition, he chooses to draw. When it is time to reflect on the color exploration, his spoken narrative is over 270 words, with some intertwined (additional) queries from me (K). Here is an excerpt from Ben's description of his Color Pile arrangement:

K: Tell me about this.

Ben: Well this is a place we went whenever, well usually when we go on walks we walk through this place. It's an alley. Here's the fences, they aren't really to scale, this is the alley like the gravel, the road at the other end and this is just the sky and the sun. This is one of the people on the way who owns a yellow Mini Cooper in their driveway. And then these are the fences one person has this huge yard with a bunch of trees. Here are the trees they rise above the fence really high. This building is the school district's maintenance building. It's across the street from the alley, we usually turn, and then here's the sun. I couldn't find any squares that were small enough. And this is just the sky down low, uh yeah, and then it got bluer up. I guess you can call these the clouds but I couldn't find any pieces that would fit there. Usually the sky kind of gets into a deeper blue as you look up. That's why I layered the blues and the sun was relatively hot when we took that walk. And here's the... so some people on this alleyway have this yellow Mini Cooper that I always notice, it's always parked, here it is.

K: So you were outside, and was there a feeling attached to being outside that you feel like is also in this?

Ben: Well like we're walking the dog and also getting some exercise. It was... fun, I like going outside. I always get excited so does the dog, that we're gonna get outside. So, like...I finish early with my schoolwork...And then I just get bored and I just stand around the house waiting for us to go somewhere so I get excited when we go on walks.

Ben describes selecting his colors:

Picking the colors was pretty easy. All I really needed to do was just figure out the scale of how big everything should be and then like how long the pieces and stuff should be so that they fit in proportion to the real alley.

Ava (pseudonym)'s composition was very dynamic, with a strong presence of contrast of hue (Itten & Birren, 1970) and a visually busy arrangement of many swatches on the page.

Ava's responses are in direct contrast to Ben's. Her memorable experience of the day was sitting in the house reading, and her composition was an expressive description of reading. To refer to the colors and drawing does not generate as much descriptive language for her. For Ava, the creation of a simple but powerful metaphor seems adequate. The pleasure of reading, she explains, is akin to an explosion. Her simple spare words describe a vivid, powerful arrangement of color. When she describes the "explosion" of thoughts in her head, she appears to both surprise herself with her verbal description, and to be pleased, as if she has discovered something exciting and familiar that she wasn't able to previously articulate about her own experience, (prior to making her arrangement). I was left to wonder if she would have arrived at this Avalogy if someone had *simply asked her* whether she enjoyed reading.

K: I just want you to be my guide to what you've created here. Just tell me about it in any way you feel comfortable.

Ava: Um... I dunno I was reading and I like to read, I was happy, and so that's sort of what I made.

K: How do you feel that you were drawn to certain colors to express that place?

Ava: It's more like they were bright and random. Like if I was sad they'd be more stripey and dark colors.

K: When you look at it, like if you were gonna be the tour guide to what...

Ava: Looks like an explosion of color, like a paint explosion or something.

K: And when you were reading did it feel like that?

Ava: I really like to read.

K: So if you were to describe the explosion what kind of explosion would you call it?

Ava: Well I'm not sure, it's not like a bad explosion like a bomb, it's more like just a bunch of colors, like a whirl of colors or something.

### **A Visual Celebration of Identities**

The simple act of choosing and arranging color swatches seems to present a compact yet powerful opportunity for the student/participant to feel celebrated. The invitation to choose the colors serves as an act of self-affirmation. The student/participants appear to listen closely to their instincts and their sympathetic selves as they compose. The process has a palpable feeling of serenity and grace which has an uplifting impact on the individual and the collective group. This is supported by the relative silence of this parallel activity in a shared space. The support for a prevailing climate of positive engagement is evidenced by the rapt attention and relaxed posture of the participants. The reflective interaction with the colors provides a welcome distance from the omnipresence of language. Imagery, including that which we create ourselves, "provides an alternate way of organizing thought, reality, and self," thus "compensating for the coercive force and structural limitations of language" (Fleckenstein, 1996, p. 920).

### **Quieting the Prescriptive Language(s) of Art**

The Color Pile's vibrant outcomes consistently suggest experience with visual composition, regardless of the participants' previous exposure to composing with form and color. The non-referential shapes seem to foster an efficient understanding of weight, and rhythm. Although the resulting color swatch arrangements may exhibit notably affective, balanced, and confident compositions, they are not intended to be analyzed using art and design rubrics. The vocabularies of formal visual analysis and the modes of critique and assessment inherited from art-practice and art-historical domains are not an asset to an equity-oriented version of the Color Pile process. Instead, we seek to elicit language and narratives of the self. To position these participant-generated arrangements as a lesson in the elements of art or principles of design would be to abandon many of the values the process upholds, including the creator's ability to linguistically re-invent symbolic and personal meanings, as they translate their own impressions from the paper into spoken narratives and descriptions.

I do not intend to delimit access to aesthetic or art world values and ways of seeing and understanding (Greene, 2001; Eisner, 2003), but to propose that an actual conflict of objectives and methods will present if we attempt to didactically teach color theory and composition in conjunction with the Color Pile and its outcomes in this context. Smith Seigel's and Itten's allegiance to the intuitive and emotional power of color relationships brought us to this application of the Color Pile, not an analysis of color as an objective optical phenomenon. Nonetheless, the activation of visual literacy skills may be a naturally occurring *outcome* of the process, and this bears further inquiry. Greene would have the art world's skills of looking be intentionally introduced, but she admits the possibility of a crisis for the viewer as they admit or omit content while viewing visual art (Greene, 1994). This may be a cultural crisis as well as a visual one. It is the work of critical visual literacy to address this. Abstraction and creation by the participant circumnavigates this need to edit the seen world through that formal lens. The Color Pile's value is an opportunity to support direct, intuitive expression of thought, feeling and experience through visual interaction with color. It is a luxury in a language-learning or language-based classroom to favor action-based, multimodal engagement, and the power to efficiently and spatially manipulate thoughts and ideas ahead of language (Albers & Sanders, 2010). Acknowledging this will help us to put aside assessment perspectives and culturally-specific frameworks, and allow for this compact opportunity to support expression and invention in full measure.



### **Beyond Representational Content**

The Color Pile provides opportunities to construct and express new meanings while facilitating the manifestation of students' thoughts, without explicit external cultural references at work. Representational visual content carries cultural meaning, as does the act of viewing it and interpreting it. Most visual content, especially when produced or reproduced as visual information or communication, expresses explicit or implicit orientations toward cultural references and perspectives. Representational imagery might include, but not is limited to still images, film, and representational art with commonly identifiable content. It attempts to mirror the visible or visibly-identifiable world. This realm can also include all forms of realism and surrealism and other reconstructions of tangible content which we seek to verify through visual observation. All of these variations are ripe with specific object-anchors and, particularly with photography and film, they act as placeholders—often suggesting singular truths of a positioned, explicit or implied nature.

Visual Thinking Strategies (VTS,) has long recognized the importance of utilizing visual content that offers multiple interpretations through ambiguity. In other words, VTS stresses the value of ambiguity in image selection to encourage multiple interpretations. Visual content in which the contexts or object anchors are uncertain will inevitably enable participant-viewers to attach a broad spectrum of meanings and enable open-ended interpretations. Abstraction through color leverages a form of “strategic ambiguity” (Bratslavsky et al., 2019). Coupled with placing the participants in the role of the designers, (Albers & Harste, 2007) this enables a positive relationship to uncertainty. The Color Pile may offer an important foundation for helping participant viewers to be more at ease with ambiguous visual information and multiple meanings.

Working abstractly, the Color Pile supports invented, imagined and subjective truths to convey the power of the imagination. A learning culture able to receive these unique points of view supports a classroom culture of acceptance. The abstract nature of the exercise presents a broad spectrum of possibility from the fantastical and metaphorical—Ava's explosive mindset while reading—to the concrete: Ben's detailed mapping of a neighborhood. Some participants draw on felt experience, while others, like Emmanuel, focus on philosophical, symbolic, or inter-relational understandings. Francisco merges the symbolism of color with the concreteness of a mapping approach, and the whimsical attachment of feelings to specific colors and the days they represent.

In this realm of repositioning color we still have to stay attuned as facilitators to the possibility of strong or fixed color associations for some cultures and individuals. The abstract nature of the process lends itself to open-ended interpretation and fluid, complex thinking and re-valuing. It seems to be particularly well-positioned for constructing and reflecting on and re-constructing established narratives. This is evident in Emmanuel's development of specific colors to represent individual characters and the abstract concept of guilt (Figure 6).

### **Visual Thinking Strategies Inspired Viewing Contexts**

Experience with the Color Pile has led me to distinguish it from other ways of collectively looking and verbally describing. It allows for uniquely informed and individuated points of view expressed by each individual. In the VTS model, viewers verbally and collectively share their observations without cross-commentary while looking at an image, a work of art or an object, or engage with and reflect on visually observing another art form, or sensory experience. Collectively, participant viewers form a community in this way, creating a layered collective story derived from the seen world (Housen, 2001; Yenawine, 2013). The facilitator carefully paraphrases each verbal contribution for the group.

The Color Pile is related to VTS, but shifts away from the echoes that often occur and the layered meanings which create opportunities to note sameness and difference of perspectives through looking and speaking. It creates a supportive context for seeing others more clearly and highlights the value of being seen and heard. Like VTS, the Color Pile is built on trust and acceptance of the inviolate nature of what each participant has described. Yet because the viewer is also the maker, we are celebrating a projection of the individual which is closely tied to the person, the ego, and the creation of a sense of self. Each component stage of these related approaches reveal opportunities to construct meaning as participants use different strategies of viewing, speaking and listening (Housen, 2001).

### Choice and Agency

If the Color Pile can act to advance the possibilities for constructing and expressing meaning for students who feel marginalized, unseen, or unheard, then I would assert that it has inherent value in many teaching and learning contexts. Choice and agency provide a robust climate for engagement, and a palpable sense of empowerment. Access to this already portable and economically accessible practice has been extended to a virtual medium during the COVID-19 pandemic as I created an online interactive version. This further extends access to the Color Pile practice as an agency-oriented visual opportunity (Lindgren et al., 2012). As a form of engagement, it is compact, portable, and transferable between language-based disciplines and additional language contexts. It is not intended to call into question the validity or inevitability of language domains or representational imagery, but to offer an alternate and parallel literacy for students as they make their meanings and understandings manifest in a visual way.

The Color Pile supports the creation of a spontaneous abstract language of color, composition, and scale. This, in turn, appears to be readily translated into verbal language by its maker. The participant is the expert: they are the architect of this symbolic mapping of personal narrative and meaning and they are therefore its most competent (and confident) translator and interpreter. Siegel called engagement with the Color Pile an experiment, highlighting the sense of exploration and discovery in a controlled environment (Smith Siegel, 2008). The student-participant appears to own the process from the first encounter.

Simply acknowledging the literacies of students' diverse home cultures is not equivalent to respecting these cultures in learning settings (Harste, 2001). In order to see students holistically we need opportunities to hear from them directly, and they need the affirmation of hearing themselves speak and experiencing themselves being heard. This enables a filtering out of imposed stories and enables them to compose their own truths (Bell, 2002). Using the architecture of color to build narratives we can give students with tentative relationships to language a visual voice, instead of relegating them to being passengers on someone else's narrative. In this way, we grant them new opportunities to share what they perceive, and know and validate what they see, feel and sense as additional ways of knowing. Writing is not the only way to express the knowable (Eisner, 2003). In turn, they will begin to define the culture and community of their learning environments. The quality of attentiveness is both explicitly and implicitly present in the Color Pile practice. Hammond emphasizes that inattentiveness to the individual sets up a shift in the potential of the brain and nervous system to fully function in a learning environment (Hammond, 2014). The importance of introducing such opportunities is an act of meaningful inclusion for students who are challenged by their access to language competencies or otherwise culturally, racially, economically, or individually marginalized. As Jewitt (2002, p. 244) stresses, "...the official institutional construction of literacy may or may not dovetail with emergent practices in homes and communities." Providing safe spaces to self-express is a matter of interest to the collective body of students in a learning environment as well as each individual.

### New Contexts

The conditions of the pandemic created an impetus for developing an online, interactive version of the Color Pile. This has enabled continued and expanded work with teachers in training and L2 teachers in different parts of the country, and the world, including Japan, Uruguay and Turkey. I have begun to record participant English teachers and language learners interacting in small groups online with the Color Pile process. Formal qualitative research utilizing the Color Pile might shed light on the capacity for abstraction and ambiguity to support multimodal learning and cultural and personal re-interpretations. Where I have recorded participant interactions, I have begun to note patterns of expression and a marked sense of attachment among participants to their expressed meanings and a marked appreciation among participants. The nature of these attachments is worthy of further exploration. Research into the Color Pile's ability to impact student anxiety and potential in relation to language learning is worth exploring (Peng, 2014), including focusing on the role of anxiety in suppressing the ability to self-express in L2 settings.

### Conclusion

The Color Pile may offer a visual respite from linguistic fatigue, and the anxieties of generating language on the spot. In language-learning, and in language-oriented learning contexts, it can mediate the biases of language proficiency and the over-weighting of dominant cultures. The Color Pile may have a positive influence when and where the conventions of language learning and representational content present as

de-limiting to disparate perspectives, and ways of seeing and understanding. The Color Pile contains constructed knowledge domains inclusive of language and culture (Harste, 2001), while acting at the juncture of visual, verbal, and lived culture. One approach to advancing literacies of the individual is to advance multimodal access to visual literacies and ways of knowing. Embedding the Color Pile in a lesson plan in a group context can act as a social experience. Perceptions of self and others are brought to bear on the broader contextual and content-based classroom culture. It may help students become more adept at expressing and advancing their unique perspectives. The weaving of color symbolism and metaphor introduces new ways of thinking and making experience visible. Where language literacy and or representational visual content are the dominant modes of communication, the Color Pile may provide an alternative opportunity for expanded student participation, engagement, and equity by interjecting a visual frame of reference. As a practice, it encourages us to put aside classifying and narrowing knowledge domains (Harste). Many perspectives, as defined by lived experience, contribute to a unique cultural, social, and personal context formed by a community of peers through this visual and verbal language of description and translation. As we give voice to these realms, we actively reinvent our own histories by constructing new connections (Housen, 1999). We can draw an analogy between the dynamic nature of color interaction causing one hue to alter our perception of another, and the possibility that one or many individuals in such a group will have the capacity to shift the understandings, the perceptions, (and more robustly, the culture) of others.

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# The “Shaken Photos” Project as a Stimulus for Developing Creative Thinking with Preschoolers

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## Abstract

*Using a digital camera to achieve a successful result requires from the user, first and foremost, to be familiar with the proper use of the medium and to have obtained basic knowledge of the principles of the art of photography. What is the result in those cases where the photographer either does not know the basic principles of photography or cannot apply them effectively in practice? Is the product considered a “failure” thus leaving photos with no clear and recognizable objects? This paper focuses on designing and implementing an applied educational intervention, themed on “shaken” photos taken by preschoolers and using this material to create digital narratives. This case study examines “shaken” photos as an opportunity to develop imagination and creativity through photography.*

**Keywords:** creative thinking, visual literacy, photos, preschool education, digital narrations

## Introduction

Creation and imagination have always been crucial factors for cognitive and emotional development. In preschool education, children have different skills, competencies and life experiences because of their age and special developmental characteristics. Creative thinking is encouraged through various means and stimuli during educational activities. According to Anning (1999), when young children enter formal education they possess a variety of ways to represent and communicate their thoughts such as painting, drawing, role play, storytelling, etc., which they gradually use less as they focus more on academic skills and symbolic systems, such as reading and arithmetic. Children create their own “representational” resources and invent original ways of making meaning, from converting assorted everyday objects, (e.g. empty boxes, paper roller), into spaceships, binoculars, etc. This action “is part of a continuous production of signals, during which the signals that have already been created become material that will be transformed into new signals” (Kress & Van Leeuwen, 1996, p. 11). Nowadays, researchers describe “multiliteracies” which form a different kind of pedagogy, “allow[ing] for different modalities in meaning making, embracing alternative expressive potentials for different learners and promoting synaesthesia as a learning strategy” (Cope & Kalantzi, 2009, p. 188).

The “shaken” photos project aims to highlight the use of Information and Communication Technology (ICT) in preschool children’s creative expression, taking as starting point what is typically considered a “failed” result as a stimulus for developing experimental and imaginative ways of thinking.

## Literature Review

According to the Curriculum for Early Childhood Education (Pedagogical Institute, 2011) some of the basic principles of Early Childhood Education are:

- Knowledge is built into interaction with the natural and social environment.
- Play is considered a dominant learning activity.
- The program aims to utilize and strengthen the children’s willingness to explore.
- Children learn through a variety of teaching approaches and express what they know through different means of representation.

A key skill that the Curriculum seeks to promote is creative thinking, since it “leads to new approaches, original ideas and alternative ways of understanding and grasping things” (Pedagogical Institute, 2011, p. 9). Moreover, “kindergarten expands the possibilities... for creative thinking when it promotes the natural tendency of infants for experimentation [and when] the teacher recognizes children’s original and unusual creations..., showing students that their ideas have value” (Pedagogical Institute, 2011, p. 14).



The Curriculum defines ICT as one of the eight learning areas. ICT in kindergarten defines critical objectives to include “search, organization, management and production of information in multiple forms, the development of ideas, personal creation and expression, exploration, discovery and experimentation” (Pedagogical Institute, 2011, p. 11). Through the use of ICT in the school environment, preschool children are encouraged “to develop critical thinking, reasoning, cognition, cooperation, communication, coordination and problem-solving skills” (Pedagogical Institute, 2011, p. 115). ICT content is the acquaintance with the basic characteristics of ICT and the acquaintance with the basic functions of the main means of photography and recording (e.g. digital camera, tape recorder, and computer), the development of original ideas, the production of multimodal information, the collaboration for the production of a joint project etc. ICT is closely linked to all core subjects (languages, sciences, arts, personal and social development, etc.).

The use of photography in research with children is not new. Researchers’ perspectives vary between sociological, ethnographical and educational point of view. Young and Wright (1973) implemented a research project using Polaroid cameras in primary school to study the visual awareness and literacy of children. Calvin (1994) searched the use of Polaroid and pocket cameras by a two-and-a-half-year-old child focusing on the child’s perspective as social actor. Clark (1999) investigated children’s’ experience of chronic illness through informant driven interviews, where photographs taken by children documenting their experience were used as stimuli. Orellana used children’s produced photographs and their comments about them “to illuminate distinctions between the urban spaces that outsiders might notice from particular urban places meaningful to children themselves” (1999, p. 73).

Photographs in education are used for various purposes such as self-evaluation, reflecting and documenting school life, and teacher professional education (Miles & Homes, 2015). From an early age, children are familiar with using digital photographs in educational projects, either as visual elements created by others used as learning material or as self-produced material used with various purposes in class. Some researchers focus on photography in education as a way for children to document daily life and experience as well as to express their ideas for the social environment (Schiller & Tillett, 2004). Researchers also focus on technical issues such as learning to use a camera and practicing photography skills, along with children expressing themselves through photography (Wong, 2020). The camera has also been used in conceptual science investigations with preschoolers (Britsch, 2019). Others focus on the use of digital photography as method for educational mediation. Friedman described an “educational process via digital photography [that] gives preschool children the ability to experiment with problem-solving, and develop curiosity and pleasure in learning, as well as independence, confidence, responsibility, empowerment and participatory learning for both parents and children” (2016, p. 15).

Digital cameras are easier to manage in comparison to the old technology cameras using film, as only by pressing a button the photographer can view the resulting photograph. Digital cameras offer “immediacy of action and output, feedback for the child, and the ability to observe the photo created” (Friedman, 2016, p. 18). Pyle (2013) began her study by showing children how to use a camera so they could provide “more purposeful photographs during the actual photo-taking session” (p. 1550). In the “shaken photos” project, neither the appropriate use of the camera nor the production of purposeful photographs was essential. On the contrary, the “failure” in both aspects—the use of the camera and the result—was the stimulus for implementing of the “shaken photos” project.

### **The “Shaken Photos” Project**

The project was implemented in the Early Childhood Educational Center of Ministry of Employment (OAED), in Athens, Greece, where the researcher works as a preschool teacher. The class consisted of 19 preschool children, aged 4–4.5 years; nine boys and ten girls, with families of average socioeconomical status. The project’s duration was 3 months long.

The idea for designing and implementing of the “shaken photos” project arose during an environmental awareness project using ICT. During that project children were engaged as photographers. They were asked to use a digital camera and capture elements of the school environment (e.g. building, classroom, garden). Then, the children’s photographs were projected in the classroom. During the projection children



were encouraged to remarks on the objects they had chosen to depict. There were several photos with unique characteristics such as: 1) photos that did not represent the whole object but part of it, in a very compact frame (using the zoom feature) which made it challenging identify what was depicted in the picture 2) blurred photos, in which the photographer hadn't kept their hand stable at the time of shooting the photo, or 3) photos that were not focused at all. During their projection, these photos caused the children's spontaneous laughter and various comments, such as, "Oh, this stupid...", "This is nothing". The impetus for the project's implementation came from a child's comment, who when viewing figure 1 spontaneously declared "It is lava from a volcano". This comment inspired the teacher to use blurred, shaken, and unfocused photos to develop preschoolers' creativity and imagination.

### Implementation of the program

The project's implementation occurred in four phases:

1. photo elicitation with preschoolers
2. selection of photos to create stories and record stories via digital media
3. creation of digital narratives using a Movie Maker program
4. collaboration with the parents

## Methodology

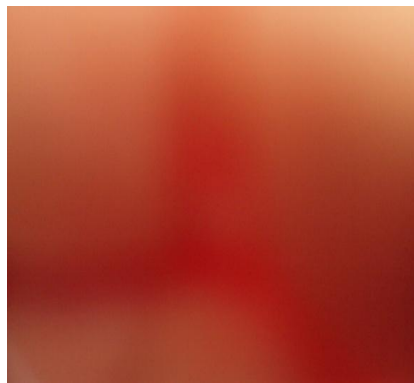
### *Photo elicitation with preschoolers*

Initially, the teacher selected ten (10) blurred, shaken or unfocused photos (figures 1 & 2). These photos were used as the base material of the photo elicitation with preschoolers. The photo elicitation procedure took place as private, individual discussions, conducted by the teacher with one child at a time, in a quiet area. No child could hear the answers of any other participants. Each child was asked open questions, such as "What do you think this picture shows?" The responses were digitally recorded. Additionally, the teacher assigned a number to correspond with each photograph. Using a simple paper recording protocol, the teacher noted each child's interpretation next to the number representing each photograph.

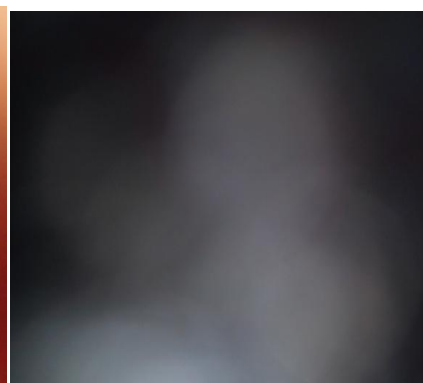
Some of the characteristic interpretations of the photos were:

- *For figure 1:* Volcano lava, fire of the dragon, thunder, explosion, etc.
- *For figure 2:* Dark night, clouds, smoke of the volcano, a dream, etc.

**Figure 1**  
*Volcano lava*



**Figure 2**  
*Fuzzy depicted subject*



### *Selection of photos to create photo stories - Recording stories*

After the photo elicitation, the researcher asked each child to select five shaken or blurred photos and place them in a line that the child desired (figure 3). The child's task was to create a short story based on those photos and share it orally with the teacher. At the same time, the narration of the story was recorded via a digital voice recorder. Since this procedure was conducted individually with each child, each participant could use the same or other photos, place them in the same or in another order and create a unique story.

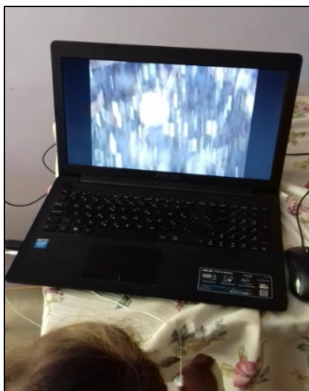
**Figure 3**  
*Selecting the photos*



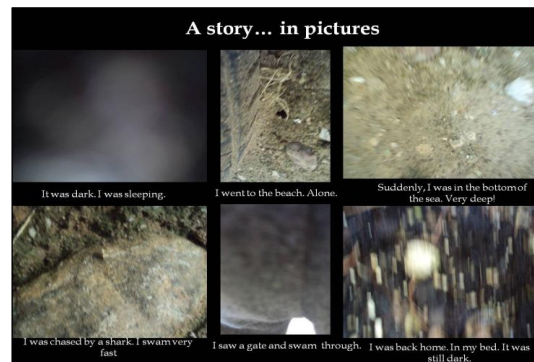
**Create digital narratives using a Movie Maker program**

Digital narratives (digital storytelling, digital essays) as a multimodal genre are an innovative aspect of new technologies that can integrate appropriate images, videos and music into to young children's educational programs (Fenty & Anderson, 2016). The photos for creating the story were inserted in the Movie Maker program, along with the audio recording of the story, in the presence of the child narrator (figure 4). After the first presentation of the material on the PC, the child was invited to made remarks about the synchronization of photo and sound (i.e. the door is not here, this is where this white appears). With the teacher's help, the appropriate settings were selected during viewing, so that sound and images could sync up, creating the digital narratives. The result was extracted as a movie format (mp4). The movies were projected to the classroom, and new discussions took place with preschoolers.

**Figure 4**  
*Creating stories on the computer*



**Figure 5**  
*A story in pictures*



One of the stories created (figure 5) is the following: *It was dark. I was sleeping. I went to the beach. Alone. Suddenly, I was in the bottom of the sea. Very deep! I was chased by a shark. I swam very fast. I saw a gate and swam through. I was back home. In my bed. It was still dark.*

**Collaboration with the parents**

The children's enthusiastic participation in the photo elicitation procedure led to the idea to expand part of the project at home. The ten selected "shaken" photos were printed. Children were invited to play a game at home with their parents like, "What is in that photo?" Children, working as investigative journalists, presented the photos to their parents. Along with the photos, the same paper recording protocol the teacher used previously, with a number correspond with each photograph, was given to the parents. Parents wrote down what they thought each photo depicted. No other information about the photos was given, thus,

parents didn't know that children took these photos. The material was returned anonymously, in a closed envelope, in a box placed at the school entrance. The teacher collected the answers of 13 parents and classified them. Some interpretations of the adults were:

- *For picture 1:* The hand of somebody in front of the camera / I cannot tell what it is / It is blood, etc.
- *For picture 2:* It is something black and white / Smoke / Lights very far / Fog, etc.

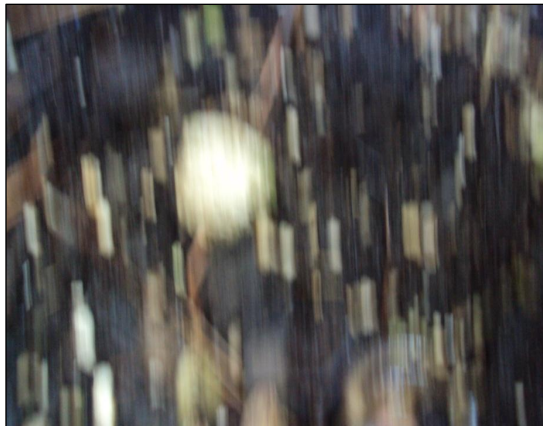
The parents' answers were compared with the children's responses.

### Discussion

After collecting the answers, the researcher conducted content analysis to detect what elements formed children's interpretations of the shaken photos. As the figurative aspects of the depicted objects such as shape, form, and lines were not as clear as depicted on the shaken photos, the crucial factors that affected children and adults' interpretation were the plastic signifiers, such as color and texture. Such elements are by definition *polysemous* which means that they can be interpreted in various ways and connected with multiple meanings by each interpreter. The role of every individual interpreter is crucial as the recognition or the cultural contraction of the meaning is affected by the previous experience, the knowledge, fashion, etc. of each interpreter (Skarpelos, 2019), especially concerning young children with different cognitive, psychological and emotional developmental characteristics than adults. The analysis showed that color was the first element that constructed the meaning for both children and adults. Red, black, and grey were the main colors in the photos. Texture was the second element noticed throughout the answers, as the visual memories of the participants were connected to the shaken photos. For example, the texture of a blurry photo reminded many participants of raindrops on windows (figure 6) or the bottom of the sea (figure 7).

**Figure 6**

*Raindrops on the window*



**Figure 7**

*Bottom of the sea*



Could we claim that there was a difference between the children's and adults' interpretations? To answer this, we had to take into consideration that children knew that the pictures were taken in the school environment by their peers, while the adults didn't have that information. Having that in mind, we could say that children, even if they knew that the photos depicted something real from their familiar school environment, most of their answers were imaginary. Children referred to imaginary creatures or landscapes that we don't encounter, such as volcanoes, lava, fire of a dragon, explosions, the bottom of the sea, a shark, etc. On the contrary, adults tried to give more logical explanations, such as smoke, lights, red clothes, or they referred to the use of the medium (i.e. a finger in front of the photographic lens). Children were encouraged to express themselves freely. Preschoolers could think beyond the specific and defined and express themselves in a more open and creative way—imagining more than photos captured in reality.

### Conclusions

This paper examined the implementation of the "shaken photos" project with preschoolers using blurred photos produced by children. The project's aim was to use "failure" as an opportunity to develop imagination and creativity through the use of ICT. The "failure" to use the medium, in this case the lack of a "successful" photographic capture, in combination with children's comments, inspired the implementation of the project. The emphasis was not on learning the proper use of a digital camera, i.e. skills that are considered essential to the use of ICT, as would be the case in a classical training program. On the contrary, starting from this failure on the use of the ICT medium by preschool children, participants were offered subversive and original stimuli, resulting from the "inappropriate" use of the photographic lens, to experiment and create. Sometimes exclusively with the use of media by children (camera), or in collaboration with the adult researcher (use of digital tape recorder together), and sometimes with the use of media by adults and children's verbal input (computer operation for Movie Maker program), ICT offers children a wealth of possibilities for experimenting and creating simple but personal multimodal texts.

Based on Stafford's definition of visual literacy as "the active reading, interpreting and understanding images and visual media" (2011, p. 1), the "shaken photos" project highlighted the active role of participants to analyze what they see in their own personal way and offer creative interpretations. Children had the opportunity to express themselves creatively, as the undisclosed subject of each photo was an interpretative stimulus. Therefore, the goal was not to detect the one and only correct interpretation, but the personal view of each participant, which resulted in multiple, original interpretations for each of the photos. "Shaken photos," as stimuli open to interpretation, were a challenge for the imagination of the children. They focused on plastic signifiers and provided interpretations distinct from the logical way of viewing and thinking, and developed personal meaning from photographs. Colors, lines, and textures were transformed by children's imaginations and the use of ICT into a "fictional" visual game between the real and the unreal, broadening visual perception and creative thinking. This comes in agreement with Arnheim's conclusion (1966) that visual perception is not a passive procedure of the visual stimulus, but rather an energetic and involving act of the eye and the mind. With the various possibilities it offers today, ICT can contribute to a new active, participatory, playful, creative educational process.

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# Supporting Visual Literacy in Nursing

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## Abstract

*COVID-19 impacted in person learning, particularly for the health sciences. Nursing students learn valuable clinical skills in simulation labs on campus. When one university campus stopped in person instruction during the 2020 spring semester, two librarians worked together to identify resources to support a nursing course that quickly switched to remote learning. These resources ranged from library licensed content to free virtual reality simulations. In order to identify materials, the librarians first defined visual literacy within nursing, as well as met with various constituents to understand curriculum goals and needs. Making connections with both the faculty and the curriculum was the impetus for examining similarities between the Association of College and Research Libraries Visual Literacy Competency Standards and the American Association of Colleges of Nursing Clinical Resources Essentials for Baccalaureate Nursing Education. Both librarians are eager to continue working on strategically and systematically incorporating visual literacy library instruction into the nursing curriculum.*

**Keywords:** Visual Literacy, Nursing Education, Health Sciences, Virtual Reality

## Introduction

In March 2020, COVID-19 drastically changed educational practices. Face-to-face instruction quickly transitioned into emergency remote teaching; resources for on-campus learning shut down and instructors were left scrambling to adjust their instruction plans to an online environment for the rest of the semester. This challenging time for instructors created an opportunity for librarians to help faculty transition to online teaching. Specifically, this paper discusses a collaboration between librarians and the School of Nursing at Indiana University.

At Indiana University, the School of Nursing incorporates multiple hands-on learning activities and in-person simulations. These are done through the use of the school's Inter-Professional Simulation Center and the Nursing Learning Center<sup>1</sup>. However, both of these learning facilities closed in March 2020 with the rest of the campus. This eliminated many learning and assessment opportunities of clinical skills that nursing students and professors rely on. The only option for professors in the School of Nursing was to adapt simulation learning to an online environment only. This was difficult for nursing professors and it was a situation that they were not prepared for.

Jackie Fleming, the Visual Literacy Librarian, and Amy Minix, the Neuro-Health Sciences Librarian, saw this uncertain time at their institution as a way to help incorporate visual literacy into the nursing curriculum and assist professors by finding digital simulation alternatives to the normally in-person simulations. Both librarians collaborated to address the challenges and opportunities of shifting a physical simulation lab learning into an online environment. These difficulties included understanding how visual literacy is defined in nursing, as well as learning the visual literacy and discipline-specific objectives and skills that are taught in simulation labs. Fleming and Minix also needed to understand the scope of virtual reality (VR), augmented reality, online videos, and other tools to aid teaching and learning in order to best support instruction that would typically take place in a simulation lab. Both librarians saw this as an opportunity to identify and amplify relevant library and open resources, as well as identifying visual literacy connections in the curriculum.

The initial step in addressing these challenges was to conduct a literature review in order to understand the characteristics of an effective nurse, simulation learning in nursing education, and the current role that visual literacy plays in nursing education (see Figure 1). After conducting the literature review, both librarians felt that using a basic framework for introducing visual literacy into the School of Nursing would

be beneficial. Fleming and Minix created this framework by mapping the ACRL Visual Literacy Competency Standards 2011 (ACRL Standards) to the American Association of Colleges of Nursing Clinical Resources Essentials for Baccalaureate Nursing Education 2008 (AACN Essentials). From this mapping exercise, the authors were able to write a definition of visual literacy within the context of nursing education and start the process of creating discipline specific learning objectives that incorporate visual literacy. The authors also reviewed current and free virtual simulation resources, as well as resources provided through their institution. They then created a spreadsheet with this information to distribute to teaching contacts within the School of Nursing.

### Figure 1

*Infographic of the process for implementing visual literacy in a nursing curriculum*



When the librarians presented at the International Visual Literacy Association's virtual conference in September 2020, they described their ideas and the initial steps. The purpose of this article is to give a more thorough description of this project, explain why visual literacy is a skill for nursing students, and describe the next steps that the authors hope to take.

#### **Literature Review:**

A majority of the literature that discusses visual literacy in nursing education agrees that being able to observe visual stimulus is an important skill for all medical professionals. One common method for teaching observation skills to medical students has been visual thinking exercises. Visual thinking strategies method is defined as "a method used to focus visual observations to enhance critical thinking and language skills"

(Jasani et al., 2013, p. e1327). This method of teaching critical thinking and close-looking through the observation of artwork comes from the research of Abigail Housen. Housen defines Visual Thinking Strategies as a student-centered curriculum where teachers “pose open-ended questions, encourage the group members to think out loud, encourage every participant to speak, and allow repeated opportunity to share what is seen” (2002). Abigail Housen expanded her research by co-founding the organization Visual Thinking Strategies (VTS)<sup>2</sup> with Philip Yenawine. This organization trains educators from a variety of backgrounds to become certified members of the VTS community. The training sessions led by VTS facilitators can happen in an art museum or any educational setting. There have been many partnerships established between nursing schools and their institution’s art museums to help increase the observation training of their nursing students<sup>3</sup>.

VTS has been embraced in a variety of ways by nursing educators. Numerous case studies discuss situations where visual thinking helps nursing students grow their observational skills (Jasani, 2013; Moorman, 2015; Moorman et al., 2017; Shapiro et al. 2006). During sessions, nursing students look at a work of art while VTS facilitators ask them three questions: What is going on in this picture? What do you see that makes you say that? What more can you find? (Moorman, 2015, p. 750). After the first question is asked and answered, the facilitator repeats back to the students their answer. This is done for clarification and for the students to get more practice with visual communication. The last question is posed to the group of students so they can work together to communicate what other details and characteristics of the artwork they can find as a group (Moorman, 2015, p. 750).

Research shows that VTS training sessions are generally effective ways of increasing nursing students’ observational skills (Grossman et al., 2013). In her article exploring the opinion of nursing students who have gone through VTS training, Moorman (2015) discovered that two main themes were emphasized in the participating students’ responses: feeling safe in learning and thinking differently (p.751). In reference to feeling safe in learning, Moorman’s study recognized that nursing students appreciated that there were no right or wrong answers in giving visual observations during the VTS session (p.751). The students felt comfortable participating in front of their peers because there was no fear of being labeled as wrong. After attending two VTS sessions, the students noticed an increase in their attention to detail when observing patients and a positive impact on their ability to communicate visually with their peers (p.753). It is important to note that it took merely two VTS training sessions to increase the nursing student’s ability to communicate and observe visually.

There are a number of articles discussing the recent popularity of online learning simulations and blended learning modules for nursing programs. Choi et al. (2020) defines virtual simulations in nursing education as the use of “interactive technology providing a realistic clinical situation in a virtual world where students can engage in decision making with realistic changes within the situation as the simulation unfolds” (p.104623). These simulations are used as a way to “put” nursing students in a semi-real situation they may find themselves in their future careers. It is important to give the students practice in these high-pressure situations so they can grow their ability to make life and death choices when needed. For this purpose, virtual simulations are used to assess clinical competency and emotion recognition of nursing students during the simulations (Mano et al., 2019).

### **Defining Visual Literacy in the Context of Nursing Education**

In the scope of their literature review, the authors did not find a definition of visual literacy that would work well with the intent of their project and incorporated the structure of the *ACRL Standards*. Because of this challenge, the authors decided to write their own definition of visual literacy within the context of nursing. This definition uses the structure of the *ACRL Standards* visual literacy definition and was heavily informed by the literature review mapping exercise with the *ACRL Standards* and *AACN Essentials*. The authors defined visual literacy as, “a skill set that allows nursing students to be astute observers in their work and daily lives. A visually literate nursing student thinks critically about visual stimulus in their profession, assesses physical symptoms with accuracy, and develops a care plan for their patients with the long term goal in mind”<sup>4</sup>.

### **Mapping the Essentials to the ACRL Standards**

To begin this process, the authors first needed to understand and identify the overlap between the nursing

accreditation concepts and the visual literacy standards. The authors' institution's School of Nursing uses the American Association of Colleges of Nursing (AACN) *Baccalaureate Essentials* (American Association of Colleges of Nursing [AACN], 2008) as their framework for nursing curricula; the *AACN Essentials* provide specific concepts that nursing students will become proficient in once they complete their baccalaureate education. The Association of College and Research Libraries (ACRL) established the "Visual Literacy Competency Standards for Higher Education" (2011) to guide visual literacy within interdisciplinary higher education. The authors' compared the *ACRL Standards* to the *AACN Essentials* in order to map similarities between the two measures and identify possible opportunities for visual and information literacy in nursing.

Matching concepts geared toward nursing proficiency to the visual literacy competency standards was not an exact one-to-one translation. However, there are common goals shared between the two measures, and identifying them helped frame how visual literacy could be addressed in nursing at the authors' specific institution. Additionally, it is helpful to know which visual skills students are working on when identifying potential coursework material.

The authors first looked at the first standard of the *ACRL Standards*, which states that the visually literate student, "determines the nature and extent of the visual materials needed" (ACRL Visual Literacy Competency Standards, 2011). Each standard has performance indicators as well as learning outcomes, which provides general information regardless of the course or discipline. For the purpose of this exercise, the authors identified relevant performance indicators; the learning outcomes helped narrow specific skills that would translate through the *AACN Essentials*. The performance indicators selected from standard one express that the visually literate student being able to: "identify a variety of image sources, materials, and types" and "articulate ways images can be used to communicate data and information (e.g., charts, graphs, maps, diagrams, models, renderings, elevations)" (ACRL 2011).

The next step involved identifying specific examples or skills within *AACN Essentials* based on the broad performance indicators provided by the *ACRL Standards*. The fourth nursing essential, information management and application of patient care technology, aligned well with visual competency standard one. The fourth concept in the *AACN Essentials* (2008) states that:

Graduates must have basic competence in technical skills, which includes the use of computers, as well as the application of patient care technologies such as monitors, data gathering devices, and other technological supports for patient care interventions. In addition, baccalaureate graduates must have competence in the use of information technology systems, including decision -support systems, to gather evidence to guide practice. Specific introductory level nursing informatics competencies include the ability to use selected applications in a comfortable and knowledgeable way. (p. 17)

The *AACN Essentials* also include performance indicators that provide context. These indicators state that nursing students will be able to: "evaluate data from all relevant sources, including technology, to inform the delivery of care" and "demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice" (e.g., retrieval information systems, including access, evaluation of data, and application of relevant data to patient care) (AACN, 2008, p. 18).

The shared goals for both *ACRL Standard* one and the fourth essential is using visual information as evidence. Visual information in the nursing field can come in many forms, including charts, graphs, and other data. Nurses use these data to make informed decisions by understanding the technology and tools in their field. Addressing these common factors between the *Essentials* and the *ACRL Standards* may help name and scaffold these skills in a meaningful way with the help of librarians (see Table 1).

The second set of *ACRL Standard* competencies the authors examined was standard three, which defines the visually literate student being able to, "interpret and analyze the meanings of images and visual media" (ACRL Visual Literacy Competency Standards, 2011). The performance indicators selected from standard three express the visually literate student being able to: "identify information relevant to an image's meaning; examines the relationships of images to each other and uses related images to inform interpretation; and recognizes when more information about an image is needed, develops questions for further research, and conducts research as appropriate."

**Table 1**  
Mapping ACRL Standard One to AACN Essential IV

<i>ACRL Standard One—The visually literate student determines the nature and extent of the visual materials needed.</i>	<i>Essential IV—Information Management and Application of Patient Care Technology</i>
<p><i>Performance Indicators:</i></p> <ul style="list-style-type: none"> <li>- identifies a <b>variety of image sources</b>, materials, and types.</li> <li>-<b>Articulates ways</b> images can be used to <b>communicate data</b> and information (e.g., charts, graphs, maps, diagrams, models, renderings, elevations).</li> </ul>	<p><i>Performance Indicators:</i></p> <ul style="list-style-type: none"> <li>-<b>Evaluate data from all relevant sources</b>, including technology to inform the delivery of care.</li> </ul>

Note: The similarities between the ACRL Standard One and the AACN Essential IV are in bolded text.

Coincidentally, the third *ACRL Standard* indicators aligned with the third *AACN Essential*, focuses on the scholarship of evidence-based practice. This essential “provides a basic understanding of how evidence is developed, including the research process, clinical judgement, interprofessional perspectives, and patient preference as applied to practice” (AACN, 2008, p.16). The performance indicators state that nursing students should be able to: “integrate evidence, clinical judgement, interprofessional perspectives, and patient preferences in planning, implementing, and evaluating outcomes of care” and “collaborate in the collection, documentation, and dissemination of evidence” (e.g., principles and models of evidence-based practice and nurse sensitive quality indicators performance measures) (AACN, 2008, p. 16).

The alignment between *ACRL Standard* three and the third essential focus on the idea that patients are the images themselves. This notion that patients are the images being analyzed and interpreted pushes the definition of what an “image” is. However, looking at visual cues to help determine the next point of care in conjunction with visual evidence (e.g., gathering additional information from visual data or determining when more information is needed) are critical skills nursing students should master (see Table 2).

The authors would like to expand and explore how targeted library instruction can improve specific nursing skills in their practice through a visual and information literacy lens. The goal of this exercise was to identify and name common areas as a way to start a conversation. The authors recognize this approach will have to be performed again in a more targeted, minute way at both the curriculum and course levels.

**Table 2**  
Mapping ACRL Standard Three to AACN Essential III

<i>ACRL Standard Three- The visually literate student interprets and analyzes the meanings of images and visual media.</i>	<i>Essential III- Scholarship of Evidence Based-Practice</i>
<ul style="list-style-type: none"> <li>- Identifies information <b>relevant to an image’s meaning</b>.</li> <li>-<b>Examines the relationships</b> of images to each other and <b>uses related images to inform interpretation</b>.</li> <li>-<b>Recognizes when more information is needed</b>, develops questions for further research, and <b>conducts additional research as appropriate</b>.</li> </ul>	<ul style="list-style-type: none"> <li>-<b>Integrate evidence</b>, clinical judgement, interprofessional perspectives, and patient preferences in planning, implementing, and evaluating outcomes of care.</li> <li>-Collaborate in the collection, documentation, and dissemination of evidence.</li> </ul>

Note: The Similarities between ACRL Standard Three to AACN Essential III are in bolded text.



### Curriculum Needs & Locating Resources

COVID-19 and the switch from physical learning into an online environment was the catalyst that brought this project into fruition. Fleming began reaching out to subject-area librarians shortly after she was hired in order to discuss and explore what visual literacy looks like throughout a variety of disciplines. Minix recently acquired nursing liaison librarian responsibilities and was working on understanding what the curriculum needs of the nursing school are and how library instruction and services could support them. The timing, focus, and newness to their respective areas provided space to explore this topic.

The librarians began by meeting with the simulation lab coordinator, Sally Gindling, to learn about clinical simulation at the campus. Gindling shared specific examples that demonstrated how attentive students must be to patients and how dynamic that can be. For example, the coordinator might be emulating a homeless patient or a five-year old child. Visual elements could include all of the person's belongings in the corner of the simulation room for the former patient example or something as simple as using a teddy bear as a prop in the latter; these details help create a narrative and environment that nursing students will experience in their jobs. Thus conversations about visual literacy within nursing began and the authors decided to learn more.

Per Gindling's recommendation, the authors met with a faculty member whose courses centered on the simulation lab. Dr. Roxie Barnes is an assistant professor at Indiana University, and she met with the authors during the summer of 2020 to discuss her course and the challenges she faced switching from in person instruction to online. Dr. Barnes discussed how students were not able to participate in physical simulations in the Spring 2020 semester due to COVID-19. Instead, she pulled videos from past simulation labs and used those as discussion starters, where students could share what they thought went well and what they would've done differently.

One of the challenges Dr. Barnes shared was the prohibitive costs of platforms that offered virtual or augmented simulation experiences. Although there are a number of tools out there, budget cuts prevented many departments and schools from switching to these technologies in light of COVID-19. The authors saw this as an opportunity to help define what visual literacy is within the scope of nursing education, which would then help identify library or Open Access (OA) resources to support this course.

Minix began by using a course mapping spreadsheet<sup>5</sup> she had used on a previous Open Education Resource project. The spreadsheet, provided by librarian Willa Tavernier in the Scholarly Communications department within IU Libraries, organized important course concepts based on the current assigned textbook. Next, Minix identified library licensed platforms that housed visual content, which included Films on Demand: Nursing Collection, Nursing Education in Video, and the Journal of Visualized Experiments (JoVE). In addition, she also looked for materials that were Open Access or Open Education Resources through resources provided by the Scholarly Communications Librarian Sarah Hare, also at Indiana University Libraries. The National League for Nursing (NLN) released a document that provided virtual simulation options for undergraduate nursing students (American Association of Colleges of Nursing, 2008). The spreadsheet helped organize and facilitate searching throughout the various information systems and provided Dr. Barnes with an accessible document to work through and ultimately decide which resources would suit her course needs best (see Figure 2).

### Process and Next Steps:

The authors are currently working on forming learning outcomes nursing professors can incorporate into their own instruction practices. These learning outcomes will emphasize visual literacy skills within the context of nursing education. Through the literature review, the authors were able to identify four general skills that nursing students need to have in order to be successful. Those four areas are visual communication, observation skills, critical thinking and data literacy. These four areas were used to categorize the *ACRL Standards* and the *AACN Essentials* (see Table 3). The purpose this exercise was to match like-terminology within both sets of competencies. This enables the authors to identify specific skills that nursing students need within the four categories identified in the literature review.

**Figure 2**  
Sample of library-licensed and open access content mapped to the curriculum

Resource	Current Textbook: Understanding Essentials of Critical Care Perrin and MacCleod	Key Concepts:	Library Owns: Films on Demand: Nursing Collection	OER Resources	Library Owns: JoVe	Library Owns: Nursing Education in Video
Chapter 10	care of the patient experiencing an intracranial dysfunction	intracranial pressure, assessment of patient with a potential for increased intracranial pressure, primary cause of increased intracranial Pressure: TBI, Primary cause of increased intracranial pressure: Meningitis and seizures	<b>Intracranial pressure</b> ( <a href="https://fod-info-base-com.proxyiub.uits.iu.edu/p_Search.aspx?bc=0&amp;rd=a&amp;q=intracranial">https://fod-info-base-com.proxyiub.uits.iu.edu/p_Search.aspx?bc=0&amp;rd=a&amp;q=intracranial</a> )	N/A	<b>Intracranial</b> ( <a href="https://video-alexanderstreet-com.proxyiub.uits.iu.edu/channel/nursing-education-in-video?q=intracranial">https://video-alexanderstreet-com.proxyiub.uits.iu.edu/channel/nursing-education-in-video?q=intracranial</a> )	<b>Cranial Nerves</b> ( <a href="https://www-jove-com.proxyiub.uits.iu.edu/search?q=intracranial&amp;exclude_sections=15+48+11+0+49+13+29+12+14+47+2+4+1+50+112">https://www-jove-com.proxyiub.uits.iu.edu/search?q=intracranial&amp;exclude_sections=15+48+11+0+49+13+29+12+14+47+2+4+1+50+112</a> )

**Table 3**  
Similar Topics Between the *ACRL Standards* and the *AACN Essentials*

Citations from Literature Review, References to <i>ACRL Standards and Essentials</i>	Visual Communication	Observation skills	Critical Thinking	Data Literacy
<i>ACRL Visual Literacy Competency Standards 2011</i>	<p><b>Standard 3:</b> Performance indicator 1, Learning outcomes A., B., C. Performance indicator 2, Learning outcomes B., C., E. Performance indicator 3, Learning outcomes A., B. Performance indicator 4, All learning outcomes</p> <p><b>Standard 5:</b> Performance indicator 1, All learning outcomes</p> <p><b>Standard 6:</b> Performance indicator 1, All learning outcomes Performance indicator 3, Learning outcome C. Performance indicator 4, All learning outcomes.</p>	<p><b>Standard 3:</b> All performance indicators, All learning outcomes.</p> <p><b>Standard 4:</b> All performance indicators, All learning outcomes.</p>	*It could be argued that all of the <i>ACRL Standards</i> include critical thinking. *	<p><b>Standard One:</b> Performance indicator 2, Learning outcomes C., D.</p> <p><b>Standard Four:</b> Performance indicator 1, Learning outcomes D., F., G.</p> <p><b>Standard Six:</b> Performance indicator 1, All Learning outcomes.</p>
<i>AACN Essentials 2008</i>	<p><b>Essential II:</b> Performance indicators 3,4.</p> <p><b>Essential IV:</b> Performance indicators 1,2,6.</p>	<p><b>Essential III:</b> Performance indicator 6</p> <p><b>Essential IV:</b> Performance Indicator 12</p> <p><b>Essential VI:</b> Performance indicator 1</p> <p><b>Essential VII:</b> Performance indicators 1,2,8,9,13</p> <p><b>Essential IX:</b></p>	*It could be argued that all of the <i>AACN Essentials</i> include critical thinking. *	<p><b>Essential IX:</b> Performance Indicator 1</p> <p><b>Essential IV:</b> Performance indicator 6,8</p>

While these skills are broad, the goal is to narrow them down through further revision. The terminology is meant to be somewhat general because the authors want nursing professors to be able to adapt the learning outcomes to their specific curriculum. As this table goes into revision and Fleming and Minix start writing learning outcomes, the authors hope to keep things somewhat broad for ease of use. One difficulty

in organizing the competencies within the identified categories was the overly broad nature of the term critical thinking. Throughout the literature review, the term critical thinking is identified as an essential skill for nursing students numerous times. However, both authors agree that both sets of competencies can be argued to embrace critical thinking. Because of this, the authors decided to put the entire *ACRL Standards* and the *AACN Essentials* under the critical thinking category. This may take more thought and revision as the authors start writing out the learning outcomes in the near future.

### Next Steps

Writing the learning outcomes has taken a bit longer than expected because the authors are still learning about the specifics of the nursing curriculum at their institution. However, before they speak with more nursing professors in their institutions School of Nursing, the authors want to have something concrete to show them. The authors plan to draft the learning outcomes and then consult the Teaching & Learning department at their institution for feedback since writing learning outcomes is something they specialize in<sup>6</sup>. In addition to the learning outcomes, the authors hope to create a graphic with the general skills outlined in Table 3. This graphic will be inspired by the *Visual Literacy Array* (cite) graphic that is based on the *ACRL Standards*<sup>7</sup>. The purpose in creating this graphic is to have a clear and concise visual representation of how the learning outcomes can be incorporated into the current curriculum at the School of Nursing.

### Conclusion

At the time of writing, it has been almost a year since COVID-19 began impacting the lives of millions and the structure of higher education. One of the most difficult aspects of this has been planning for the future when there is so much uncertainty. While we are still living in uncertain times, both authors feel that their work can positively impact the curriculum of the School of Nursing. If the pandemic has taught the world anything, it is that nurses and doctors are essential parts of society. They need to have a strong education that prepares them for anything in their future careers. The authors strongly believe that having a visual literacy skill set is a part of that preparation.

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### Footnotes

<sup>1</sup>For more information about the Inter-Professional Simulation Center and the Nursing Learning Center, visit the School of Nursing website at the following link:

<https://nursing.indiana.edu/undergraduate/interactive-learning-facilities/index.html>.

<sup>2</sup>The Visual Thinking Strategies organization has a detailed website that explains the research behind the VTS method and how to become a certified VTS facilitator. <https://vtshome.org/>.

<sup>3</sup>There have been many partnerships between an institution's medical schools and the art museums on their campus. All of the case studies listed in the references of this article are examples of this. To see more examples of medical school and art museum partnerships, visit:

<https://www.utdallas.edu/arthistory/medicine/resources/>.

<sup>4</sup>To see the PowerPoint presentation the authors gave at the virtual IVLA conference, please email one of the authors, Jackie Fleming [jkflem@iu.edu](mailto:jkflem@iu.edu) or Minix, Amy Minix, [alminix@iu.edu](mailto:alminix@iu.edu).

<sup>5</sup>To see the Excel Spreadsheet the authors shared with Dr. Barnes, email the authors

<sup>6</sup>The Teaching and Learning Center specializes in a variety of instructional techniques. For more information, visit their department website: <https://libraries.indiana.edu/teaching-learning>.

<sup>7</sup>The *Visual Literacy Array Chart* has appeared in a few publications including *Keeping up with Visual Literacy* and *Portal: Libraries and the Academy* journal.

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# Library Exhibitions and Visual Literacy

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## Abstract

*Library exhibitions showcase collections and can be laboratories where users apply key visual literacy skills, such as making close observations, practicing interpretation, and challenging assumptions. Library exhibitions facilitate self-directed inquiry and have a wide pedagogical range. At academic libraries, faculty include exhibition curation and viewing in their curriculum to promote scholarship and activism. Public libraries use exhibitions to cultivate civic interest and encourage intergenerational and multi-cultural learning. Across settings, exhibition experiences support visual learning, prompt critical thinking, and mobilize change. Through examining contemporary library engagement models such as the American College and Research Library's Visual Literacy Competency Standards for Higher Education, this paper provides examples of exhibits that illustrate ACRL's visual literacy benchmarks. Additionally, the paper provides a brief overview of recommendations for partnering with libraries to expand opportunities for visual learning.*

**Keywords:** Association of College and Research Libraries, curation, engagement practices, library exhibitions, visual literacy

## Introduction

Library exhibitions can inspire, illuminate hidden facts, challenge assumptions, build personal connections, and initiate change. At academic libraries, faculty use exhibitions in their curriculum to engage students in exploring diverse subjects and as platforms to promote scholarly dialogues that spur social activism. In public libraries, exhibitions cultivate interest in civic and public issues and encourage intergenerational and cross-cultural learning. In art museum libraries and other special libraries exhibits highlight collection strengths and bring their missions to life. Overall, exhibitions play incredibly active roles in engaging people with library collections across a variety of settings.

Modern library exhibitions more than celebrate and highlight library resources and collections; rather, they serve as workshops where users can practice and gain key cognitive skills. Through exhibits, curators and visitors make close observations, ask questions, share constructive critiques, stimulate creativity, develop divergent thinking, and practice making interpretations. For librarians, exhibitions allow them to expand their role as curators and share their instructional expertise in different ways. It is paramount for librarians to have a deep understanding of the critical information literacy skills underpinning their work in order to increase their exhibitions' pedagogical effectiveness.critical.

This paper explores the role of library exhibitions and exhibit spaces in promoting critical literacies, namely visual literacy as defined and measured by the Association of College and Research Libraries' *Visual Literacy Competency Standards for Higher Education*. Furthermore, this paper examines skills gained during exhibition curation work and exhibition visits to highlight ways library exhibits help further visual literacy and meet the ACRL's seven standards of visual information literacy. Further, this paper draws upon examples of exhibitions from different libraries to illustrate ways library exhibitions promote visual literacy and encourage people to consider the possibility of using library exhibitions or collaborating with libraries on exhibition projects.

## Library Exhibitions, Curation, and Visual Literacy

Traditionally, libraries are seen as text-driven institutions and not readily considered places for visual experiences or training. However, library collections are filled with maps, posters, photographs, as well as illustrated books. Exhibitions provide libraries an opportunity to display visual examples from their holdings in ways that tell stories, engage visitors, and, in turn, create an environment primed for visual learning and

teaching.

To create an exhibition, curators assess source materials, select visual examples to illustrate a defined narrative, and write interpretively in a way that directs and instructs viewers to look critically at and analyze materials on display. Curators teach information analysis methods based largely on effective visual communication techniques. Exhibition development work promotes visual literacy by requiring curators to articulate image needs, effectively access search tools to identify image sources, analyze the meaning of visual media within larger historical/interpretive frameworks, assess the reliability and validity of image sources, successfully employ images, use a variety of tools and technologies to create visual media, and follow legal and ethical best practices when using visual media.

In creating exhibits, curators follow the ACRL's *Visual Literacy Competency Standards* and help libraries promote visual culture and understanding through exhibitions. With knowledge and awareness of visual literacy best practices and competency benchmarks, libraries can play a direct and active role in promoting visual literacy education through their exhibits to “develop the critical thinking and evaluation skills essential to participation in visual culture” (ACRL Board of Directors, 2011). As curators build visual interpretive skills through exhibit work, they become better able to engage exhibit visitors through the content and programming they create.

As educational institutions, libraries use exhibitions to advance their mission. As valuable as the library's collections, exhibitions are a critical service that libraries offer to their communities. Exhibitions are powerful visual communication tools that can promote artistic literacy and facilitate creative development. A library with an exhibition program regularly provides opportunities for visitors to experience the visual world and helps its community develop an understanding and appreciation of art in its diverse forms (see Figure 1).

### Figure 1

*Special Collections Research Center's exhibition gallery at the University of Chicago Library, photo by Carol Ng-He*



### ACRL's Visual Literacy Standards

In 2011, ACRL—the Association of College and Research Libraries, a division of the American Library Association, developed its *Visual Literacy Competency Standards for Higher Education* as part of a wider

initiative to map out information literacy standards for higher education and to complement its seminal *Information Literacy Standards* that guide library instructional initiatives. *Visual Literacy Competency Standards* address issues presented by visual materials and were developed as curricular tools to promote the effectiveness of visual instruction and learning (ACRL Board of Directors, 2011). When examined in light of exhibition development, the standards highlight particular ways exhibitions help teach visual literacy and demonstrate the visual learning in library exhibition settings.

ACRL defines visual literacy as:

...a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media. Visual literacy skills equip a learner to understand and analyze the contextual, cultural, ethical, aesthetic, intellectual, and technical components involved in the production and use of visual materials. A visually literate individual is both a critical consumer of visual media and a competent contributor to a body of shared knowledge and culture (ACRL Board of Directors, 2011).

Moreover, the visually literate individual can accomplish seven key standards (ACRL Board of Directors, 2011):

- determine the nature and extent of the visual materials needed
- find and access needed images and visual media effectively and efficiently
- interpret and analyze the meanings of images and visual media
- evaluate images and their sources
- use images and visual media effectively
- design and create meaningful images and visual media
- understand many of the ethical, legal, social, and economic issues surrounding the creation and use of images and visual media, and access and use visual materials ethically

### **ACRL Standards, Performance Indicators, and Learning Outcomes**

The following are brief synopses of seven library exhibitions. Each illustrates ways library exhibitions map to ACRL's visual literacy standards and notes how the exhibit experience speaks to visual literacy performance indicators and learning outcomes.

#### **Standard 1**

Performance indicator: The visually literate determine the nature and extent of the visual materials needed.

Learning outcomes: The visually literate define and articulate the need for an image, and are able to identify a variety of image sources, materials, and types (ACRL Board of Directors, 2011).

Effective exhibits highlight, rather than overwhelm, in both terms of textual interpretation and visual presentation. Curators take on an editorial role, identifying parts of an exhibit that benefit from visual examples then selecting visual materials that illustrate key concepts, communicate complex data, and best express information.

In 2019, the Special Collections Research Center at the University of Chicago Library partnered with Court Theatre to create an exhibition about developing a play based on Nobel Prize-winning author Saul Bellow's seminal novel *The Adventures of Augie March*. The curatorial team faced the challenge of turning a text-only book and a modern Word.doc script into a visually compelling exhibit. The team identified ancillary visual materials such as photos, personal artifacts, and manuscript letters from its Bellow archive, and mined Court Theatre's production workspaces for visual inclusions such as a scaled stage model, costume sketches, set renderings, and photographs captured during rehearsals and meetings. Without visual materials to enliven the exhibit's discussion, the show would have remained a flat, word-only story, but the curators identified a variety of image sources and materials and considered a broad range of visual material to enrich the exhibit experience. Here, curators met learning outcomes by articulating image needs and identifying visual sources to best communicate with exhibit viewers.

**Standard 2**

Performance indicator: The visually literate find and access needed images and visual media effectively and efficiently.

Learning outcomes: The visually literate select appropriate sources and retrieval systems for finding and accessing needed images and visual media. They conduct effective image searches, and are able to acquire and organize images and source information (ACRL Board of Directors, 2011).

Serendipitous discoveries are part of any exhibit experiences, including those at libraries. Visitors can find and access images that resonate with them in unexpected ways. In the 2014's *More than a Fence: (de)Constructing Mexico/US Borders* exhibit at California State University San Marcos (CSUSM) library, exhibit visitors could engage in a multimedia exploration on the symbolic and experienced impact of the Mexico-U.S. border through an interactive installation of photography, sculpture, and texts. Created in collaboration with school professors, students in the Introduction to Sculpture class, and community artists, the exhibit engaged visitors in reflecting on the meanings of the borderlands and immigration. Before designing and constructing their own concepts of the border walls, students participated in an intensive group research project. The border walls students created ranged from "an open window next to a padlocked door; a colorful Día de Los Muertos style skull adorned with flowers; a drone flying overhead, attached to wires above the library gallery" (Chu, 2018). Visitors were invited to participate in the dialogues by responding on a slip of paper. Over the course of the semester, the chain-link fence was woven with hundreds of slips of paper. Visitors cruised the exhibition on their own, informally, searching and accessing images and visual media, which allowed them to ponder and perhaps make sense of the layers of complexity of the issues presented.

**Standard 3**

Performance indicator: The visually literate interpret and analyze the meanings of images and visual media.

Learning outcomes: The visually literate can identify information relevant to an image's meaning; situate an image in its cultural, social, and historical contexts; and validate interpretation and analysis of images through discourse with others (ACRL Board of Directors, 2011).

Exhibits not only showcase photographs and other visual materials, but also probe and ask larger questions, tease out an image's significance to larger issues that are interpreted within cultural, social, and historical contexts. Ideally, this interpretive process is interactive and will initiate relevant discussions and discourse with others.

In 2016, the California State University San Marcos Library exhibited *(In)Visible Project: Critical Perspectives on Homelessness and Hunger at CSUSM* as part of its ongoing Context Library Series in which programming "is designed to encourage the campus community to have conversations about difficult topics, and to mobilize students, staff and faculty to take action" (Fraiser, 2016). In the exhibit (see Figure 2), through striking portrait photography and poignant autobiographical narratives, Roberto Baer Guerra's multimedia installation provided a dignified and intimate portrait of San Diego's swelling homeless population. The exhibit and related events aimed to expose and confront the stigma surrounding homelessness, raise awareness about the realities homeless people face, and provide the library's community an opportunity to come together to learn, discuss, and take action to address the tough social issue. This exhibit's success rested largely on its visual expressiveness and prompted to place imagery into a larger social understanding. The exhibit met standard three's performance indicators to situate images within cultural/social contexts and exhibit programs that promoted discourse among visitors.

**Standard 4**

Performance indicator: The visually literate evaluate images and their sources.

Learning outcomes: The visually literate evaluate the effectiveness and reliability of images as



visual communications. The visually literate evaluate the aesthetic and technical characteristics of images. The visually literate evaluate textual information accompanying images. The visually literate make judgments about the reliability and accuracy of image sources (ACRL Board of Directors, 2011).

### Figure 2

(In) Visible Project exhibition at California State University San Marcos Library, photo permission by Melanie Chu



*The Naming of Things: Selections from the NYPL Picture Collection* was an interactive exhibition at the Grand Central Library on display in 2019. The exhibit was a collaboration between the Pratt Institute and the New York Public Library (NYPL), and the exhibition was first presented at the Pratt Photography Gallery in 2017. Using images from the NYPL Picture Collection, Pratt Institute students enrolled in the Curatorial Practices course curated the exhibition to show visitors the subjective nature of the cataloging process, in which images are categorized for the public to search and access at the library. The student curators engaged visitors and asked them to consider and experience how words could define images and how those words affected a viewer's understanding of images. Visitors used their judgment to catalog images to name a selection of un-cataloged items.

By engaging in the cataloging process, audience members gained a greater appreciation for how images function in our culture, how people define them, and how others react to the definitions ascribed to them. The student curators of *The Naming of Things* “[inverted] the more conventional relationship between digital technology and pictures: the custom-built application that allows visitors to ‘name’ the pictures is in the service of the objects that are present in the gallery” (Pratt Institute, 2017).

### Standard 5

Performance indicator: The visually literate use images and visual media effectively.

Learning outcomes: The visually literate use images effectively for different purposes. The visually literate use technology effectively to work with images. The visually literate use problem solving, creativity, and experimentation to incorporate images into scholarly projects (ACRL Board of Directors, 2011).

University of Chicago Library bibliographer and professor in the Center for the Art of East Asia, Dr. Katherine R. Tsiang, authored a comprehensive exhibition catalog for the traveling exhibit *Echoes of the Past: The*



*Buddhist Cave Temples of Xiangtangshan* (Smart Museum, 2010). For the first time in many decades, the exhibition brought together works of sculpture held in isolated collections and pieces that sustained damage when removed from their original context. These sculptures were shown together with digital video installations showing the sculptures in the caves. Visitors had an opportunity through interactive workstations to explore the caves, see 360-degree views of the sculptures, and virtually relocate the sculptures back to the original sites. Technology allowed visitors to examine computerized reconstructed images of damaged sculptures and 3D-printed models of select sculptures accompanied the exhibition.

For the exhibition, curators enlisted the technical expertise needed to scan the sculptures and cave sites, and they used the data to render multi-dimensional images that accompanied smaller sculptures on display. The team reached standard five's learning outcomes, showing that the visually literate are able to use technology effectively to work with images and are able to incorporate images into scholarly projects. Their masterful use of multimedia technologies vastly increased the exhibit's understandability, allowing visitors the opportunity to view reconstructed art in situ and based its visualizations as part of the work of larger scholarly projects studying the art and history of the Xiangtangshan caves.

### **Standard 6**

Performance indicator: The visually literate design and create meaningful images and visual media.

Learning outcomes: The visually literate produce visual materials for a range of projects and scholarly uses. The visually literate use design strategies and creativity in image and visual media production. The visually literate use a variety of tools and technologies to produce images and visual media. The visually literate evaluate personally created visual products (ACRL Board of Directors, 2011).

*Born to Create*, an annual art exhibition held in Chicago Public Library's Harold Washington Library Center is a good exemplar showing how exhibits can engage students in producing visual materials for a range of projects and teach them to apply design strategies and creativity in visual media production.

*Born to Create* showcases eclectic collections of original art created by Chicago high school teens that submit work to Chicago Public Library's annual Teen Winter Challenge. Since 2015, the Teen Winter Challenge has provided a platform for teens to express themselves creatively and submit work for review. In 2018, in honor of the City of Chicago's Department of Cultural Affairs and Special Events' *Year of Creative Youth* programming theme, *Born to Create* brought together eighteen artists and thirty-three works of painting, photography, video art, fashion design, and musical composition. In conjunction with that year's exhibition, the library also hosted an opening reception in the library's exhibit gallery that featured a moderated panel discussion with selected winners.

*Born to Create* illustrates a community participatory exhibition program where a library partners with youth and a school district's visual arts department to effectively cultivate students' proficiency in using tools and technologies to produce visual media that amplify personal stories and reflections (see Figure 3).

### **Standard 7**

Performance indicator: The visually literate understand many of the ethical, legal, social, and economic issues surrounding the creation and use of images and visual media, and access and use visual materials ethically.

Learning outcomes: The visually literate follow ethical and legal best practices and properly cite images and visual media (ACRL Board of Directors, 2011).

Exhibits provide an opportunity to teach about fair use, copyright, and intellectual property as it applies to image content. In physical exhibits, labels accompanying images and items on display include attributions and credit statements that identify information about the creator, date/place of publication or creation, as well as ownership notes and disclaimers about image permissions. The University of Chicago Library's online exhibit *En Guerre: French Illustrators and World War I* includes images with active rights (2014). In

the virtual exhibit, captions for protected images include notes identifying the image rights owner. The library holds a renewable fee-based contact with the Artist Rights Society to include this image, with royalties supporting the artist's estate. Furthermore, on the exhibit's rights and reproduction page, the library includes additional notes summarizing fair use of the library's materials, the artist's image rights, and instructions for those seeking copyright permissions (2014). This example demonstrates how the visually literate properly cite images and ethically commit to paying royalty fees.

### Figure 3

*Born to Create exhibition at the Chicago Public Library, photo by Carol Ng-He*



Exhibitions such as the seven aforementioned examples illustrate the potential displays have to be part of visual literacy educational experiences for both the curatorial team and visitors. Examining exhibition work within the framework of the ACRL's standards helps breakdown the exhibition development process and visiting experience to isolate and identify particular visual literacy teaching opportunities present in the exhibition experience, which help librarians more successfully teach (or further develop their own) exhibition development skills, while also promoting exhibition viewing experiences that develop visitors' visual literacy skills. Librarians who understand their work within the context of the ACRL's standards are primed to better educate and promote visual literacy through their exhibit work.

### Collaboration and Partnership Opportunities

Librarians aim to create quality and meaningful exhibition experiences that resonate with library visitors. Collaborating with others outside their organization helps inform their work, direct their efforts, and amplify the effectiveness of their exhibit programs. Forming and growing community partnerships help librarians, and key constituents understand each other better and extend the reach of services and programs. The following recommendations are ways libraries and key partners can work together and improve exhibition effectiveness, supporting teaching and learning critical literacy skills such as visual literacy.

### Parents and Caregivers

Exhibitions in public libraries offer an excellent entry point for intergenerational interactions, and libraries, on the whole, are shifting from being purely a repository of books to a dynamic hub for learning and connection (Ng-He & Gibbons, 2021). Increasingly, public libraries are offering enriching exhibit

experiences and providing space for families and individuals to create cherished memories and to build strong community bonds. Librarians continually explore ways to serve visitors' needs. Parents and caregivers can voice their family's interests, curiosities, and opinions to help librarians identify exciting topics and areas of interest that they may develop into exhibits.

### **Teachers**

Teachers can energize their curriculum by partnering with libraries and exploring library resources, including exhibitions. Educators can incorporate both physical and virtual exhibitions into their curriculum and lesson plans in fun ways that align with their learning goals. For example, teachers can arrange class visits to library exhibits or assign self-guided exhibit tours to their students. In advance of exhibition viewings, teachers can prepare pre-visit lessons and onsite activities. Incorporating visual literacy skill-building lessons into these activities can be very effective learning opportunities.

### **Artists**

Librarians enjoy sharing creative work with their communities and welcome opportunities to display art, and many libraries are open to displaying the work of local artists. Most public libraries have cases and display spaces in their facilities that are available to showcase artwork. Artists can also partner with librarians to organize hands-on art workshops or demonstration programs at the library. Local artists may consider forming artist meet-up groups at the library to establish relationships with the library's staff. These partnerships may feed future exhibitions and related public engagement activities. Thinking outside of the traditional gallery space, artists can partner with libraries to create programming that reaches a local audience and gives libraries access to visual arts not typically found in their collections.

### **Fellow Librarians**

Librarians can collaborate on inter-institutional exhibits with colleagues at other libraries to tap into a wider range of library collection materials and staff expertise while broadening and growing audiences. Forming an exhibition consortium pools resources and helps librarians develop professional networks to support their exhibition activities. Working together leverages staff talents and collection materials needed to produce library exhibitions while also helping librarians stretch budgets and amplify community engagement opportunities.

### **Museum Colleagues**

Libraries may be terrific venues to host traveling museum exhibitions. Some libraries lack the staff expertise, scope of collections, physical spaces, and security needed to produce and host exhibitions typical in quality to those produced by galleries and museums, and hosting a traveling show (or a scaled-down version), allows libraries to offer a high-quality, sophisticated exhibit experience. Additionally, library exhibit visitors differ from traditional gallery and museum visitors, inasmuch as most visit a library for information and access to library materials, and many discover exhibitions during their visit rather than it being an experience that initiates their outing. Marketing and promoting traveling exhibits can help drive traffic to the library. The name power of the museum could help increase traffic to the library while also promoting the museum to library visitors. Through collaboration, both organizations promote each other's services.

Overall, exhibitions provide opportunities for partnerships that broaden a library's reach to its constituencies and help the library more clearly understand the needs and interests of its key stakeholders. Through collaboration, libraries can strengthen symbiotic ties with essential groups of library users and better position exhibitions for success, thereby increasing their potential to educate and promote critical literacy skills such as visual literacy. Librarians who understand their work within the needs of collaborative networks are better able to increase the impact of their work and help their exhibitions promote visual literacy skills and learning.

### **Summary**

Increasingly, as exhibition creation and development processes become more diverse and sophisticated in subjects and deliveries, libraries are creating exhibits that better engage and educate their audiences. Curators who consider the ACRL's *Visual Literacy Competency Standards* while creating exhibits are able to identify visual literacy teaching opportunities present in the exhibition experience, both for themselves as content creators and for those visiting the exhibit. Curators who improve their visual literacy skills are better

positioned to create experiences for visitors that help develop and build analytical and visual skills. Furthermore, libraries broaden the reach of their exhibition programs by forming collaborative partnerships with exhibition constituents. Collaboration, in turn, helps libraries increase their ability to educate and impart visual literacy skills through their unique exhibit experiences. Overall, exhibitions across all types of libraries play a role in inspiring and educating visitors while also teaching skills to help people effectively employ, evaluate, and consume visual media.

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# A Visual Design Framework and Assessment to Inform Instruction

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## Abstract

*As evidence of meeting program criteria required by the Accreditation Board for Engineering and Technology (ABET), engineering technology (ET) students are expected to both read and create graphical communications. Academic librarians' visual literacy (VL) instruction can support ET students' ability to communicate through graphics. Under comprehensive VL instruction, teaching visual design principles is an area of VL that supports graphical communication. An adaptive comparative judgment (ACJ) assessment was given to 115 ET students to inform visual design instruction and future research. A visual design framework supplemented the assessment to familiarize students with visual design principles. ACJ offers an alternative assessment model because instead of grading against a rubric of learning outcomes, it uses context to judge the quality of a work. The assessment results outline specific areas to focus visual design instruction for students to effectively navigate and create graphical communications.*

**Keywords:** Visual literacy, assessment, visual design, adaptive comparative judgment, visual literacy instruction

## Introduction

As evidence of meeting program criteria required by the Accreditation Board for Engineering and Technology (ABET), engineering technology (ET) students are expected to both read and create graphical communications. Graphical communication courses are not required by ABET, though, so instruction often falls on ET faculty even if they do not have the expertise or time to include it in their coursework (Keller et al., 2018). Academic librarians' visual literacy (VL) instruction can support students' ability to communicate through graphics. While graphical communication is a competency under VL according to library literature, practices under visual communication can support the reading and writing of graphics. Under a comprehensive VL teaching plan, visual design principles are one of several approaches to teaching effective visual communication (Brown et al., 2016).

VL has different meanings and expectations depending on the context from which it is taught. Based on Kędra's review of VL definitions across different contexts (2018), Kędra and Žakevičiūtė offer three categories of VL skills: visual reading, visual writing, and other visual literacy skills.

Visual reading covers skills of image interpretation/analysis, evaluation, visual perception, knowledge of visual grammar and syntax and learned ability in visual-verbal translation. Visual writing covers skills in visual creation, image production and use, and in effective visual communication. Other visual literacy skills include visual thinking and learning skills and applied use (such as using images ethically) (Kędra & Žakevičiūtė, p. 2, 2019).

When teaching students skills for "effective and meaningful" visual communication, Brown et al. propose leading students through a process of inquiry. One question for students to ask themselves is, "What design strategies will I use?" (2016, pp. 65-66). As Malamed states, "Visual design affects the quality of learning, the value of the communication, and the motivation of the audience members. It leverages the brain's innate capabilities, improves engagement, and satisfies the audience's aesthetic sensibilities."

To inform visual design instruction, it is necessary to measure students' level of visual design competency within VL via assessment. As Kędra states, research on VL assessments is necessary to investigate questions in the field and demonstrate VL's value and importance in higher education curriculum (2018).



This paper offers a VL assessment and framework to gauge prior knowledge in visual design to support visual communication instruction. The exploratory research presented is visual design as it applies to the reading and writing of data visualizations, but it can potentially apply across VL competencies.

At a university in the Midwest, 115 ET students were presented with a visual design framework to orient them to how effective visual design helps viewers easily navigate graphical communications, specifically data visualizations. They were then asked to participate in a voluntary comparative judgment (CJ) assessment to gauge their visual design prior knowledge. The assessment offered pairings of data visualizations to compare and choose which they thought was the “best” and prompt students to explain their choice. The instruction team asked themselves, *Do ET students choose data visualizations that reflect best practices in visual design?* Based on observations from senior capstone projects and poster presentations, the team believed the students would choose visualizations not necessarily grounded in visual design but focused on the underlying data. In regards to the written portion, the team only wanted to see if any patterns emerged. The results showed a need to develop visual design instruction so students could make informed decisions when reading and creating graphical communications and to articulate meaningful feedback for their peers.

### Literature Review

Studies show a divide between the demand students experience in higher education to navigate and create visual materials and the instructional support they receive to meet that demand (Hattwig et al., 2013). Faculty convey frustration with students’ lack of skills to communicate effectively and persuasively with visual materials; they also express frustration with the support to offer that instruction (Green, 2006). When students self-report high levels of visual literacy skills and investigation into the topic shows otherwise (Brumberger, 2011), there is an increase in the divide between the demand to create visual communication and instructional support.

In response to the idea that millennials naturally possessed a high degree of VL because of repeated exposure to technology, Brumberger administered a survey to help prove or disprove that belief. At the time, the term “digital native” was used to describe millennials, further enforcing the misconception. Four hundred eighty-five undergraduate students across a range of majors and program years at Virginia Tech University took the survey. The survey was designed to answer a number of questions about technology and proficiency, including how students rated their level of proficiency with presentation software such as Microsoft PowerPoint presentations. 75% of respondents reported being “somewhat or very skilled” in presentation software. The majority of students reported using templates that come with presentation software, and only 13% reported designing their own templates. Surprisingly, in an increasingly visual culture, only 49% incorporated images regularly, 40% said they sometimes did, and the remainder said they never incorporated images. While results showed the presence and use of visual information, including graphics, in students’ lives, Brumberger concluded that “the data indicate clearly that the survey participants are far from adept at producing and interpreting visual communication” (Brumberger, 2011, p. 44).

ABET is the accrediting body for engineering and ET programs. ABET’s 2020-2021 criteria for engineering students include “an ability to acquire and apply new knowledge as needed,” “to communicate effectively,” and “an ability to...analyze and interpret data” (ABET, 2020-2021). Whereas the criteria for ET includes “an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature” (ABET, 2020-2021). In 2000, ABET responded to engineering employers’ request that graduates enter the workforce with 21st-century skills. Students had sufficient engineering skills, but lacked the ability to communicate. Like many educational organizations at the time, ABET thought student learning could be better assessed through curriculum outcomes. This led to the revamping of ABET’s criteria for engineering programs. Criteria 3, “an ability to communicate effectively,” is assessed through portfolio writing and competency tests. ABET did not require courses to meet this outcome but instead looked for evidence that this outcome was exercised across curriculum requirements. The argument is that if students experienced various environments in which communication takes place, they would be better prepared for how communication takes place in the workplace. Engineering faculty found it hard to integrate writing into their coursework, though. They argued it took time away from the core engineering curriculum, and they did not have the support needed, such as consultation time with experts, to effectively integrate writing communication into their classes (Williams,

2001).

Graphical communication understanding and application are learning outcomes for ET students (ABET, 2020-2021). If engineering faculty find it hard to adequately integrate written communication into their curriculum, graphic communication beyond 3D modeling may be challenging. The curriculum for engineering and ET students typically emphasizes science, math, and engineering, but students take technology courses that implement applied practices. While engineering students study to develop new design solutions for complex problems, ET students study how to put those design solutions into practice within construction and manufacturing organizations (Michigan Technological Institute, n.d.). Graphic communication, as a subset of communication, is an essential skill in engineering because of the importance of conveying design ideas. Although not explicitly stated in the 2000 ABET criteria, it was implied that programs would include it under the ability to communicate effectively. In response to this outcome, a survey was conducted at the annual American Society of Engineering Educators (ASEE) in 2003 to rank the value of fourteen proposed graphic communication outcomes under the mandated 3(g) criteria for effective communication. In engineering, graphic communications have included everything from manual drafting and pencil drawings to 3D computer drawing and simulation. In this survey, of the fourteen outcomes, “ability to create presentation graphics” is included. It states, “This outcome includes creating data graphs and charts, generating color raster images, and creating animations and slide show presentations.” The results of the survey rank this outcome relatively low, third up from the bottom. Descriptive geometry and manual geometric construction techniques were the two lower, and the “ability to create 3D solid computer models was listed as the most important” (Barr, 2004, p. 5). The ABET criteria for engineering continue not explicitly to state graphic communication. As of 2016-2017, the ABET criteria for ET does under 3(f) “an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature” (ABET, 2016-2017)

A survey was administered to mechanical engineering (ME) faculty. When asked what visual materials faculty encourage students to use, 3D CAD solid models, graphs, charts and tables, diagrams and schematics, and sketches were the most popular. When asked how important visual literacy instruction was in the context of ME design, out of twenty-one faculty responses, fourteen considered it extremely important, six considered it somewhat important, and one considered it slightly important (Keller et al., 2018). While there is a lack of VL instruction to meet academic demands (Hattwig et al., 2013), there is also a lack of research on evaluating VL skills (Bowen, 2017; Keđra, 2018; Keller et al., 2018). Further, as Keller et al. (2018) argue, while literature is available on VL assessment, VL assessment within STEM is underrepresented. In response, at the ASEE 2018 conference, they proposed five benchmark standards a person in engineering design must meet to be considered visually literate. The standards include “Use design strategies and creativity to modify existing visual media and create original visual media” (p.7, 2018). Images located, adapted, and created in team-based senior capstone projects were assessed against the five standards. Students’ capstone projects included documenting their design process and presenting their resulting design products.

To develop the five standards, the authors identified competency-based tools to assess VL skills in higher education, including Bowen’s (2017) Visual Literacy Competency (VLC) rubric. The VLC rubric, intended to be both flexible and reliable, assesses competency levels specific to the identified important learning outcomes. The rubric includes the VL competencies analysis and evaluation, as well as the design and creation of visual text. The VLC rubric is built on the SOLO taxonomy, the Structured Object Learning Outcome Taxonomy, as it applies to VL skill competency (Bowen, 2017). Biggs and Collis’ SOLO taxonomy identifies levels of learning by complexity. It begins with not knowing anything about a topic to being able to apply knowledge to unknown, future learning applications. It can be used to evaluate a learner’s competency level (Biggs & Collis, 1982). Lastly, the authors identified Arslan and Nalinci’s (2014) use of a Likert scale to evaluate VL competencies. Applied in an interdisciplinary higher education context, the authors identified seven dimensions that a visually literate student should be able to practice. Students are assessed to see where on the scale their level of VL lies within the dimensions. Included is the dimension “Designing and creating visuals” (64). The Association of College and Research Libraries (ACRL) Competency Standards for Higher Education, American Association of School Librarians (AASL) Standards for the 21<sup>st</sup> Century Learner, the enGauge 21<sup>st</sup> Century Skills, among other standards, were used with the

competency assessment tools to develop the five standards (Keller et al., 2018).

Huber et al. (2020) illustrates a collaboration between an ET librarian and ET faculty to support the VL demands for visual communications within ET. The partnership included VL instruction sessions and the adaptive comparative judgment (ACJ) software by [RM Compare](#) to assess student work. Students were required to make a visual map of their program work and a visual resume. For the assignments, there was instruction on visual resources to create visual material, ethical use of visual materials, and visual design principles to support their visual material creation. Huber's (2020) visual design framework, SHARC (Space, Hierarchy, Alignment, Repetition, Color), was included in the visual design instruction. After each submitted assignment, every student individually took the ACJ assessment. The assessment visually presented their peers' work side by side, two at a time. The student chose which she thought was "best" between the two and then, explain why. Each student received anonymous feedback from peers through this assessment process, and then turned in revisions of their work. The feedback that they received from their peers served as another opportunity for the students to learn, and the instructors were able to read and assess the students' feedback for evidence of VL skills. They also assessed the students' VL skills through the revised assignments. The researchers found that because ACJ is visual in nature, it served as a good tool to teach and assess visual material. Students made marked improvements on their revisions of the visual material, but their articulation of VL skills in the form of feedback was low, leaving an opportunity to further develop their instruction.

ACJ differs from traditional assessment tools where instructors use a rubric of learning outcomes to score against evidence of student work. ACJ comparatively presents two artifacts of work, and the judge chooses which is the better (Bartholomew, Zhang, Garcia Bravo, & Strimel, 2019). ACJ is based on Thurstone's law of comparative judgment (CJ) principle introduced through a paper in 1927. Thurstone argued that humans work best with comparison when judging an object, whether it be an example of handwriting, values of a color, or ethical opinions. He proposed that it is difficult to judge something as a standalone piece, but given two objects side by side (A & B), with a set of attributes to look for, we can judge whether A or B is the best example of those attributes. Once the judge decides which object is the better in comparison, she will be given a new set of comparisons (A & C) depending on whether A or B was chosen. Comparison offers context. He showed that when you provide a group for comparisons, with each object being compared to another in the grouping (ranking order), a pattern emerges that is a mathematically reliable form of assessment while showing the relative quality of the individual works (Thurstone, 1927).

Pollitt and Murray brought CJ into current assessment practice through their use of CJ with foreign language skills (1993). Pollitt then applied CJ in a design & technology portfolio class. The portfolios consisted of diverse deliverables, including design details of prototypes created. CJ was the holistic approach needed to assess a product with different components. With a team of judges (instructors) having varied expertise, they took the CJ assessment. They chose between pairs of students' work and then gave feedback on their choices. Input from a range of expertise gave students valuable information that marking alone could not provide. Pollitt shared the material with a large group of judges at different locations, making CJ adaptable through scanning capabilities and information technology, hence ACJ (2004). Pollitt and his research team then created a web-based version through which people could take the ACJ assessment, as described in a later paper of their work (Kimbell et al., 2007). Any number of instructors can be invited to an ACJ assessment session. A single guiding statement helps instructors stay focused on what makes one example of a student's work a "better" choice over the other. ACJ "is a method for scoring students' work in which judges are asked only to consider *validity* while making their decisions; nevertheless, the result is extremely high *reliability*" (Pollitt, 2012, p. 27). Research has shown that the rate of reliability is higher when decisions are made comparing pairs of works, rather than subjective decisions based upon specific traits (Pollitt, 2004, 2012).

ACJ was originally intended for summative assessment and as a tool for teachers and professionals to use. In a university graphic design course, ACJ was used throughout the semester as a formative assessment tool, and students were engaged as judges (assessors). Limitations to formative group critique sessions led the research team to ask if students participating in ACJ sessions for assignments throughout the semester could lead to better designs and a greater understanding of visual design principles. The class was divided into two groups. One group took part in traditional group critique sessions. Designs were printed

off from fellow groups (within the larger group) and given a conventional scoring rubric and a place for comments. Individuals received the rubric with feedback on their work. The other group participated in RM Compare's ACJ assessment sessions. The students in the ACJ sessions stated that they enjoyed the ACJ assessment more than traditional critique sessions, found it easier, and the feedback had more impact on their learning. Students tended to provide feedback with personal preferences instead of specific, desired traits. This tendency made it hard to identify what students learned. Additionally, students reported concern that peer feedback was not as good as instructor feedback. There was also frustration with how the RM Compare ranked work, which could lead to repeated comparisons. The study showed that students who participated in the ACJ feedback ranked lower in the quality of their work than their peers in the traditional critique groups at the beginning of the semester, but by the end of the semester, their rankings improved. This improvement, and the positive response from students participating, was evidence that ACJ positively impacted learning (Bartholomew et al., 2019).

This literature review conveys a need to support the graphical communication evidence ET students are expected to meet. There is a lack of research on VL assessments to inform visual communication instruction. Specifically, there is an even greater lack of VL assessments within STEM. While there are assessment tools, such as the VLC rubric and standards and the ACRL Visual Literacy Competency Standards for Higher Education, to score evidence of students' VL work, ACJ offers an alternative assessment model. ACJ engages instructors and students in the process of judgment and explanation through context. Additionally, ACJ allows a group of instructors and students to participate in the assessment so that students can benefit from a range of expertise in their feedback and gain exposure to peers' work.

### Methods

The instruction team met in spring 2020 to plan a master's in engineering technology (MSET) research methods class. The instructors were an ET librarian and ET faculty member. The team agreed to emphasize the importance of visual materials in coursework by integrating VL instruction throughout the semester. Students would be required to communicate with visual materials in presentations and deliver a data visualization in their final project.

There was little evidence that students had received formal VL instruction in their program. The MSET faculty member asked that students receive substantial visual design instruction because data visualizations had been an area he perceived as needing improvement. Anecdotally, both instructors agreed that, through their observations of senior capstone projects and poster presentations, the main point of students' data visualizations was not always clear. It was common for students to spend more time explaining a visualization than an effective visualization should require. Additionally, students often used competing bright colors, limited their data graphs to bar and pie charts, and lacked clear visual paths for effective reading. This discussion led to the data visualization section topics:

1. identify the purpose of the visualization
2. identify the visualization message/story
3. choose the right graph for your data
4. apply visual design principles to create a visualization

The visual design section was broken down into three sections:

1. understand how visual design affects the navigation of data visualizations
2. apply visual design principles to navigate data visualizations
3. apply visual design principles to create navigable data visualizations

Because little evidence was available on how much, if any, VL instruction students had received in their master's program or undergraduate work, the team decided a prior knowledge assessment was necessary to inform instruction. As the university strongly emphasizes data literacy across programs, the instructors chose to assess students' visual design skills as it impacts the effectiveness of graphical communication (Brown et al., 2016; Malamed, 2015). The study builds on the Huber et al. (2020) VL instruction and assessment project described in the literature review. Specifically, the comparative assessment software, [RM Compare](#) from RM Results, was used in combination with Huber's (2020) visual design framework, SHARC (Space, Hierarchy, Alignment, Repetition, Color).



RM Compare's assessment was a good fit because it visually compares two pieces of work, and comparative judgment software is used for students to assess each other and/or for instructors and professionals to evaluate student work. The model needed to be catered to the project because there was no student work to use with the software. The instructors met with RM Compare to see if they could experiment with the application. As noted in the literature review, one function of RM Compare's software is that, when students and/or instructors choose which comparison they think is "best," students' work is rated on a scale of lowest to highest. The team agreed they could provide 30 data visualizations for up to 200 students to compare two at a time. RM Compare was able to create an algorithm to make this work. As students took the assessment, the visualizations would be ranked "best" to "worst" based on which graphs students thought were the "best" examples of visual design.

The SHARC framework document by Huber (2020) was chosen as supplemental material to introduce students to visual design because it presents visual design principles and how they support the navigation of data visualizations, and includes examples of SHARC applied to data visualizations. Thirty visualizations were chosen by the instructors that were believed to be "good" and "bad" examples representing each component in SHARC. The data visualizations were found online from various resources. Visualizations included as "good" examples were chosen from people or organizations known for their work in visual design, such as Stephanie Evergreen's *Evergreen Data* [blog](#). Images included as "bad" examples were found from Google searches using the keywords "bad" and "data visualizations" and "examples" or variations on those keywords. A few visualizations from [Dear Data](#) were included to represent hand-drawn examples. A rubric was created for the team to rate each visualization based on SHARC. See Appendix "Visual Design Rubric for Practice."

The instructors wanted to answer the research question, *Do ET students choose data visualizations that reflect best practices in visual design?* By allowing students to choose between visualizations, the instructors could gauge what ET students found to be good visual design examples in data visualizations. Once students chose the "best" work of two, they were prompted to explain their choice. The students' choices in visualizations and the explanations given for their choices would inform the course VL instruction.

Close to 200 students from undergraduate and graduate ET programs were sent an email asking for their voluntary and anonymous participation in the assessment. They were informed that participation did not affect their grade in any way and that the assessment results would be used to develop future visual literacy instruction, specifically visual design instruction. The SHARC framework was sent as an attachment. The email also emphasized that students were only to compare the visual designs of the two visualizations and choose which they thought was "best." The comparisons were not the same data with different visualizations. The data was always different in each graph. Directions for signing into the assessment were given and they had a week to take the assessment at their convenience.

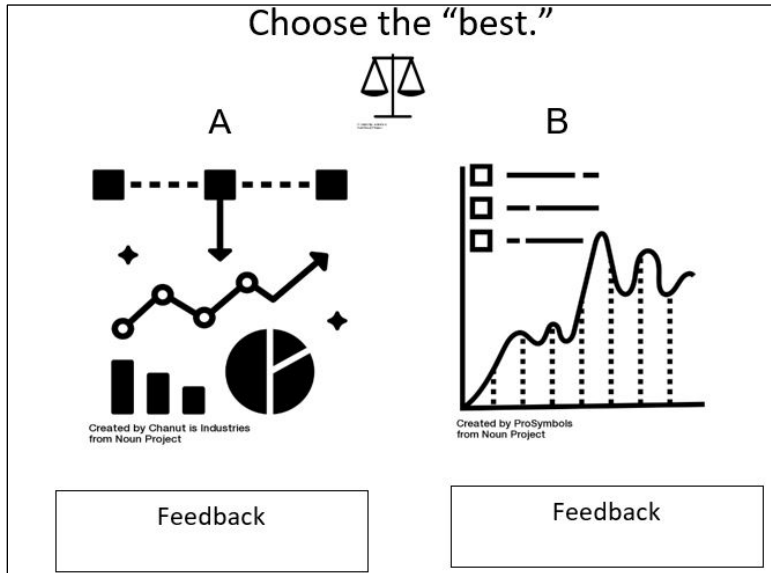
Once in the software, students saw the below directions at the top of the page (with a link to the SHARC framework was included in the directions). Figure 1 illustrates the comparison and page layout.

Directions: Click on 'A' or 'B' to choose which data visualization you think "best" represents effective visual design. You will then be prompted to explain your choice. \*Note: Each data visualization uses a different dataset. Don't compare data; simply choose which design you think is better and explain why. Keep in mind the SHARC (space, hierarchy, repetition, color) framework to explain your choice. There are no wrong answers.

A hundred and fifteen students participated, sixteen of which were graduate students, and ninety-nine of which were undergraduates. The research team gathered valuable information from the choices students made and the language they used to articulate their choices in visualizations. A graduate statistical consultant provided statistical analysis of the data.



**Figure 1**  
RM Compare screen of two data visualizations



**Results and Analysis**

Figure 2 shows how the 30 images in the visual assessment ranked based on the students' choices. The graph on the far left, "[Gender Pay Gap](#)," was the highest-ranked choice, i.e., students chose this data visualization more often than any other data visualization as an example of the "best" visual design. The graph on the far right, "[MLS Salaries per 8/1/2013](#)," ranked it as the lowest, or "worst" example of visual design. The underlying statistical model used is the Bradley-Terry Model. This probability model assigns a positive real-valued score to a particular image 'i' compared to another image 'j.'  $P(i>j) = P(i) / (P(i) + P(j))$ . This algorithm iterates overall possible comparisons, maximizes the likelihood of the observed data, and finally converges to a unique solution (Agresti, 2013; "Bradley-Terry model," n.d.).

**Figure 2**  
Relative rankings of the 30 data visualizations

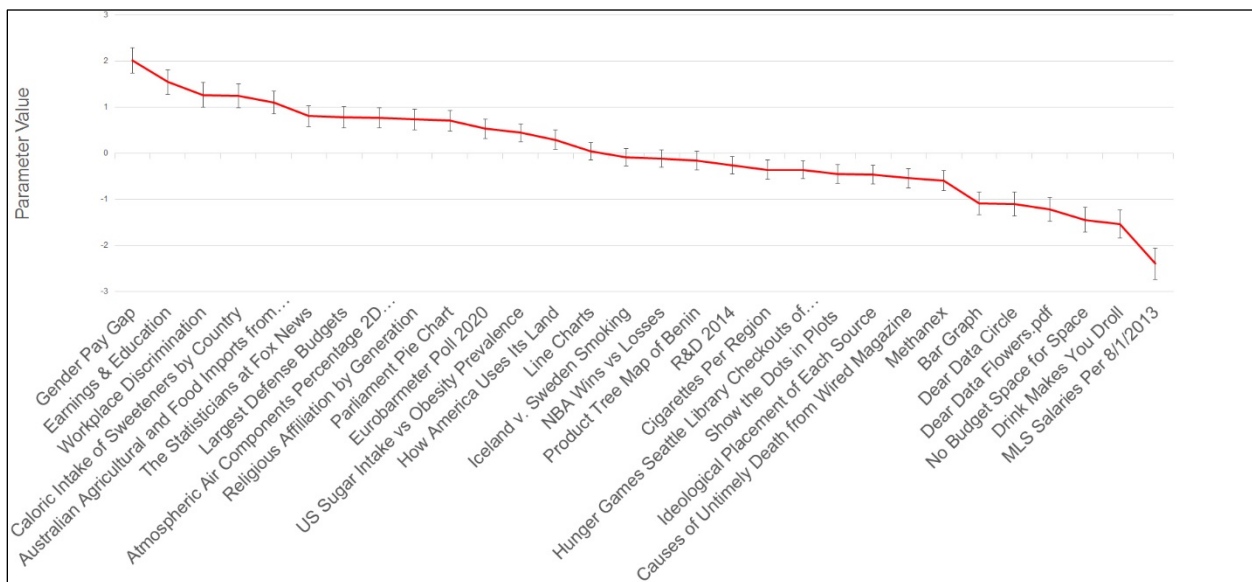
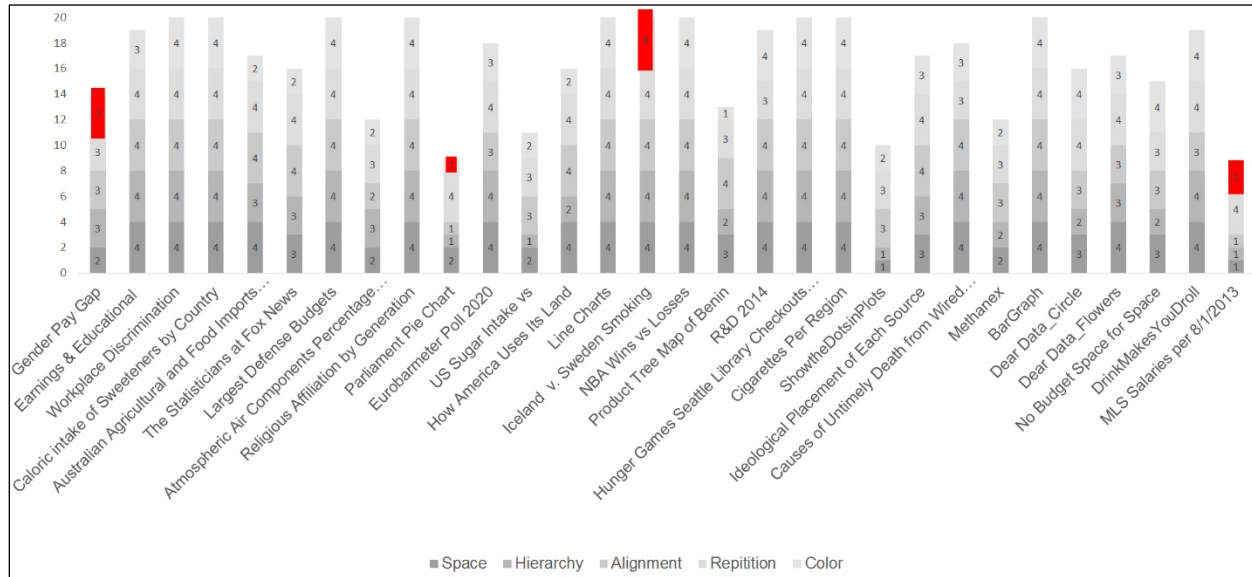


Figure 3 depicts the scores of each image by category in relation to students' ranking of images. Each data visualization was given a score, 1-4, using the Appendix, "Visual Design Rubric for Practice," created by the instructors. The rubric was based on the SHARC framework. The scores are on the Y-axis. The X-axis depicts the images lined up according to their final rank, based on students' choices of the "best" examples of visual design (left to right, highest-ranked to lowest-ranked).

**Figure 3**

*Data visualization scores*



Students ranked the "[Gender Pay Gap](#)" visualization the "best" of all the visualizations, but the instructors only gave it a visual design score of 14 out of 20. In terms of visual design, the space is cluttered with unnecessary competing elements. The viewer's eye can easily be drawn to visual detours. All elements, particularly space, could have been better utilized for the viewer to navigate the graph easily. The instructors and students agreed that the "[MLS Salaries Pay Per 8/1/2013](#)" was the "worst," with a score of 8 out of 20 given by the instructors and ranking last by the students. The only SHARC element that worked in the graph was Repetition, and one could say it was overused. Interestingly, The "[Parliament Pie Chart](#)" was given the second-lowest visual design score of 9 out of 20 by the instructors, particularly in regards to the lack of hierarchy and alignment, and the competing use of color, but the students ranked it in the upper half of "best." Lastly, a number of graphs the instructors thought were excellent examples of visual design did not match the students' rankings, which were in the middle or low end of the scale. For example, with "[Iceland v. Smoking](#)," the use of SHARC elements creates a clear navigational path for viewers to read and comprehend the graphical communication.

Although there are graphs the students and instructors agreed on, these findings may indicate students focused more on the underlying data than the visual design. If the comparisons had been based on the same data, maybe students would have made different decisions, but the software was not set up to work that way. The advantage to comparing graphs representing different data may be that it forces the assessor to focus only on the design. The results of the assessment indicate a need for two-part instruction: 1) a session that focuses on identifying the right graph for the data; and 2) a session on visual design principles to create easy-to-navigate graphical communications.

The instructor's scores are not set in stone and there is room to debate the effectiveness of different design elements. Instruction and time for classroom discussion would encourage debate, which might make students more informed and purposeful in their, visual design decisions, even if others would make different decisions.

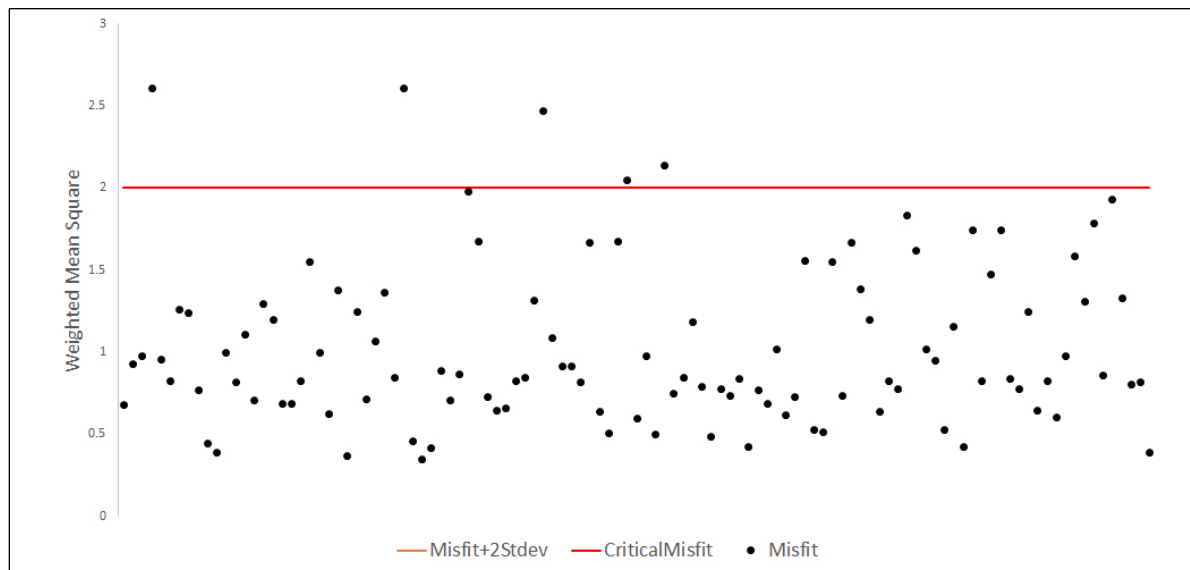
Table 1 reveals a significant difference in ratings for the categories of hierarchy and alignment from the top five “best” and the bottom five “worst” visualizations the students chose. This difference indicates that these factors played a greater role in students’ choices over the other SHARC elements. As stated above, the “Parliament Pie Chart” was given one of the lowest visual design scores by the instructors, particularly in regards to hierarchy and alignment, but the students ranked it in the upper half “best.” Further investigation, through instruction time, could help inform the influence these elements had on students’ choices.

**Table 1**  
*Comparison of “Best” and “Worst” ranked data visualizations.*

Data Visualization Ranking	Ranks		Avg. Rating				
	1	5	Space	Hierarchy	Alignment	Repetition	Color
Top 5	1	5	3.6	3.6	3.8	3.8	3.2
Bottom 5	26	30	3.4	2.6	3.2	3.8	3.4
Difference			0.2	1	0.6	0	-0.2
Correlation between rank and scores			-0.03	-0.20	-0.04	-0.11	0.11

Figure 4 illustrates the variability in choices among students. Students above the red line indicate those whose choices deviate from the rest. It could be interpreted that students were inconsistent in their choices. However, most students are below the red line. This variability is expected and can be treated as noise. Overall, there are a few outliers, which can be read as the students having similar prior knowledge of visual design.

**Figure 4**  
*Judge Misfits*



*Note.* The mean square can only be positive; that is why we do not see any values below zero.

The Figure 5 word cloud shows the words students used in their explanations for the choices they made. “Data,” “color,” and “colors” were used the most. Words such as “easy,” “understand,” “hard,” “read,” “information” also rank high in usage. Randomly sampled examples of students’ explanations include:

1. “The color block is more attractive. Space and the hierarchy are better incorporated in A.”
2. “A is more concise yet informative.”
3. “B is easier to understand the data trend.”
4. “I cannot focus on the data in A because of the background.”

5. "Too much going on in 'B'"
6. "The spacing fits the data, and the color pallet also makes sense for the data."
7. "The data is described in a reasonable fashion. The colors and spacing make sense for the described data, and the labeling makes it clear to the observer what they are looking at."
8. "This one has better hierarchy and alignment design. It repeats its data in columns, and as the columns rise in size, they move to the right. The other design has its data point chaotically organized to fit in a square, which leads to confusion."
9. "A uses too many colors to overcomplicate while B only uses four distinct colors as well as has it simplified with few words and symbols."
10. "A has more color and hierarchy, but B has more space and repetition. B is more simplified and, therefore, easier to read and understand. However, A is not overly complicated as well and also has a flower image that can be left as an imprint in people's mind when they see it."
11. "I like chart graphs more than drawings."

**Figure 5**  
*Word Cloud*



In addition, Table 1 indicates that hierarchy and alignment informed students' decisions. Their word choices

show they used those words in their explanations, but they are not the top words. Since “data” and “color” are the most used words, there may be a disconnect between what they chose and their ability to articulate their choices. Additionally, although the examples are a small percentage of the explanations captured and randomly chosen, they represent a lack of detail and understanding of specific words, such as hierarchy and space. There may also be an inability to articulate how the different visual design elements work together to support visual communication. The last two comments, 10 and 11, refer to hand drawings of graphs the instructors included. The graphs could be considered more artistic than scientific, but the instructors believed they employed effective visual design principles. The hand-drawn graphs ranked low on the scale of student choices. Again, this may indicate a focus on data over design.

### Discussion

This paper offers an ACJ assessment tool combined with a visual design framework to assess ET students' visual design prior knowledge. An exploratory study, the results give valuable information for future teaching and research. The instructors believe students were reading and creating graphical communication with limited knowledge of visual design based on observations of student capstone projects and poster presentations. Between the choices made and the explanations given, the instructors believe students were more focused on the data and could benefit from visual design instruction as part of a larger VL instruction series. Specifically, students were drawn to bar and pie charts and primary color use in the visualizations. The study demonstrated a divide between what the instructors found to be good examples of visual design and what the students thought were good design examples. Lastly, while students appeared to rely on hierarchy and alignment in their decision-making, they were not words ranked the highest in the explanations. Overall, the explanations given lacked the details to suggest an understanding of the effect visual design principles have on the navigation of data visualizations. Further, as a group, students made similar choices, suggesting they share similar visual design beliefs.

There were limitations in that it is possible students would have chosen differently if they were given comparisons of the same data. It is also possible that the way the assessment was designed more accurately revealed students' prior knowledge of visual design. Additionally, just as the assessment was about to be given to students, the Covid-19 pandemic happened. The ET librarian was going to visit the classes that were taking the assessment to explain the SHARC framework, how the assessment worked, and its purpose. Instead, an email included as much detail as possible without overwhelming students. Additionally, more students may have taken the assessment without the pressures that immediately hit campus because of the pandemic. Lastly, the instructors would have preferred a follow-up conversation with students about the survey, but the circumstances made it too difficult. Future work will include further developing the SHARC framework, using ACJ for prior knowledge, formative and summative assessments, and hosting focus groups to learn about students' experience using these two tools.

This assessment and framework combination is significant because it responds to Kędra's call for more research on VL assessments to answer questions in the field and to support the value of VL instruction in higher education. Although exploratory, it offers an alternative assessment model that uses context to judge quality over scoring against a rubric or set of standards or competencies. This study used SHARC, but standards or competencies could be integrated instead.

RM Compare's software is ideal, but not all libraries have the funding to purchase it. The strength of an ACJ assessment is to use it for both formative and summative assessments, and as this study showed, prior knowledge assessments. Some practical, low-cost options to integrate the idea of comparative judgment is to create a Google slide deck or something similar, where pieces of work are placed side by side. Within the comments section, each assessor can say which they think is “best” and explain why. This option does not rank the choices and change the comparisons based on ranking, but it is a start to judging in context. Another idea is to photocopy student work and make zines or booklets. Each page opening is a comparison and fun way to present student work. Letters can be at the top of each page (A & B). Students can have a form where they list which examples they think are “best” in the comparisons and explain why. Ideally, in both examples, students submit electronic documents for their explanations so that text analysis can be done through a simple word cloud or through more detailed analysis options, such as Voyant or RapidMiner.



## Conclusion

ET students need VL support to make informed decisions about reading and creating graphical communications, as well as giving feedback to their peers. Although graphical communication may be seen as the domain of graphic designers, there is no evidence in the literature that engineering and ET students receive instruction from them. VL instruction from academic librarians that includes visual communication instruction can help ET students successfully navigate graphical communication. Specifically, visual design instruction is a way to engage students with what makes graphical communication effective and ineffective. The work presented is intended to foster discussion and future work. As stated previously, it is ideal that visual design instruction includes conversations and debates about visual design principles. It is not the intention of this paper to present prescriptive material but rather materials to work with and explore dynamic instruction in the classroom and future research. From past instruction with students, they enjoy this topic. They experience the pressure to communicate through visuals, but a one-stop-shop to help them create effective and meaningful visual communication is not available. When asked where they learn how to create visuals, piecemeal stories emerge with gaping holes. Standing in front of the classroom with a list of standards or competencies out of context can be hard to deliver with lasting impact. ACJ with SHARC can be a start to more actively engage students with the assessment process to better support VL and demonstrate its value in higher education.

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**Appendix****Visual Design Rubric for Practice of Skills**

Category	Advanced (4)	Proficient (3)	Developing (2)	Beginning (1)
Space	Practices intentional use of and arrangement of elements to create visual harmony	Demonstrates limited skills for the intentional use of and arrangement of elements to create visual harmony	Includes elements to create visual balance	Displays limited to no skills on the use of space
Hierarchy	Practices hierarchy prioritizes elements from the most important and supporting details	Demonstrates limited skills on the hierarchy to prioritize elements from most important to supporting details	Demonstrates hierarchy to prioritize elements	Displays limited to no skills on the use of hierarchy
Alignment	Practices grouping elements with seen or unseen lines to keep information organized	Demonstrates limited skills on how to group elements with seen or unseen lines to keep information organized	Demonstrates skills on how to use alignment to organize information	Displays limited to no skills on the use of alignment
Repetition	Practices unifying elements so important differences became a focus point	Demonstrates limited skills on how to unify elements, so important differences became a focus point	Demonstrates skills on how to use repetition to create focus points	Displays limited to no skills on the use of repetition
Color	Practices the use of color to create mood and emphasis	Demonstrates limited skills on how to use color for mood and emphasis	Demonstrates skills on how to use color to create an effect	Demonstrates little to no skills on how to use color to create an effect

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# Visual Encounters with the Past: Teaching Visual Literacy to Enhance Historical and Cultural Understanding

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## Abstract

*At the University of Denver, the reference librarians and special collections curator have developed strategies to incorporate visual literacy into instructional sessions across multiple disciplines. In this chapter, we will discuss our collaborations with faculty in anthropology and in history to help students interpret tangible and digital archival visual information that will inform their understanding of historical contexts and meet learning outcomes in two classes: “Native American Resistance in the Digital Age” and “World War I.” Whenever we partner with faculty to include visual literacy in non-arts courses, we start with course outcomes and work with the faculty to determine how the incorporation of visual literacy can help reach those goals. Our process is iterative, practice based, flexible, and ever evolving. This chapter will provide practical strategies that educators can use to implement this type of collaboration at their own institutions.*

**Keywords:** critical visual literacy, information literacy, librarian/curator/faculty collaborations, primary source research

## Partnering on Visual Literacy and Information Literacy

Visual literacy is an important aspect of information literacy that is not often included into non-arts-based library instruction, despite the multitude of visual materials that can be used in partnership with text-based course materials to deepen and enrich the instructional experience. Many non-arts librarians and archivists do not have backgrounds in the arts and may be hesitant to bring visual materials and visual literacy-based exercises to their coursework, but as Matusiak et al. (2019) have shown in their study of undergraduate and graduate students, not incorporating visual literacy into coursework is a lost opportunity that leaves a gap in the students’ knowledge base.

In this chapter, we cover how we have developed ongoing partnerships between archivists, subject librarians, and teaching faculty in non-arts disciplines to co-create activities using visual materials based on course outcomes and goals to mitigate some of the knowledge gaps that Matusiak et al. (2019) and others in visual literacy studies have noted. Collaborations between library faculty and teaching faculty highlight potential areas of mutual benefit and strengthen existing relationships. Working with the archives can allow for the inclusion of visual primary sources into in-classroom library instructional activities, which can spark student wonder and excitement in ways that may not happen if instruction focuses only on visual materials in library databases. We have discovered that, even if the physical collections are limited, incorporating tangible materials into activities can make a real difference in student engagement. At the same time, utilizing materials in databases can open up possibilities to explore archival and other visual materials from all over the world, expanding the opportunities for deep dives into discipline-specific areas.

Above all, collaboration is an ongoing and iterative process and it is necessarily sometimes slow and organic in nature. We have worked with teaching faculty and each other over time to seek opportunities for mutual benefit, from partnering with faculty when they are developing new courses, to applying jointly for library grants to redevelop and refine aspects of their courses with visual information literacy in mind. We are committed to growing and developing this process, as it will always be evolving.

### Visual Literacy

The 2011 *ACRL Visual Literacy Competency Standards for Higher Education* defines visual literacy as “a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media,” including crucial skills such as understanding and analyzing context and culture. In 2016, ACRL formed a Visual Literacy Task Force to update the standards to align with their *Framework for Information Literacy for Higher Education*. At the International Visual Literacy Association’s virtual conference in 2020, Thompson et al. (2020) presented preliminary findings identified by the ACRL Visual Literacy Task Force about issues of increasing importance to visual literacy instructors, based upon surveys and interviews. Several of these issues reflect our own visual literacy teaching experiences, such as: moving away from skills-based standards towards dispositions and habits of practice; incorporating critical visual literacy into our instruction, which, in addition to contextualizing images per visual literacy, investigates power relations; and prompting students to practice “slow looking,” or slowing down to examine what they are seeing. The task force members also identified challenges and opportunities in the visual literacy interviews which resonate with us, such as the role of librarians and curators in visual literacy instruction and the collaborations between librarians and discipline faculty to introduce visual literacy to students (in our case, non-arts students) in order to help them to both meet the goals of the course and to develop life-long learning skills that are crucial in today’s visually-rich online culture (Thompson et al., 2020). For non-arts librarians interested in the idea of slow looking as a visual literacy skill, the Toledo Museum of Art has a helpful website on the steps in the process that first entail looking, observing, and seeing, and then describing, analyzing, and interpreting (*Visual literacy: The art of seeing art*).

Three themes in the recent literature inform our approaches to visual literacy instruction. The first theme involves the prevalence of images available to students and the mistaken assumption that students are able to critically evaluate and contextualize meaning, which underscores the crucial role of visual literacy in today’s academic environment and in life-long learning. In their study, Matusiak et al. (2019) determined that undergraduate and graduate students across non-arts disciplines show that “being surrounded by visual media does not necessarily mean that students know how to find appropriate images, understand their meaning and cultural context, or integrate them into academic work” (p. 124).

The second theme concerns the uncertain role librarians should play in engaging students with visual objects. By surveying academic librarians, Schwartz (2018) found that many don’t know about the visual literacy standards and don’t address visual literacy in their instruction, while others believe it isn’t the role of the librarian to be involved in visual literacy at all. Schwartz described visual literacy instruction that centered on creating visual materials rather than critically examining them, and it is understandable to us that many academic librarians would feel those skills were beyond their abilities and job descriptions. Our interest is in the analysis of visual primary sources rather than in image creation, although we do collaborate with faculty who have their students create knowledge through exhibits. Even as the task force is aligning the standards with the framework, Meeks (2017) examined ways in which the standards and the *ACRL Framework for Information Literacy in Higher Education* could be used to situate visual literacy within information literacy. Although she works primarily with those in arts and design, she advocates for visual arts librarians to take the lead and “help guide the development of the habits of mind needed to understand and thoroughly teach visual literacy across the library profession” (Meeks, 2017, p. 194). Early on, after the standards were developed, Beatty (2013) provided examples of visual literacy instruction that addressed each of the standards, and that would help alleviate librarian anxiety about incorporating visual literacy into instruction. In *Visual Literacy for Libraries: A Practical, Standards-Based Guide*, Brown, Bussert, Hattwig, and Medaille (2016) offered examples of instruction strategies and activities to help academic librarians apply, teach, and promote visual literacy.

The third theme is the emergence of critical visual literacy into instruction by academic librarians willing to take the plunge into this still somewhat uncharted area. Instruction based upon the standards is helpful, but as Grimm and Meeks (2017) pointed out, “the focus on specific outcomes, presented as bite-sized pieces that can be taught apart from one another, obscures the potential intersections and synthesis of some of these larger ideas” (p. 177). This includes the philosophical shifts in library instruction brought about by the *Framework*, and the growing interest in critical information literacy that inform their instruction. Grimm and Meeks centered social justice in visual literacy instruction, employing the theories and practices of critical librarianship and feminist pedagogy to ensure students go beyond finding, analyzing, and using



images, to also engage with power structures and social issues. Beatty and Hernandez (2019) collaborated on applying socially responsible pedagogy to combine critical information literacy and visual literacy in a for-credit information literacy class, using activist art and social justice imagery. Although Grimm, Meeks, Beatty, and Hernandez all discussed arts and design students, their pedagogical approaches inform librarians working with non-arts students in different disciplines, much as Meeks advocated.

In our collaborations with faculty, we guide non-visual arts students to begin to think critically about the cultural and historical contexts of images and visual materials they discover in physical and digital archives, especially those that saturate our popular culture (e.g., the Curtis prints discussed below). Thus far, our visual literacy instruction has been introductory, since the faculty, librarians, and students are not necessarily in disciplines that normally engage with visual materials. We don't expect the students to emerge from our instruction sessions as experts, but as individuals stretching their skill sets to become more comfortable analyzing and thinking critically about visual materials they find.

### **Visual Literacy and Historical and Cultural Context**

#### **Native American Resistance in the Digital Age**

Both the archivist and social sciences librarian had been collaborating with Dr. Esteban Gómez on instruction for a few years before the opportunity arose to partner on his anthropology course, "Native American Resistance in the Digital Age." The course attracted primarily graduate students from anthropology, education, and religious studies. Dr. Gómez's goals for the course were: have students evaluate resistance from a historical standpoint, ensure students understand how Indigenous knowledge systems contest Western conceptions of authority through art and digital media, and have students explore the voice and agency of Indigenous people in different fields.

In order to effectively tailor the visual literacy activities, we met with Dr. Gómez to discuss the course learning outcomes and to identify possible archival collections that would support those goals. Dr. Gómez had outlined specific learning outcomes in his syllabus that could be enhanced through visual explorations and we decided to focus on two in particular. The first was for students to examine Native American resistance through an interdisciplinary lens. Although this was an anthropology class, the students would be exploring resistance from a wide range of disciplinary perspectives. In fact, they would apply a postcolonial approach "to understand how Indigenous filmmakers, curators, scientists, healers, artists, and scholars use Indigenous knowledge systems to contest Western conceptions of authority" (E. Gómez, syllabus, spring quarter 2019, p. 1). Consequently, the students would be considering Indigenous resistance, creativity, and cultural heritage from anthropology, art, photography, museum studies, communication and media, literature, film, medicine, and science fields. Dr. Gómez also wanted the students to examine Native American resistance over time, from the early encounters of first European contact and during the American colonial period, through westward expansion and into the present, so that studying these events from historical perspectives was also important.

This first learning outcome was closely aligned with the second; Dr. Gómez wanted students to engage with Indigenous epistemologies for a better understanding of the ways in which Native Americans and other Indigenous peoples have experienced the systematic marginalization of their voices and agency both in and through the media and governmental policy. We also approached this learning outcome from historical perspectives, so that students could analyze the range of Native American visual representation by settler colonialists, and critically examine how these images contributed to the foundation of enduring stereotypes.

Dr. Gómez has been an enthusiastic supporter of library instruction and we have partnered with him previously on several of his upper and lower division undergraduate and graduate level classes, including a Visual Ethnography class that served as a prototype for the visual analysis activities described in this chapter. Building on existing relationships is central to gaining faculty engagement when proposing new collaborations and types of literacies. Dr. Gómez was awarded the Joseph I. Moreland Information Literacy Grant for the "Native American Resistance in the Digital Age" class. This internal grant is designed to encourage faculty to partner with subject librarians and/or the curator of special collections and archives to integrate information literacy into their classes, especially those classes that count towards major credits. As stated in his grant application (and based on conversations with the social sciences librarian and curator

of special collections), Dr. Gómez wanted to focus on inclusive authorities, so that students would learn how to search for secondary and primary sources written and created by Indigenous authors. To support this learning outcome, we designed our visual literacy activities around the “Authority is Constructed and Contextual” ACRL Information Literacy for Higher Education frame. In addition, a class research guide provided students with strategies and resources for identifying Indigenous-created scholarship, creative works, archival materials, and perspectives.

Together, we planned for three library sessions with the students that would feature our archival and special collections. Since the course investigated Indigenous resistance from the colonial era onwards, we decided to highlight our eighteenth- and nineteenth-century captivity narratives, and also use the Edward S. Curtis portfolio of photogravure prints, *The North American Indian*, and reproductions of nineteenth-century artist George Catlin’s paintings of Native Americans as a way for students to analyze Western European representations of Native peoples. The students critiqued foundational stereotypes and tropes, such as the “land as an empty wilderness,” the image of the “noble or barbarian savage,” and the portrayal of Native Americans as a “vanishing race.” To contrast these stereotypes, we drew upon our “Native American, First Nations, and Indigenous Graphic Novels” collection to examine Indigenous self-representation, agency, storytelling, resilience, and resistance to settler colonial narratives and visual representation. All three sessions employed visual literacy strategies, although the students also reviewed the captivity narrative and graphic novel texts and captions. Class discussions during each session addressed historical context and theoretical concepts, with particular attention to how visual and textual representation contributes to, or counters, dominant cultural narratives and colonial legacies about Native peoples.

### **Native American Captivity Narratives**

The first session with the Native American resistance class focused on our small but growing collection of Native American captivity narratives. This genre in the United States developed over time with American westward expansion and often featured an Anglo-American woman taken captive by Indigenous peoples (Johnson, 2016). Though captivity narratives aren’t unique to either the United States or to this period of American history, this sub-genre provides significant insight into settler colonists’ anxieties about Native peoples in areas of white settlement.

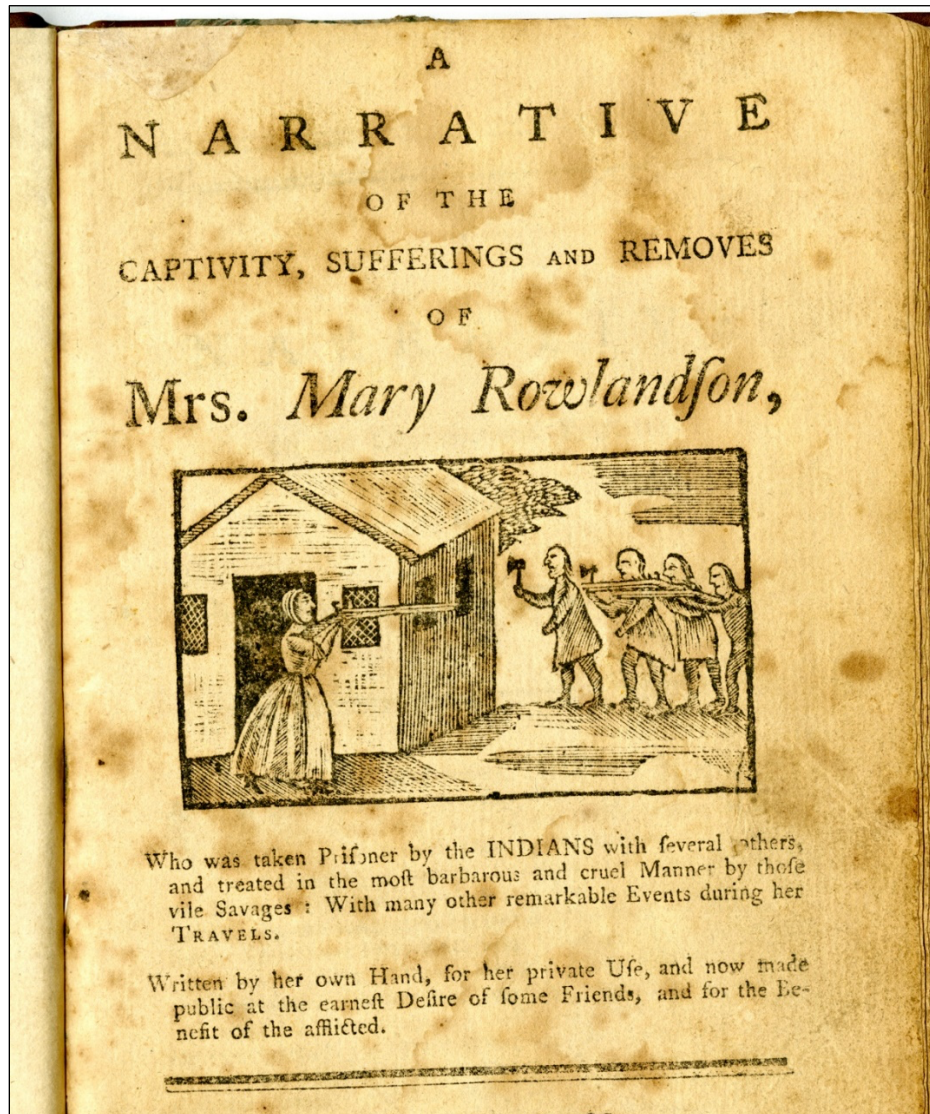
Before the session, students read selections from *Buried in Shades of Night* (Stratton, 2013), which analyzes Mary Rowlandson’s influential captivity narrative that took place during what is sometimes called King Phillip’s War in the mid-1670s. This story was told and re-told in subsequent editions and reprintings that were, Stratton argues, published at times that were intended to heighten white settler suspicions about Native Americans as the enemy, such as the years leading up to the Revolutionary War (p. 20). Students worked in small groups to analyze several pre-selected captivity narratives in our collection with illustrations, with each group sharing their analysis as the class concluded.

We adapted a visual analysis exercise from *Visual Literacy for Libraries* (2016), which asked students to: look (at the image composition, people, and setting), read (determine the purpose of textual information that accompanies the image), examine (see if the text changes the analysis of the image), and then describe and interpret (why might the image have been created, what is the image’s intended audience, does it fit with or disrupt what you know? How does or might this form of visual representation contribute to enduring stereotypes about Native peoples?).

Students then chose a captivity narrative from *HathiTrust Digital Library*, and selected an excerpt to read and analyze for individual essays and group presentations that addressed the question: “What are we to understand about this captivity narrative’s representation of Native culture(s), and its method of composition? What tropes and stereotypes are present?” Multiple students commented that they needed the context and grounding from the reading prior to the session, which dealt specifically with the title page illustration from the 1773 edition of Rowlandson’s story (see Figure 1), so that they had the tools to effectively analyze the images present in the captivity narratives for their assignments.

### **Figure 1**

Rowlandson, M. W. (1773). Title page illustration. *A narrative of the captivity, sufferings, and removes of Mrs. Mary Rowlandson*. John Boyle's Printing-Office. Courtesy of University of Denver Special Collections and Archives.



### Edward S. Curtis's *The North American Indian*

Prior to the next session, the students watched the documentary, *Coming to Light* (Makepeace, 2000), and read an article titled "The Photograph as an Intersection of Gazes: The Example of *National Geographic*" (1991). The goal of this session was to explore the significance of the "gaze" in the representation of Native peoples by white settlers – in this case, the painter George Catlin and the photographer Edward Curtis. The images used were all of the Hopi people and the librarians and faculty intentionally selected a variety of genres, including portraits, group photographs, landscapes, and architecture. Students were asked to carefully examine the visual contents of the photographs and their composition. The goal was to pay close attention to visual details, rather than provide an interpretation of the photographs. The students then did the same with Catlin's paintings, which were in color art monographs. Students followed the session by selecting one photograph or painting, according to the professor's prompt, for a reflective essay that responded to the article on the Western gaze.

Curtis sometimes orchestrated or altered the photogravures during the printmaking process, which provide



teaching opportunities. *Coming to Light* incorporates interviews with descendants of people who were photographed by Curtis, several of whom recalled oral histories from their ancestors about having been asked to dress a certain way (or even being given clothing that was not theirs). It also covers the most (in)famous example of a print that Curtis altered, titled “In a Piegan Lodge” in the full limited edition set of *The North American Indian*. In the photogravure print, Yellow Kidney and his father, Little Plume, pose in a lodge with a clock in between them (see Figure 2); the clock is visible in the photographic print, held by the Library of Congress, made directly from the glass plate negative but it does not appear in the photogravure print that is part of *The North American Indian* limited edition set (see Figure 3). We have used this photogravure print juxtaposed with the digitally available photographic print several times, and students often do not notice this alteration or other changes or discrepancies unless they are prompted to do so. This is another example of how “slow looking” (Thompson et al., 2020; Toledo Museum of Art) can be a great addition to in-class activities; otherwise students (especially in non-arts classes) are prone to speed through the visual analysis and miss important details.

**Figure 2**

Curtis, E. S. (1910 March 11) *In a Piegan Lodge*. Curtis (E. S.) Collection (Curtis no. 3122-10). Library of Congress, Washington, D.C. <https://www.loc.gov/item/2003652798/>

**Figure 3**

Curtis, E. S. (1906). *In a Piegan Lodge* (portfolio 6, no. 188). *The North American Indian*. E.S. Curtis. Digital Edition of the *North American Indian*, <http://curtis.library.northwestern.edu/>



During the session, the students raised ethical questions that we need to address, namely: consent, community-based Indigenous intellectual property, and cultural patrimony. We discussed the implications of not having a memorandum of understanding with the Hopi nation to study these images. We will be convening a small group of faculty partners, some of whom are Indigenous, to develop guidelines for classroom use of these images going forward. This situation raises an important point, namely, that instructors should always consider the ethics of including images of colonized or otherwise vulnerable people or communities, particularly if the instructors are not members of the communities.

### Graphic Novels

The University of Denver was founded in 1864 by John Evans, acting Territorial Governor in Colorado, the same year that the notorious Sand Creek Massacre occurred on November 29, in which hundreds of peacefully assembled Arapaho and Cheyenne were attacked and murdered by government troops. In 2014, (the 150th anniversary of both events), the University published the *Report of the John Evans Study Committee*, which found Evans culpable for the massacre. The report concluded, “John Evans’s pattern of neglect of his treaty-negotiating duties, his leadership failures, and his reckless decision-making in 1864 combine to clearly demonstrate a significant level of culpability for the Sand Creek Massacre...” (Clemmer-Smith et al., 2014, p. iii).



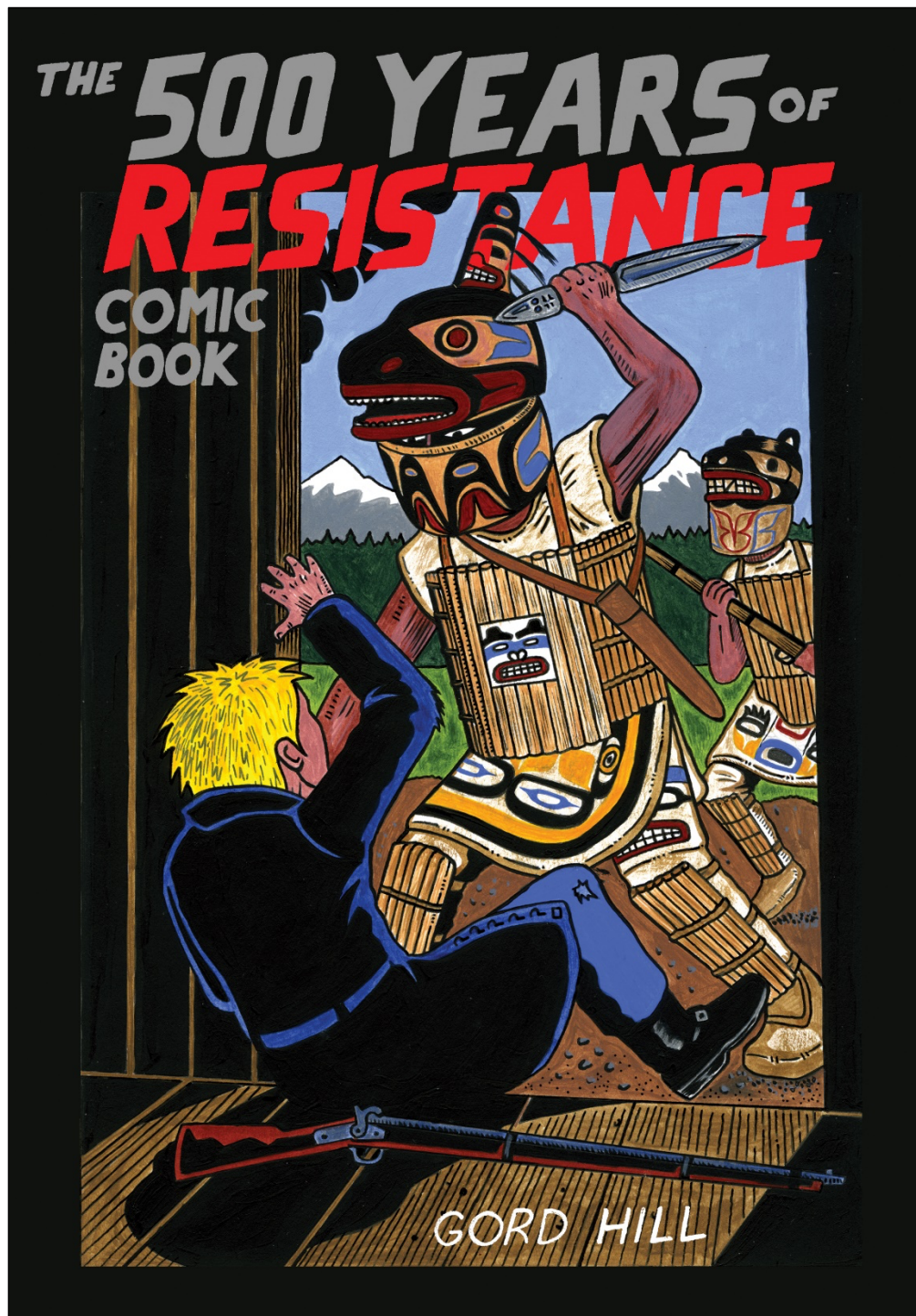
In light of our university's terrible legacy and troubled past history with the Arapaho and Cheyenne nations, and also to diversify and increase representation of Native American-authored works in our holdings, we have been building a collection of Native American and Indigenous graphic novels (to complement our collections of other Native American works) that was the focus of our final visual analysis session. The collection currently comprises more than thirty titles by creators such as Gord Hill, David Alexander Robertson, Arigon Starr, Elizabeth LaPensée, Katherina Vermette, Richard Van Camp, Michael Nicoll Yahgulanaas, Jay Odjick, and Patti LaBoucane-Benson, among others. Canada has a very robust Indigenous graphic novels community and, currently, most of the titles in our collection are by First Nations Canadian authors and illustrators. We worked together with Red Planet Books/Native Realities Press in Albuquerque, New Mexico, and also consulted recommended titles from Debbie Reese's, "Best Graphic Novels by Native Writers," *American Indians in Children's Literature* blog post and the Highwater Press title list to form the collection initially. We plan to attend the Indigenous Comic Con to identify additional authors and titles. Our hope is to use this growing collection for teaching with many different academic disciplines, as the novels lend themselves to analysis from arts, humanities, and social sciences perspectives. Although seen as a popular and accessible genre, graphic novels can address serious and complex topics in meaningful ways (for example, Art Spiegelman's classic graphic novel about the Holocaust, *Maus: A Survivor's Tale*). They are also increasingly a medium through which underrepresented or minoritized communities can speak about their experiences and reach a wider audience. As a testament to the transformative power and impact that graphic novels can play in Native American agency and representation, Dr. Niigaanwewidam James Sinclair (2020, January 30), writes, "They are a culmination of the control that Indigenous people have over their own images and what is said about them... It's the most revolutionary text there is" (*History, About the Mazinbiige Indigenous Graphic Novels Collection* section, para. 8).

In order to prepare students for the graphic novels visual analysis session, the students read the article, "A Necessary Antidote': Graphic Novels, Comics, and Indigenous Writings," by Henzi (2016), and they were given an introduction to analyzing comics by their classmate and anthropology graduate student, Melissa Kocelko, whose master's thesis research concerns Native American comics. Echoing Dr. Sinclair's statement, Henzi's (2016) article also emphasizes that graphic novels, like Gord Hill's *The 500 Years of Resistance Comic Book* (see Figure 4), "underlines the importance of this different medium, and of the visual, as necessary tools towards raising awareness of colonial history and towards raising awareness of long-lasting resistance efforts to ensure the continuity and transmission of traditions and storytelling for future generations" (p.25).

During the session, students worked in small groups to select and analyze a compelling graphic novel from our collection. Dr. Gómez created the assignment, which was intended to enable students to explore the structure of graphic novels by paying attention to the format, visual content, text, and narrative. Students began by examining the format, looking specifically at the layout, panel arrangement, frames, and gutters, and by noting any images that extended to or beyond the edge of the page in a technique referred to as bleed. Next, the students selected a sample of panels and bleeds to answer questions about visual content. During this part of the activity, the students identified where objects were placed, such as the foreground, midground, or background, and to note whether specific objects or characters occupied a particular space. The students also identified individual colors or objects that drew the eye more than others, as an indication of graphic weight. They looked closely at the faces of the characters and paid attention to the kinds of expressions most often associated with primary and supporting characters. Finally, they examined shading and color for particular characters, objects, and panels. The third part of the activity was focused on the narrative components of selected panels and bleeds, during which the students answered questions about how captions in the story were employed for scene setting and descriptions. The students were asked to look at the use of speech balloons for both internal dialogue and external dialogue between characters, and also their reinforcement of character development. The last part of the activity was centered on the graphic novel's narrative; students were charged to identify the major themes of the story, who the ideal or intended audience might be for these works, and to assess how all the different elements of format, visual content, and text support the overall narrative structure. Finally, and central to the learning outcomes, the students were asked to critique the methods employed in these stories responding to and countering settler colonial narrative themes and representations and, in turn, the means by which the novels empower Native agency, perspectives, and resilience. Some of the graphic novels did this in more overt or subtle ways.

**Figure 4**

Hill, G. (2010). Cover. *500 years of resistance comic book*. Arsenal Pulp Press. Reproduced with permission of Arsenal Pulp Press.



We plan to adapt these visual literacy workshops focused on Native American foundational stereotypes and counter narratives to an online format for Dr. Ramona Beltrán's graduate social work class, "Historical Trauma and Healing." In addition to determining the best ways for students to work online with the captivity

narratives, Curtis prints, and graphic novels (due to the COVID-19 pandemic), we are also considering how to make the activities meaningful for a visually-impaired student, or for those students who prefer an audio format of the graphic novels. Consequently, we are exploring the possibility of using the audio comic, *Unseen*, created by Chad Allen, a self-identified blind artist and featuring a blind protagonist, the audio version of Neil Gaiman's graphic novel, *Sandman*, or Mira Jacob's book, *Good Talk: A Memoir in Conversations*. The students will most likely also have an online presentation and comic-making workshop with *NAGPRA Comics* series co-producer, Jen Shannon, a museum curator and associate professor of cultural anthropology. In ways similar to our graphic novels collection, *NAGPRA Comics*, "a community-based, collaboratively produced comic series that tells true stories about repatriation from tribal perspectives" (What Is NAGPRA Comics? section, 2019) aims to redress historical injustices by centering Indigenous narratives.

### World War I

Since the fall quarter of 2015, the arts and humanities librarian and the archivist have been collaborating with Dr. Carol Helstosky who teaches the "World War I" class. We focus on tangible and digital primary source research in the course, which allows for students to interrogate the narratives they encountered in their secondary readings by locating and interpreting contemporaneous primary sources. Most undergraduates in this lower-level course are non-majors, with varied knowledge about the war and its implications for future wars and society. Through this approach, the professor ensures "students learn what it is that historians 'do' when they approach research and analysis," gaining skills to interpret secondary sources through their own analysis (C. Helstosky, syllabus, spring quarter 2020, p. 1) We collaborate to help students develop into confident, critical thinkers, centering them in the research process and empowering them to question and research the historical record.

Every year when we teach this class together, we have the students immerse themselves in the Adam Matthew *First World War Portal* database on the first day of class. After a short instruction on navigating the database, students were directed to find two sources that interested them, and, in a worksheet, describe those objects and then list three questions each of the objects raised for them. In a second session, students would then explore a variety of digital primary sources in other commercial and freely-available digital collections, from trench journals to diaries to war resisters' documents. We found that the students' interests varied widely, but we were struck by the fact that many students would choose visual objects in that initial class. At the end of the academic quarter, students were again asked to explore the digital primary source databases, and a few would choose visual materials. However, almost none of the students included visual sources in their final projects. Although we didn't ask the students explicitly why, we found some possible answers in the scholarly literature. In their analysis of scholarly history journals from 2000 through 2009, Harris and Hepburn (2013) found that, for various reasons, research involving images by historians did not increase, despite the growth in availability of digital images. Without scholarly models, perhaps undergraduate students do not feel confident about their abilities to use visual materials in their projects. In her study on archival photographs in research being conducted by historians, Chassanoff (2018) had to expand her search beyond history faculty because "it was difficult initially to locate individual historians working in academic history departments who were using digitized photographs to make historical arguments" (p. 148). This lack of scholarly models for incorporating visual materials into academic publications contributed to our decision to demonstrate for students how to interrogate a visual image.

We assessed the questions raised by the students in those first worksheets, and we found that the questions the students asked about the objects fell largely within four categories: effectiveness, purpose, iconography/representation/stereotype, and misunderstanding/mislabeling (Keeran et al., 2019). Because a great deal of information was disseminated to the public via images during World War I, we brainstormed how to have students analyze and contextualize this vital part of visual culture, and we began with propaganda posters, which combined text and images. We decided to address this important aspect of the war, and restructured part of the library workshop to ensure all students developed introductory skills related to the visual culture of World War I.

James (2009) points to the wide distribution of war posters in combatant countries that were created to persuade the home front of the importance of supporting the effort. Advertising posters were already a well-established means of reaching consumers, and governments used this avenue of communication to unite



the population through messages that stressed national characteristics needing preservation from their foes. Posters were and still are “designed to appeal quickly to a passing viewer and depend upon a certain instantaneous recognition” (p. 20). Although we don’t know today exactly how the war posters were displayed or received, “because they cannot be studied in the surroundings in which they appeared, nor can their viewers be called to bear witness to them in any systematic way” (James, 2009, p. 16), we do know that war posters were much more widely distributed than regular advertisements. A 1915 article in *The Manchester Guardian* describes the poster atmosphere:

It is impossible, in London at least, to escape the war posters. They assail you from every corner. They take you in the streets and in the trains. They threaten, persuade, cajole, and frighten. Every taxicab cries out at you in forty different sharps and flats, and the only way out of the noise is inside (H. R. C., 1915 April 5, p.10).

There are “reasons to call World War I, as many have done, ‘the poster war’” (James, p. 4).

Originally, we created a scaffolded plan to introduce the students to visual literacy: an in-class assignment in which groups analyze a British propaganda poster, followed later in the quarter by two worksheet assignments in which students would examine specific types of visual objects: postcards and newsstand boards. But, due to the onset of COVID-19, our institution had to transfer courses to an online environment the week before spring quarter 2020 began, and we had to adjust our plans.

We retained the scaffolded approach, but focused on enlistment and war bond posters. The arts and humanities librarian developed a video illustrating how to navigate Adam Matthew’s *First World War Portal* for the initial worksheet. She then created a second video modelling how to interrogate a propaganda poster, and the professor created an assignment in which the students were to evaluate three posters from a pre-selected group of English-language recruitment and war bond posters from Britain, Canada, Australia, and the United States. We met after the students watched the second video, and held a Zoom group meeting prior to the assignment due date for students to start articulating what they had discovered about their selected posters. We wanted to make the students more comfortable viewing and engaging with visual materials by having them develop basic skills and to prompt the students to think critically about what they were seeing. The goals for the poster assignment, which replaced our original in-class activity plan, were to have the students: analyze the interaction of image and text from either the recruitment or war bond posters; determine the motivation for persuading the intended audience; and make arguments in a reflective essay about the posters to answer questions raised. Our discussion here will be on the second video, which modelled what students needed to do for the assignment.

In the video, we initially introduced the classic Uncle Sam propaganda poster from World War I as a point of reference, believing the students would recognize this image, and then introduced a British propaganda poster, “Red Cross or Iron Cross?” (see Figure 5), and began unpacking the image, looking closely and describing both text and image. We then determined basic background information through metadata, images, and text. After initially looking, observing, and seeing, we described what we saw in the contents of the poster: a woman, dressed in white, with a red cross symbol on her veil and around her neck, stands in the foreground, pouring a glass of water on the ground, while a soldier lying on a stretcher reaches for it. To the right, two amused men gaze upon the scene. The words Red Cross, in red, and Iron Cross, in black, scream from above the image, while the words below serve both as caption and as propaganda. We then looked at the metadata to gather basic information: it is a British propaganda poster that was intended for the home front, and which had the keywords “nurse, war wounded, anti-German propaganda, propaganda, women at war” assigned to it. Questions this poster might generate about the contents include: why is the Iron Cross being compared to the Red Cross? Perhaps the 21<sup>st</sup>-century viewer knows what the Red Cross is, but what is the Iron Cross? What do the words German sister mean and why is sister in quotation marks? Who are the two men in the background? What is the meaning of the clothes and helmets they are wearing? Are they stereotypes of Germans? Why is this poster directed at women specifically? Next, we researched definitions to contextualize the terms. The Iron Cross is a military medal that was externally perceived as a symbol of German military aggression. A sister in Britain is a nurse, not a nun, as some might have thought. The quotation marks are probably intended to be ironic or accusatory, that this nurse isn’t acting like a nurse or a woman. Who are the two men? Are they Kaiser Wilhelm II and Crown Prince Wilhelm of Germany? We can look for images of military officers to try to determine their identities. The man at the rear could be the Kaiser, for he is often caricatured with the helmet, mustache, and sash.

**Figure 5**

Anonymous. *Red cross or iron cross?* Dangerfield Printing, 1918. Source: Original Format: University of British Columbia, Library, Rare Books and Special Collections, World War I Poster and Broadside Collection (SPAM413C), doi:<http://dx.doi.org/10.14288/1.0038231>. Reproduced with permission from University of British Columbia Library.



Would the audience have understood all the information being conveyed? Yes. The woman in white is a German Red Cross nurse, who is supposed to aid all soldiers, not just German soldiers, but she chooses the Iron Cross, or nationalism, over her calling. She smirks, callously pouring a glass of water on the ground. The two German soldiers, possibly someone high up in Red Cross administration as well as the Kaiser, smile approvingly at her action, giving the scene in the foreground authoritative support. The text informs



us that the response of all British women would have been the same: disbelief and outrage that any woman would act so coldheartedly. Why is this poster directed at women, specifically? To remind British women that they have a role in the war on the home front. Possibly to build indignant morale among women, for the soldier could be their son, brother, husband, or fiancé. To portray British women as morally superior to heartless German women. To highlight the cruelty and pettiness of the German people, even their nurses. This poster could be used in projects related to women's roles in war, anti-German propaganda on the home front, stereotypes in war, and more.

We concluded the video with three other British posters that use iconographic representations of Britain—Britannia, the lion, and the bulldog—to illustrate that these images, which 21<sup>st</sup>-century American students might not comprehend, were meaningful to the British at that time. We underscore that we want them to learn the visual vocabulary from the First World War to enhance their knowledge and understanding of the daily world in which soldiers and citizens existed, and not to be intimidated by using images, but to remember that images are part of the conversation – they aren't ancillary but contribute important information to the academic audience.

The poster assignment was scaffolded over the course of a week. First, we modelled techniques for students on unpacking unknown visual materials, then we discussed the range of posters as a group, and, finally, students wrote reflective papers on chosen posters. This process allowed the students enough time with the materials to thoroughly look, examine, describe, interpret, and reflect at a deeper level.

### Lessons Learned

As we continue to partner with faculty on incorporating visual literacy activities into classes outside the traditional arts disciplines, we build on our previous experience with the goal of improving our knowledge and practices. There are important lessons to be learned with each class, both in terms of successes, or what worked well, as well as with challenges. And like all instruction interactions, we recognize that learning is collaborative and shared among students, faculty, and librarians. We've found the following to be helpful guidelines.

It's important to recognize that librarians and faculty have different experiences and, correspondingly, varying levels of comfort with conducting visual analysis. Of the three librarians, the arts and humanities librarian has the most extensive knowledge about working with visual material. But as we've learned, visual analysis lends itself to many different disciplinary perspectives. In fact, visual analysis is a standard part of research methodology in non-arts fields, including anthropology, communication, history, and sociology, if employed to different degrees at the undergraduate and graduate levels, but it is uncertain how frequently visual analysis is actively taught. Consequently, don't let your inexperience or discomfort inhibit incorporating visual analysis activities into library instruction. We live in a heavily visual world, images are ubiquitous, and everyone (librarians, faculty, and students alike) will benefit from learning how to think critically and purposefully about images. Building upon previous experience to strengthen and expand your visual literacy skills will be an ongoing process, but we advise "jumping in," rather than waiting for the time when you feel you've become an expert. Instead, embrace the adage "learn by doing," for yourself as well as for your students.

To ensure that the visual analysis activities will be integral to the course and enhance the students' learning experience, work closely with the faculty member to plan activities that support the course learning outcomes or goals. Since non-arts courses may not have explicit visual learning outcomes, consider this an opportunity to be creative. As part of this effort, make use of the visual materials available in your library's archives and special collections, or/and your digital collections. In addition to the collections discussed in this essay, for example, we've used photographs from our university's student newspaper, *The Clarion*, to examine issues of gender, race, and representation on campus over time. Moreover, especially when working with visual material from the past, it will be crucial to support students' learning with scaffolded instruction that introduces them not only to visual analysis concepts and techniques, but which also provides historical and cultural contexts.

Finally, we recommend that you consider carefully if there are any ethical issues in using the images

selected. Both analog and digital special collections, in particular those concerning vulnerable or racialized groups, may have been acquired originally at a time when the rights of these people were not considered or permission secured. This is especially important to take into account if you are not a member of those communities. As discussed above, this remains a subject of ongoing deliberation for us about how or whether to use the Curtis prints in our teaching. We also encourage you to think creatively about how visual analysis activities might be adapted for students who are visually impaired. And, as is central to all teaching, it is important to assess what has worked well with the visual analysis activities, to note what can be improved, and to remain flexible so that you can make changes for the next time.

Our experience using visual material to teach students from non-arts disciplines about the past has been extremely rewarding. We've found that students often engage more fully with visual material in ways not presented by studying texts alone. Images, in particular, seem to speak to students and enable them to connect with and learn about the experiences of people from different cultures and time periods, as long as they are provided with the skills, support, and historical and cultural contexts to guide their analysis. Given this foundation, students can gain a richer understanding of the interconnections between the past and present, and apply these skills beyond the classroom and throughout their lives.

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# Visuals that Portray a Wind Farm

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## Abstract

*John Debes, the founder of the IVLA, argues that our first language is body language – visual and tactile information together helping us make sense of the world (Debes, 1972). During research of the public response to what could be the first freshwater offshore wind farm in North America, on Lake Erie, participants have a distinctly embodied understanding of environmental information. Their oral stories, drawings, and written responses reflect use of visual literacy that personifies wind turbines, the lake, fish and birds, and Earth's processes as human in nature. In return, participants' perception of the wind farm's features, size, and distance is skewed toward an immediate, physical presence. Between anthropomorphism and embodiment, what the general population sees as important in a large-scale sustainable energy project is very different from what is shown in technical documentation from scientists, engineers, and policymakers, complicating public decision making.*

**Keywords:** technical communication, perception, embodiment, metaphor, environmental communication

## Introduction

Visual literacy shapes human understanding. According to John Debes, “an object perceived by a child has little meaning until the child has a chance to touch, taste, or otherwise manipulate it” (Debes, 1972). Experiences, as lived through the human body, have a direct effect on how humans generate meaning. This happens through the assignation of signs and symbols in the form of language, which is predetermined by embodied notions of movement, place, and form (Lakoff & Johnson, 1980). By extension, our human embodied perceptions serve to “color” how we view the world and make out its workings. This research applies the concept of visual literacy to a study about environmental communication regarding a proposed wind farm. Our society needs to find better ways to communicate about the benefits and risks of large renewable energy projects, and ultimately, about the need to address the complex problem of global warming. Research investigating the determinants of visual literacy that affect the understanding of environmental concepts can help bridge the gap between scientific and policy technical documentation and public comprehension.

Roger Fransecky and John Debes define visual literacy as:

A group of vision-competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, and symbols natural and man-made, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others. (Fransecky & Debes, 1972, p. 9)

Visual literacy supposedly consists of a “group” of competencies that various scholars of the subject have attempted to categorize into lists for evaluating ability, purpose, subject matter, and cognates to language (Fransecky & Debes, 1972; Kostelnick & Roberts, 2011; Moore, 1970; Porteweig, 2004). These competencies help define the modes of visual communication and how they refer to meaning structures, including alphabetic language, when interacting with the world. Each system of categorization offers a unique way to look at visual processing. For the purposes of this study, we will first take Maxine Moore's system of perceptual development to look at how participant responses lay on a continuum of increasing breadth of perception from individual conceptualization to decision making and enaction (1970), and then look at Fransecky and Debes's system to evaluate the content of participant drawings through mode and purpose (1972). Here is a broad overview of the project and research design in relation to visual literacy, and then a discussion of how visual literacy shaped participant responses and attitudes toward the wind farm project.

A pilot offshore wind farm project on Lake Erie, called Icebreaker Wind, had been proposed by a public/private partnership called LEEDCo that first began looking at implementing this type of project back in 2004 and was in the final stages of approval for construction during summer 2019. If it were approved, it would be the first freshwater offshore wind farm in North America, located eight miles out from Cleveland, Ohio (LEEDCo, 2020). The Great Lakes are the largest source of freshwater globally. This pilot project would serve to open the development of the lakes to wind power, which had been proposed in many regions but not accepted yet. There was much public deliberation about the project in the local papers. But how did the public feel about this project, and how would they respond to the technical documentation about this wind farm that included much visual information in the form of photographs, technical illustrations, charts, and maps?

The problem is that experts and policymakers do not often consider public perceptions about environmental issues when putting together technical documents (Grabill, 2007; Simmons, 2008; Ding, 2014). This creates a gap in knowledge between those in power and the public, leading to misunderstandings and resistance to new projects, regardless of their possible benefits. This is not from any lack of education or intelligence in the public, but rather the existence of differences in viewpoint. Through surveys and interviews of 40 Northeast Ohio residents, this research project asked participants about their literacy (reading and writing habits), their environmental knowledge, and experiences. Then, the interviewer asked participants specific questions about the proposed wind farm and associated technical documents. Participants viewed a range of document types, from alphabetic text to partially illustrated, photographic, and video genres, to investigate the effects of modality changes. Participants had the chance to respond in written, oral, and drawn formats. In the end, small focus groups met to talk about the project and give their recommendations to policymakers.

Allowing participants to respond through drawing offered intriguing results. During face-to-face data collection with participants, participants drew directly on a piece of white printer paper with black sharpie markers of different widths in response to questions about their geographical and spatial knowledge. Having a blank slate, or *tabula rasa* did away with the predetermined nature of an online GIS mapping system that would automatically calculate distance, perspective, direction, location of roads and landmarks, and naming conventions that would influence participant decision making. The drawings relied solely on participants' internal knowledge of the local geography and their reflection of important monuments and locations in relation to Lake Erie, Cleveland, and the proposed wind farm.

It was only after asking participants to draw their own images of the wind farm and maps that they were shown an actual map of Lake Erie and photographic simulations of the proposed wind farm, and they were asked about the technical documents' validity in relation to their personal renditions. This method was chosen to reflect the most accurate, natural answers from participants, showing their viewpoint before tampering with it and introducing the technical documents. By being open to participant reactions, no matter how simple (in the form of quick drawings) or unobjective (emotional and irrational statements), new knowledge about how the general population regarded technical documentation about this large renewable energy project would be possible. Inconsistencies in participant responses to the technical documents were signs of disjuncture between what they expected to see and what was shown to them as objective reality. Different types of visually literate responses to technical documentation about the proposed wind farm directly affected participant understanding and acceptance of the human-environmental intervention.

When considering the drawings of the proposed wind farm that participants shared during the interviews, it was clear that their view of the wind farm was that of an immediate, close experience and the turbines were huge compared to the surrounding landscape features, including buildings, the lake, and even the city of Cleveland. But why would the majority of participants draw their rendition of the wind farm to such a large scale? Was it simply a matter of inability to portray proportion accurately, or not knowing how far out the turbines were to be placed, or having some predetermined image in their mind of how it should look? On the first count, it is true that proportion was not something that participants were concerned about correctly representing. However, if the drawings showed an inability to render proportion, it is more likely that their drawings would have shown a wide range of turbine sizes, from small to medium and large. But 76% of the turbines in the drawings were drawn to magnitudes hundreds of times larger than their accurate proportional size. On the second count, participants were told multiple times during the interview and in the text of the



technical documentation that was shown to them that the wind farm was supposed to be built eight miles offshore.

It is conceivable that participants did not realize how tall objects such as the wind turbines would recede into the horizon at such a distance. But this also does not account for the consistency of the large size shown in participant drawings. Finally, if participants did have a predetermined idea of what the wind farm should look like and represented this in their drawings, why were they all so similarly large proportionally? This logical analysis of participant responses through the drawings is important to make despite its futility because it is easy to dismiss the study's findings because of misguided notions that participants were somehow deficient in drawing ability, perception of distance and proportion, or working only from subjective memory. It is impossible to know what the conceptual process was in participants' heads as they drew their renditions of the wind farm, but it is possible to analyze the results in relation to what participants said in their interviews and wrote in their surveys.

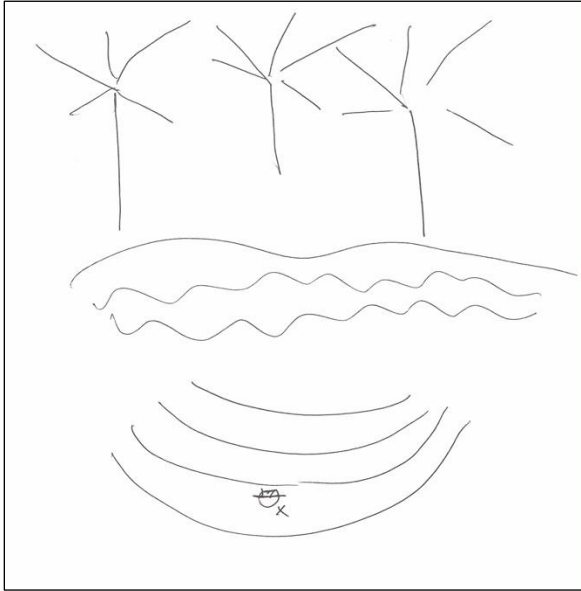
What tipped the balance toward embodied cognition was the finding that some participants claimed even after viewing the simulated photographs of the wind farm far out in the distance of the lake (as seen in Figure 1) that their huge drawings (see Figure 2) were correct: "It looks like what I thought it would look like" (interview, participant 24). One participant exclaimed when viewing the simulated photograph, "Aw, there's my beach picture... See, they're close together, like in my thing" (interview, participant 23). See participant 23's drawing in Figure 3.

Although these participants drew three turbines at basically the same size proportionally as the beach and water combined, they believed that the simulated photograph matched their work well. Other participants had similar reactions: they accepted the accuracy of the photographic visual simulations, even if they did not match up with their size expectations, and at the same time, they stood by their subjective representations of the proposed wind farm. Participants generally did not question the number of turbines portrayed in their drawings versus the number shown in the photographic simulations, even though this number varied from one to twenty, as shown in Table 1. The average number of turbines in participant drawings was five. The highest number of drawings showed six turbines, 10 out of 38 representations. So, the collective understanding of the number of turbines involved in the project was fairly accurate. But the distribution of results shows a highly variable response rate, with six drawings overrepresenting the number of turbines and 22 drawings underrepresenting the number of turbines.

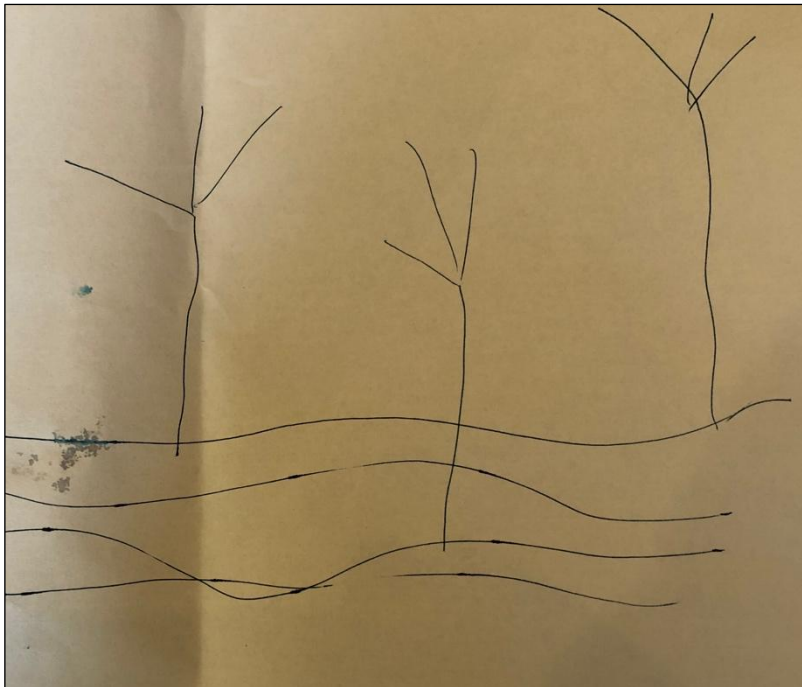
**Figure 1**  
*LEEDCo Simulation (LEEDCo, 2021)*



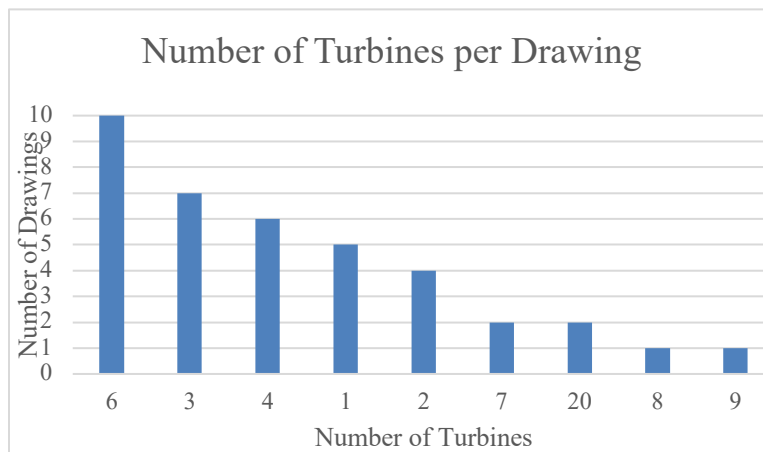
**Figure 2**  
*Drawing 3, Participant 24*



**Figure 3**  
*Drawing 3, Participant 23*

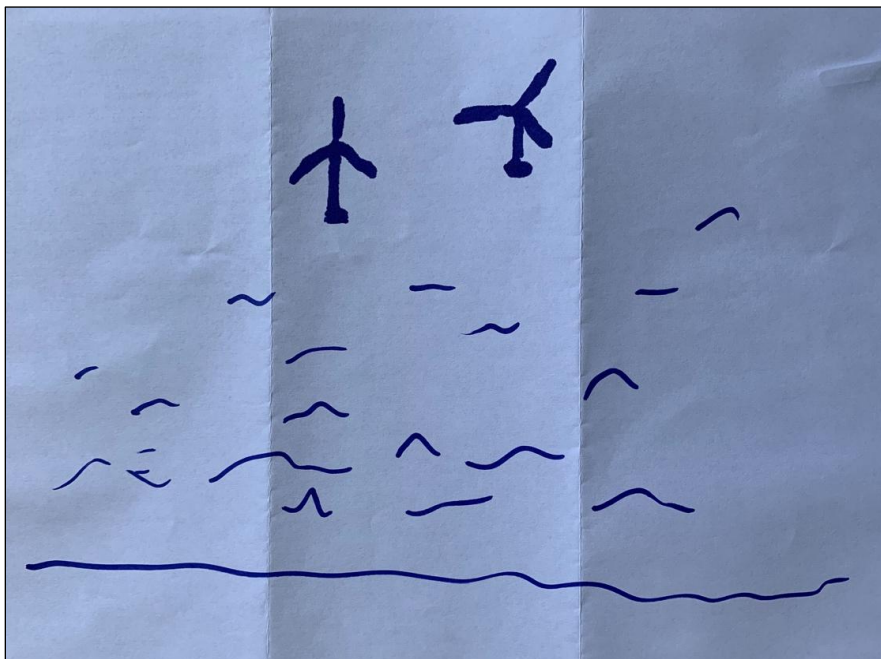


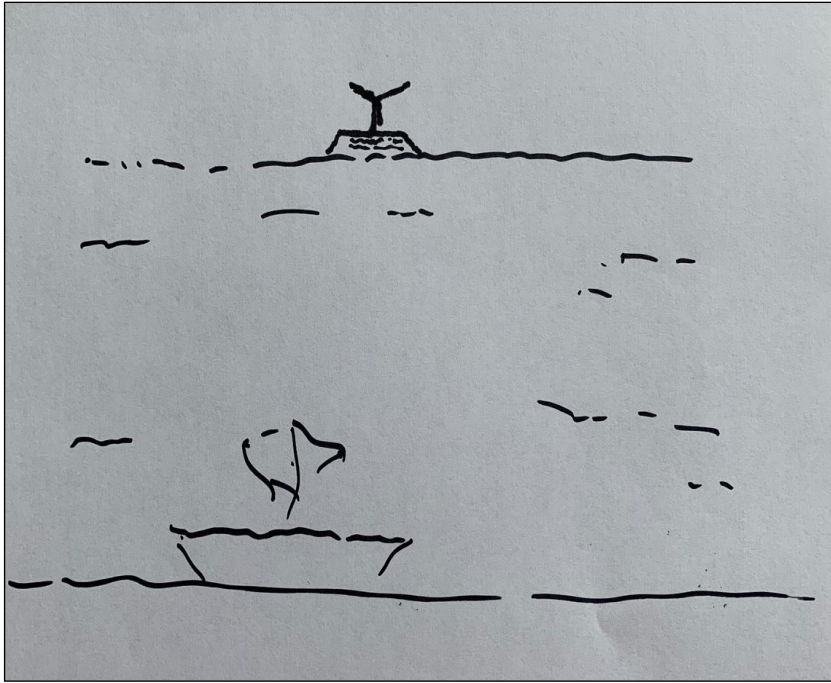
**Table 1**  
*Number of Turbines per Drawing*



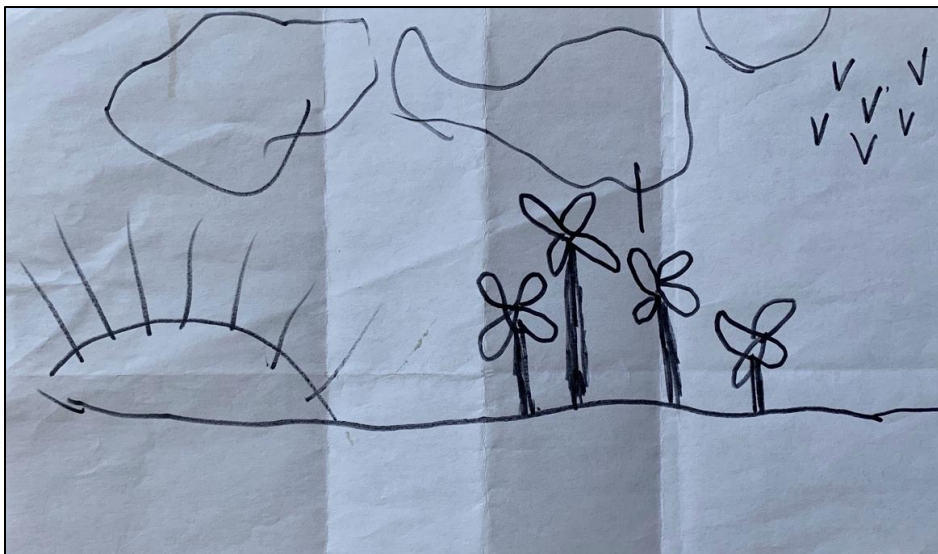
Some participants quickly realized that their drawings (seen in Figures 4 and 5) were flawed when compared to the technical simulations: “My happy wind farm is wrong!” (Interview, participant 26), “Looks like I definitely got it wrong ... I feel a little stupid about my drawing now” (Interview, participant 18), and “I guess I should have drawn them smaller” (Interview, participant 31). While admitting differences between their drawings and the technical simulations, these participants seemed more dismayed by the content of the photographic simulations than upset about the inaccuracies of their drawings. As one participant stated, “they look weird just sticking out in the middle of the water” (Interview, participant 14), and another said, “It’s pointless ... remember, I think they’re awesome” (Interview, participant 38). Between the minuscule size of the turbines in the technical simulation photos and the rather romanticized drawings created by participants, there was a disjuncture between the expectations of the public conception of the wind farm’s visual impact and what was shown in the simulations.

**Figure 4**  
*Drawing 3, Participant 26*

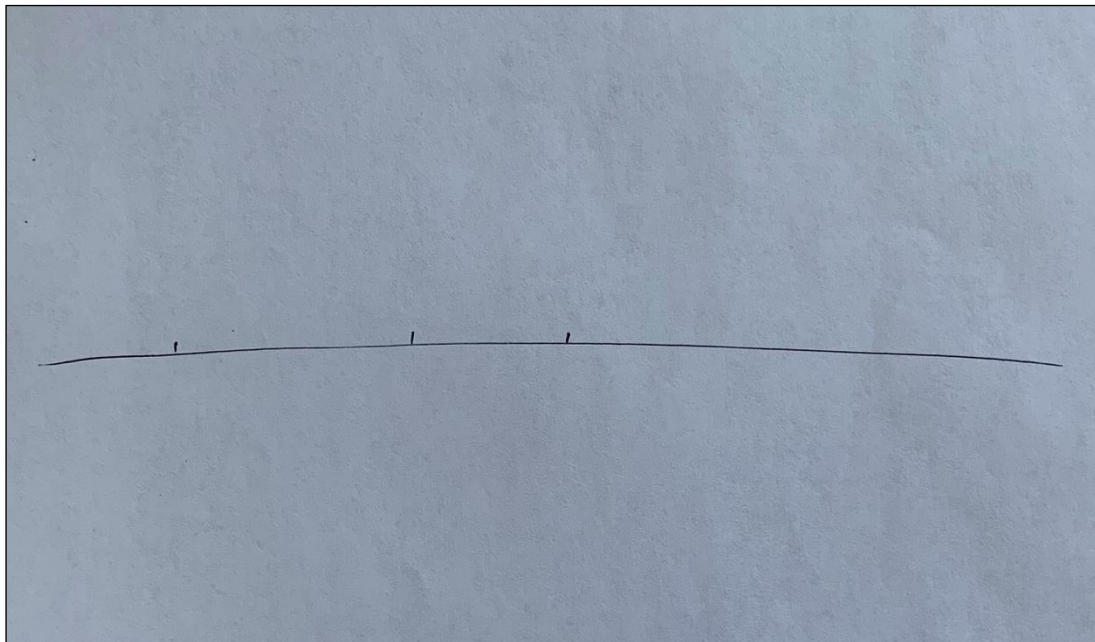


**Figure 5***Drawing 3, Participant 18*

The anticipated size of the wind turbines, for example, was disproportionately large compared to most other subjects in participant drawings, including buildings, the sun, and even Lake Erie. Of 38 representations of wind turbines, 29 were “huge” (designated as such in a qualitative evaluation, as in the drawing from Participant 31 shown in Figure 6), five were “large” as shown in Figure 7, and four were “small,” as in Figure 8. The small representations can be considered close to, if not proportionally accurate, which made up 10.5% of turbine drawings.

**Figure 6***Drawing 3, Participant 31*



**Figure 7***Drawing 3, Participant 36***Figure 8***Drawing 3, Participant 10*

The ramifications of the public perception of large turbines in the proposed wind farm are staggering because if the perception is that these turbines will be magnitudes larger than in reality, then they will also be viewed by some as by default a nuisance, or to use the term that many participants did, the turbines will be an “eyesore.” But it is not as simple as this because although the great size portrayal in participant drawings denotes a disruption to the view on Lake Erie, it also signifies the importance and greatness of purpose. Many participants, such as number 38, described the turbines as “awesome” and saw them as a



symbol of progress and monumental awe-inspiring pride. What we are moving toward here is the understanding that it did not matter to participants that technically, the wind farm would be so small in the distance that they would barely be able to see it, even on a sunny clear day.

They wanted to have a close-up view and understanding of the turbines, so close that they could reach out and touch them, an embodied experience that could take in the ecological and social meanings and repercussions of building such a project on Lake Erie. This is why the simulation photographs were deemed woefully inadequate by most participants, even as they were considered one of the easiest technical documents to understand and were generally thought of as technically accurate. As one participant asked before they registered the turbines in the distance, “What is it simulating?” (interview, participant 13) and it does not seem that the document had a purpose for the public, but instead was created and used by LEEDCo and policymakers to fulfill a required visual impact analysis that was supposed to protect the public from unwanted visual disruption. LEEDCo also used this document at public information sessions to show the minimal disruption that would be caused by the construction of the pilot wind farm.

Even after participants were shown multiple simulated photographs, they claimed that their huge drawings were accurate. Something is going on here, where participants’ expectations were not met by the type or format of information provided by the technical documents. John Debes, the founder of the IVLA, argues that our first language is body language – visual and tactile information together helping us make sense of the world. Participants in the study had a distinctly embodied understanding of environmental information. Their oral stories, drawings, and written responses reflect visual literacy through metaphor that personifies wind turbines, the lake, fish and birds, and Earth’s processes as human in nature. Participants’ perceptions of the wind farm’s features, size, and distance were skewed toward an immediate, physical presence. The size of participant turbine drawings reflected an embodied, the immediate viewpoint of the wind farm, even if they are not proportionally accurate. In addition, in participant drawings and language, the wind project was personified, with turbines having a lifespan. Participants were concerned not just about the initial construction and energy output, but also about maintenance and ultimately their decommissioning, focusing on the needs and lifespan of the turbines and equipment. Images such as the waves pounding against a lighthouse made participants visibly concerned about the lake’s dangers when considering the construction of such a project in a violent environment.

Between the anthropomorphism and embodiment, what the public saw as important in a large-scale sustainable energy project was very different than what was shown in technical documentation from scientists, engineers, and policymakers. The social connection was central, and using the human body as a reference point was key. Participant drawings showed the turbines variously alone or in groups of up to 20, even though they knew that the proposed wind farm called for exactly six turbines. The number of turbines represented was more a reflection of social relationships and personal identity than technical accuracy. So, what do these findings have to say about visual literacy and its development?

Ruth Moore (1970) organizes perceptual development of visual literacy into five steps

- 1) sensation
- 2) figure perception
- 3) symbol perception
- 4) perception of meaning
- 5) perceptive performance

Participants in this study generally met the sensation, figure, and symbol perception requirements, as shown in their representations of the wind turbines and their location. They recognized that the construction of the proposed wind farm would change the visual landscape, that the wind turbines would exist as independent figures in this landscape, and that their representation on paper was mostly symbolic for a whole host of mechanical systems encased by the wind turbine structures that would produce power. However, at the fourth meaning stage, Part A: “Mental manipulation of the identified form or pattern,” participants failed in terms of “ability to reproduce forms, tunes, or syllables by memory” and “ability to overcome the constancies of brightness, color, size, and shape.” The form, pattern, size, and shape of the wind farm were not successfully transferred from the technical readings and conversations that preceded

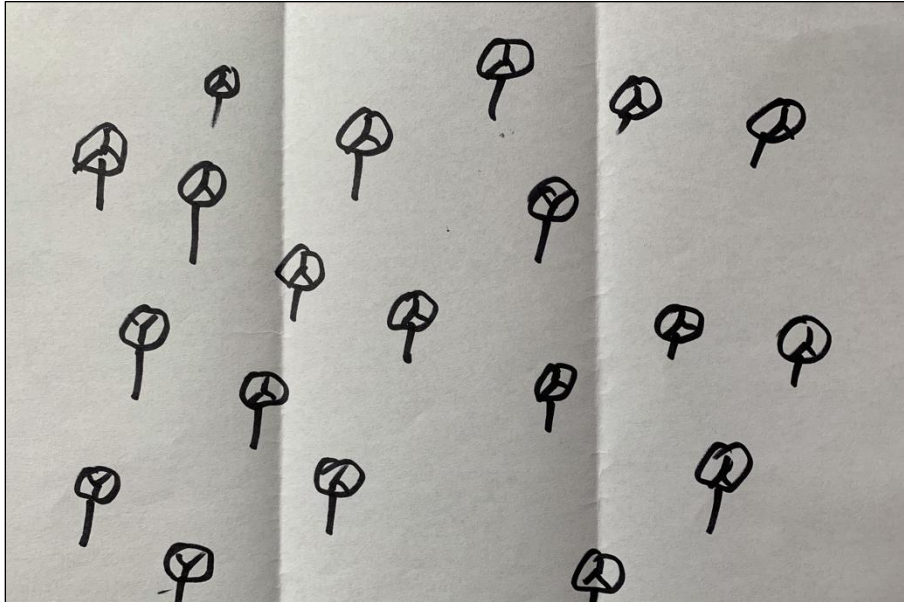
their drawings. This, in turn, adversely affected participants' perceptive performance, or the "ability to make complex decisions where many factors are involved ... [including] successful analytical or global approach... diagnostic ability ... [and] insight into personal, social, and political situations" (Moore, 1970).

From this analysis, it is possible to argue that it is a more significant leap to move from symbol perception to the attribution of meaning than to move through the first three stages. This leap was not possible for most participants in the study, and therefore the final step that allows for decision making and taking action on the issue was not attainable. The way that participants visualized the proposed wind farm project directly affected their understanding of the purpose and methods at play in the certification and approval process and technical documentation necessary for the project to begin construction. However, participants readily assigned personal meaning to the proposed wind farm project and conducted their own evaluation of its merits through their individual value systems. These values extended beyond technical operational considerations to include social, ethical, moral, and symbolic constructions.

Turbines were often referred to as "windmills" in the ancient farming relationship with wind power and grain grinding. The term "wind farm" was preferred to any other description, denoting a focus on harvesting the wind for community use. In Figure 9, Participant 34 drew their wind farm as if the turbines were arranged like the plot of a farm. Participants envisioned having a communal relationship with them. A total of 80% of participants believed that birds would be at risk from the turbines, even though technical documentation showed minimal risks to birds. Participants wondered how birds and bats "see" and how they would avoid the turbines. The overwhelming concern for bird mortality from the wind turbines reflected an empathic connection with an animal species that subsumed the rational, scientific findings that turbines do not significantly increase bird deaths.

### Figure 9

*Drawing 3, Participant 34*



Participants valued symbolic renditions and qualities of the wind farm. They described the turbines as being beautiful, graceful, awesome, and making a pleasing pattern. Participant drawings often envisioned the turbines as flower-like structures, surrounded by the sun and birds flying by. These qualities are not often presented in technical documentation. Project managers assumed that people considered wind turbines a possible eyesore, but most participants saw wind turbines instead as a positive symbol of change. Finally, the maps that participants drew of the city of Cleveland showed that they had a high variation in

geographical knowledge and limited attention to scale or proportion regarding distance. What was important to them remained large and centered in their drawings, revealing that communicating the proposed wind farm's exact geographic location would prove problematic.

Fransecky and Debes (1972) list the purposes or modes of visual communication as:

- 1) definition
- 2) description
- 3) enumeration
- 4) spatial arrangement
- 5) comparison
- 6) categorization
- 7) traveling eye (exploration)
- 8) chronology or process
- 9) idealization
- 10) directive utterances
- 11) fiction
- 12) personal emotional expression

The technical documentation about the proposed wind farm focused on the first six modes of visual communication in order to objectively describe the specifications of the project, but participants who were asked to express their perceptions of the project responded with the full range of these modes. For example, participants' concerns about the maintenance and ultimate decommissioning of the turbines viewed the project as not a one-time construction deal but a continually evolving process of electricity production that would take place over a period of time. In terms of idealization, "from a carefully selected set of pictures, something very close to the ideal ... can be communicated visually. What is required is a careful selection of aspect and time and elimination of the imperfect or atypical" (Fransecky & Debes, 1972, p. 29). Participants chose to represent the wind farm in an idealized manner so that their understanding of the project was prioritized, to the exclusion of what would be deemed technically "accurate." Their drawings' persuasive function was generally naïve or primitive (in terms of lack of perspective) and raw in form, compared to the technical illustrations and photographs that were no less meant to persuade but was instead framed as "accurate."

Participants created a fictional world in their drawings of the proposed wind farm, as Fransecky and Debes describe, "a confabulation tailored with exquisite care for the feelings and images that would be created in the minds" of their audience, "to share, spontaneously or deliberately, feelings strongly held" (1972, p. 29). Their versions of the proposed wind farm were not "wrong," but rather illustrate the wide range of visual perceptions and literacy held by the public concerning complex environmental information. That technical documentation consciously avoids acknowledging the emotional and social connections that are broken and wrought by large-scale environmental projects is dangerously close to denying our imperfect humanity. It is impossible to truly understand the environment as separate from human embodied experience, which, when faced with information that is too "big" to comprehend, reverts to stories, myths, and fable to maintain the balance.

For example, humans have a complicated relationship with birds: they can at once symbolize a message or messenger (carrier pigeons or hawks), omen or portent (crows and storks), stand for national pride (eagles) or mean happiness (bluebirds). In the technical documentation about the wind turbines' effect on birds, the turbines are discussed as a possible danger to birds in route during their migration seasons, especially at night. But it is evident from the interviews with participants and public debate about potential wind turbine dangers to birds that there is much more at stake than a few birds' lives. Participants in the study show an emotional and perceptual attachment to birds that cannot be explained by logic, and their fears cannot be put to rest by deductive methods. One of the most common fallacies regarding wind power is that the turbines kill birds, but this is a sign not of misguided thinking; rather this is evidence of an ingrained link that humans have to birds when trying to understand the environment. Humans have used birds for a long time to carry messages across distances, for food and decoration, to tell the future, and as

an animal familiar. Although most of these uses have been replaced by technology, industrial production, and science in the modern era, the traces of the birds' functions and relationships persist in the human mind. We use Twitter to send messages, stuff pillows with polyester filling instead of feathers, deploy algorithms to predict future events, and use mechanical drones to see images from the sky. However, the prototypical bird function remains intact and causes cognitive dissonance when it is not given a role to play in environmental communication.

In this study, participants were asked the question, "What are some of the risks involved with wind power to animals and humans?" (Appendix C). The majority of participants responded to the question about animal risks with concerns about birds, much fewer discussed fish, and other types of animals were mentioned in passing. Some participants were sure that the rotating blades of the turbines would kill birds:

It is not very environmentally friendly for the bird population. So, I'm really aware of that and the pattern like I love the birds. They sleep while they travel. And so, if you put the wind power on that pass you kill massive populations of birds... Yeah, they kind of take turns and they fly as a flock and some of them are sleeping and not really seeing where they're going. Almost like on a bike you know when you trust the first rider to you being in the draft and you're not working as hard. And so, a lot of the birds get hurt with the wind power. (interview, participant 19)

And another participant stated that:

But I have also heard that birds throw themselves, they don't know what's there, and that's it. And then a lot of birds are found at the bottom of these things. I imagine that can't be helped too much. Except we are losing a lot of birds. (interview, participant 38)

Many participants discussed the sensory perceptions, intelligence, and motives of birds when debating their potential ability to avoid the turbine blades of a wind farm, as is seen above in participant 19's assertion that birds sleep when they're flying in a flock and participant 38's belief that birds "throw themselves" at the turbines. It was clear that participants were struggling with imagining how a bird sees and senses objects from the air and whether those rotating blades would be difficult to avoid. For example:

Having the wind turbine spin around is not going to kill that many birds. Sure it's going to kill birds... Again, the blades aren't slicing any birds in two... Well, buildings. I mean, Eagles have really good eyes. I can't see and hawks have really good eyes. I can't see them. Why did this guy fly into my window? I would think that they would have a little bit of peripheral vision. I don't know how their eyes work. (interview, participant 2)

This kind of debate about birds' perception occurred with most participants and usually ended with no resolution or final statement about the risk to birds. When the technical documentation about threats to birds is reviewed, little is mentioned about bird perception; instead, sheer numbers for bird mortality are provided, as in the document shown to participants after being asked about possible risks to birds.

The question of bird mortality would not have been a source of contention if it were not for the cognitive dissonance that preexisted for the activists, policymakers, and the public about the role of birds in understanding the environmental context the proposed project. The science shows that wind turbines do not unduly injure birds compared to other sources of mortality, based on behavioral studies. Still, they do not explain the perceptual and motor skills that birds have in order to avoid collisions with wind turbines. It is beyond the scope of this study to investigate the perceptual and physiological abilities of birds, but such research must exist, and it would go a long way to supporting the assertion that birds will typically avoid a moving or stationary object and that their eyesight is adequately strong to do so.

To speak further about the prototypical bird relationship with humans, there are numerous ways that we have used birds to "see" beyond our average ability to view things, such as using a "bird's eye view." We can only imagine what it is to fly and see the world from a higher vantage point, but what we are asking the public to do when talking about environmental issues is to do just this. A large-scale energy-producing wind farm is built at such a scale, and has repercussions for the wider landscape, such that participants must call on knowledge outside their everyday abilities – that of birds. By explaining this, there is the risk of appearing simplistic or reverting to folk knowledge that would normally appear in fairy tales; but if we are to understand where the public is coming from, it is necessary to value this type of knowledge-making. Birds



here are at once a method of understanding for participants and an element of risk posed by the new technology. As such, their method of understanding is put at risk by the proposed project, and it obtains a sinister connotation as dangerous and “unknown” even though wind farms have been producing electricity safely for many years in other locations.

Public understanding and their renditions of technical visualizations diverge from renditions provided by experts and policymakers. Considering these findings, new document genres are possible, where participant expectations are valued and represented. Understanding the local population’s visual literacy is key to figuring out how to successfully implement projects that can help humans avoid the risks of climate change. Participants in the research project were open to sharing their viewpoints and even got riled up about the proposed wind farm, wanting to learn more and even become involved. This kind of research has the potential to promote citizen science through greater attention to visual literacy and help technical communicators improve their strategies of document construction about a wide range of topics. The end goal is to provide technical communicators with practical solutions to communicate more effectively with the public through easily digestible textual and visual information.

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# Visual Literacy and Virtual Rephotography

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## Abstract

*Rephotography is a varied set of practices that begin with taking one or more pictures of the same subject. Valued for generating conversations in-situ about a place over time, recent large-scale migration to online learning draws attention to rephotography's virtual modes. From examples that use online location software (e.g., Google Street View) to those in video game worlds, virtual rephotography might present convenient windows to unreachable destinations. However, rephotographing without having visited actual vantage points needs to take into account complexity and disjointedness introduced by such tools. Drawing from the author's current practice-led research into photomedia, visual literacy and temporality in Northeastern Japan, emergent particularities are discussed for developing visual literacy through a necessary application of Google Street View.*

**Keywords:** Virtual rephotography, visual literacy, photomedia, temporality, Google Street View

## Introduction

Ōfunato is a city located on the northeast coast of Japan. Harrowing video footage of the tsunami on March 11, 2011 dispels the visual myth of a single wall of water. Instead, it shows a rising sea level first submerging parts of the dock before inundating the area and allowing waves that followed to freely destroy partly submerged buildings and drag them back out to sea (FN311, 2012). Photographs overlooking the city made in the following years from the same fixed positions (i.e., rephotographs) showed how the downtown area was cleared before the land was raised, sea walls erected, and roads re-laid to create a grid of blank spaces, which would eventually be occupied by new buildings of lower height (MLIT, 2020). A pre-existing natural landbank from where the video was made now divides downtown Ōfunato into two areas: one of “normality,” where pre-tsunami buildings and businesses are a comforting reminder of relative safety, and one of inundation, where risk is regularly cautioned in the form of signs and memorials. Ōfunato, along with nearby coastal towns and cities Kuji, Tanohata, Tarō, Miyako, Kamaishi, and Rikuzentakata, was the subject of a funded project titled *Finding Time* that set out to use a range of photomedia to document change and perspectives on change in the Tohoku region up to and during the 2020 Tokyo Olympic and Paralympic games.<sup>1</sup> It had been decided that the games would also be known as the “Recovery and Restoration Games,” and the official guide book casually invited visitors to Japan to travel to disaster-hit regions and see the restoration for themselves (Tokyo Olympic Committee, 2020). Central to the methodology was rephotography (also known as repeat photography or fixed-point observation), a diverse set of practices that formally began in the natural sciences as a method of visually recording and exploring change in the landscape by revisiting locations in previously made images (McLeod, 2019). A number of preliminary field trips were planned to prepare a participatory rephotography workshop to be carried out with international students in one of the aforementioned cities during the games. At present, the workshop's future is uncertain, but field trips were carried out until widespread concern regarding the coronavirus pandemic.

Beginning in November 2019, the author identified and visited vantage points adopted in the fixed-point observation photographs, providing an understanding of the topographical changes below. Rephotographing vantage points of images made within the area of inundation, however, was nearly impossible. While surrounding mountains provided initial reference points – as per any typical rephotographic survey – few remaining landmarks made it possible to determine distance from those points. Walking around this area, it was more appropriate to produce photographs that would serve as reference points for future rephotography. In other words, there was a clear sense of starting an archive rather than revisiting one. In February 2020, the author briefly visited the same area while traveling between other cities. A third and more extended trip in March 2020 then coincided with a public unveiling of the Olympic Torch outside the new Ōfunato Port Community Center. During this third trip, vantage points in fixed-point

observation locations were revisited with additional time allocated to reviewing vantage points in the author's previous 'new' photographs. The day after the torch's unveiling, the Olympics (and the research with it) were suspended and travel from Tokyo to the region was discouraged due to the first wave of COVID-19. Although a further trip was possible eight months later (between the second and third waves of the coronavirus), this paper concerns 'trips' made using Google Street View when travel was otherwise not possible. Significantly, not only did these 'visits' complicate the rephotographic experience of Ōfunato as a place, but they highlighted a need to critically examine such visual tools, particularly in the context of remote learning.

### Photomedia literacy

The discussion here stems from a study of temporality in photomedia. In her survey of visual literacy definitions, Keđra (2018) noted that many visual literacy studies to date leaned toward supporting skills in 'visual reading,' but less toward 'visual writing' or other visual skills such as 'visual thinking.' If visual literacy is widely recognized as important to 21st Century education, then familiarity with photomedia is central to developing all visual literacy skills. Additionally, Kress and Van Leeuwen (1996) established that learning about 'writing' with images was something necessary for participating responsibly in contemporary society (e.g., Lester, 2013). However, as Cobley and Haeffner (2009) argued, there is much more to visual communication than what a photograph shows or does not show. In their discussion of digital cameras and users, they made clear that basic questions still existed, such as those surrounding a photographer's intentions, suggesting that, although institutions (e.g., universities) were an ideal arena to teach and develop a "critical literacy" systematically, camera users taught themselves to be critical through self-reflexivity. Unlike analogue photomedia, the technology of digital cameras "allows the cheap generation of many more dispensable pictures which can be discarded at the click of a switch rather than forcing the photographer to wait and be disappointed after paying for their development on paper." (Cobley & Haeffner, 2009, p. 142). Yet, as they and Sebeok (2001) have pointed out, discussion of nonverbal aspects involved in the decision-making of a photograph are often overlooked.

Johannessen and Boeriis (2019) have recently built on this thinking, acknowledging that the process of making a photograph is where learning occurs. They point out a qualitative difference between looking at the screen of a digital camera and the ground glass of a view camera: that the speed in which the "protext" (the anticipated final image) is visualized differs between types of cameras. For them, this has significant implications for acquiring critical skills regarding the production of photographic images. According to Johannessen and Boeriis (2019), whereas analogue photomedia required the repetitive attention of honing a craft:

[A] contemporary smart phone camera essentially models the entire craft of photography in such a way that photographers do not need any dark-room skills, or skill with or knowledge of shutter speeds, aperture settings, or the sensitivity to light of film. They simply need to know how to operate sliders and buttons in a graphic user interface, or, increasingly to point and click. (p. 20)

Technological developments in the digital camera (e.g., AF assist, focus tracking) shape decisions and learning, meaning that the user can 'concentrate on the enskillment of orienting bodily with the camera in relation to a scene until the protext is apt in terms of social affordances' (Johannessen & Boeriis, 2019, p. 20). Through self-reflexivity, digital cameras facilitated an increase in what they called "microgenesis," whereby affordances are coupled to feedback loops on the scale of action and perception. However, what they described is an intuitive action of self-location made possible by contrasting a present moment with a previously distinguishable moment. Wherever a screen makes viewing a protext possible using a digital camera, this gesture is essentially a rephotographic one. For example, while taking a photograph, bright light might be observed creeping into the right of the frame, so one might move slightly to the left, taking another photograph to avoid that particularly obtrusive light. Undoubtedly, digital cameras, by virtue of their screens, make rephotography central to a self-reflexivity and thus a desirable level of criticality. However, knowing that the image can be made without cost (i.e., conveniently and quickly) can obscure the possibility of crafting a similar result, albeit through a slower process of contemplation. In other words, it is worth remembering that while digital cameras speed up this process, it does not mean that digital cameras are superior. They offer a means of self-reflexivity through an implicitly rephotographic gesture, but one which is also temporally different from other photomedia. There is, therefore, a need for photomedia literacy — a



critical understanding of the temporal nuances between types and forms of cameras when producing images. Such a “literacy” is not merely a matter of how to use a specific camera, but also when to use it. Following Cobley and Haeffner (2009), it is also not helpful to think of this literacy as developing a visual language, but rather to think of making photographs as a visual sensibility that is not only the preservation of cameras. Photomedia, as McKenzie noted (2020, p. 1), encompasses a wide range of photographic and video technologies, which extend to online and remote forms, such as Google Street View (GSV). While GSV was used as a tool for initially planning research trips in this study, the COVID-19 pandemic forced the author to reconsider its role and thus examining its temporality in the process.

### Virtual Rephotography

Rephotography as a method of visually recording change in the landscape formally began in the natural sciences before expanding into visual culture (McLeod, 2019). Given the scale of researchers’ subjects and the time taken to identify vantage points in photographs made in far-flung parts of the natural world, virtual repeat photography was developed in contrast to what has been termed a “brute-force technique;” it is a means of locating “photographic sites accurately enough that finding them exactly should only take hours of on-the-ground searching, not days.” (Hanks et al., 2010, p. 25). While Arc Scene, a three-dimensional viewer extension of Arc Info software used for the process, was data-intensive, Google Earth (GE) became a convenient, quickly improving, and cost-effective alternative (p. 25).

Although the tools offered to virtual repeat photography hold an advantage in saving time and resources, they do not necessarily make rephotographing itself any easier. When artist Richard Kolker was in Hyères, he came across the location in Henri Cartier Bresson’s iconic 1932 image of a cyclist rushing past a set of spiral steps. Kolker later visited the site again but with Google Street View, prompting a series of images that revisited locations in other iconic images in photographic history (Kolker, n.d.). In doing so, he realized that finding a vantage point still depended on information that accompanied or was embedded in the original image. His GSV equivalents of street scenes from Stephen Shore’s *Uncommon Places* (2016) were possible because Shore titled the images with actual street names. Conversely, Kolker’s version of Andreas Gursky’s ‘The Rhine, Dusseldorf, Germany’ (1999) was more challenging given the river’s length and the high degree of post-production Gursky carried out. Thus, the handling of information in an image may prevent recognition, or worse, be misleading. It may also be incomplete: it is often easy to think of GSV as being “all-seeing,” but GSV only “captures a slice of life that carries on in the street, so it’s not in any way objective although it’s generated in a kind of objective process because its automatic and very unphotographic” (Kolker, in-person interview, 2018).

Artist Jenny Odell in her series *Re-enactments* used available geographical data to identify and revisit locations in GSV images of San Francisco in which she re-enacted poses of anonymous figures. Learning of the distorting effects of the lenses used in 360-degree cameras ‘the hard way,’ she drew attention to the challenges of replicating computer photographic vision (Odell, n.d.). As seen in GSV, information represents only a fractional understanding of a place at a particular time and is as limited as other photographic images. Great detail and frequent updates may also be less common outside notable urban areas, leaving vantage points sought in lesser captured areas possibly within pixelated blurs. Odell’s images were “in real life” (IRL) rephotographs of a virtual world. Similarly, *Virtually There* (2011) by Andreas Rutkauskas used Google Earth as a starting point to explore the Canadian Rocky Mountains. Downloading GPS tracks from the Internet and virtually revisiting others’ hiking routes, he made 8×10 sized prints of images of planned routes from Google Earth. He then walked those routes, using a 4×5 camera to rephotograph the vantage points of the GE images he took with him. Interested in landscapes affected by technology, he was concerned with a supposed gap between how landscapes were mapped and how they were experienced (Rutkauskas, 2020). These and other examples of IRL images of ‘virtual’ spaces, such as modern day rephotographs of 18th century Paris in *Assassin’s Creed Unity* (Plunket, 2014), echo Trudi Smith’s understanding of rephotography as a means of “ground-truthing,” of verifying observational data (Smith, 2007). However, the COVID-19 pandemic, makes virtual rephotography more tempting.

In situations where IRL rephotography is not possible, it is important to reflect on the term “virtual.” According to Marie-Laure Ryan (2016), the term can refer to something appearing present that is actually absent, or it can refer to something fictive in contrast to what is real (pp. 18-19).<sup>2</sup> Examples of the latter might be in-game rephotography that mimic IRL rephotography, such as the ‘A Thousand Words’ mission

in the video game *Far Cry New Dawn* (Stenhouse, 2019), which simulated the method of holding an old photograph in its original location, characteristic of the popular *Dear Photograph* project (Jones, 2012). The referent image used for the rephotography is a scene of the 'current' location as 'seen' in a previous iteration of the *Far Cry* game series. Therefore, the referent is equally unreal as the rephotograph, requiring the user to have specific cultural knowledge (i.e., having played the original game) to understand the reference. While this may not differ so much from needing prior knowledge of a place when rephotographing IRL, there is less opportunity for a user unfamiliar with the reference to encounter and engage with the same vantage point.

The same can be said of two other examples. In *On Exactitude in Science* (2017), Alan Butler paired Godfrey Reggio's *Koyaanisqatsi* (1982) with his version *Koyaanisgtav* (2017) made entirely using in-game photography from within the *Grand Theft Auto* video game series. Using the original film as a template, scenes were recreated in the game frame-for-frame but only as far as the game-world and the possibilities it afforded would allow (Butler, 2017). Similarly, in *Vertigo@Home* (2007, 2015), Grégory Chatonsky used GSV to revisit journeys between sites in Alfred Hitchcock's film *Vertigo* (1958), referring to instances where James Stewart's character was following a woman driving around San Francisco as she searched for an imaginary past. By "driving" along the same routes in GSV and pairing it with the original soundtrack, Chatonsky's version revisited the experience of a fictional character played by real actors (Chatonsky, 2007). While his film shared a connection to the actual streets along which Google's camera operator drove, that link was largely symbolic, as was the use of San Francisco as a backdrop for Hitchcock's story. Therefore, both Chatonsky's and Butler's films reference a representation rather than reference a place from which representations are derived; they are parodies. This means that there is a difference between virtual rephotography and rephotographing the virtual.

### On virtual ground

If rephotography is a means of "ground-truthing" reality experienced in visual studies (Smith, 2007), what can virtual rephotography offer researchers and users? Technologies and tools for remote viewing (e.g., Google Street View) have been in use for over a decade. They have been the subject and vehicle for many visual inquiries within contemporary arts. Therefore, virtual experiences are not new. Still wide-scale shifts to online learning in 2020 have led to a renewed spotlight on such techniques and approaches, but mostly as a solution to consumer concerns. At the beginning of the pandemic, copious suggestions were shared to balance self-isolation with the normality of working social life. In particular, Google reported that GSV was being used to offer sightseeing tours (Malczyk, 2020). More recently, virtual reality content made possible by products such as the Oculus Rift is being touted as a way to sustain interest in travel destinations for the foreseeable future (Debusmann, 2020). Mindful of this outlook, it is the role of those working in the field of visual literacy to examine such visually powerful tools and ensure that there is a space for critically discussing how they are used in a range of contexts. What follows, is an initial contribution to such discussion, drawing upon both empowerment and concerns made apparent by previous virtual rephotography examples. From revisiting Ōfunato using GSV, a set of particularities emerged that may offer a base from which to critically evaluate GSV applications that overstate the tool's symbolic power.

### Go where you 'know'

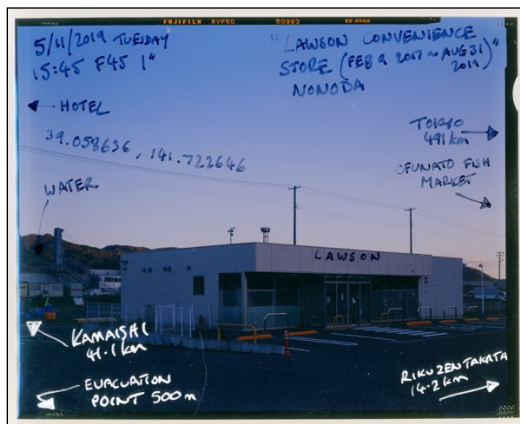
The author's IRL visits to Ōfunato began at the former's train station (now bus station) and a nearby hotel in Nonoda downtown closest to the waterside. The first trip comprised a series of walks that combined seeking out locations in previously made pictures (researched and previewed using maps and GSV) with psychogeographical walks in the area of inundation where the author responded to what was encountered and documented. Initial walks circled out north and south from the hotel, occasionally retracing parts of the same route. By the second night, a point was made for walking around the area of 'normality' on the last morning. Across the first two days, walks occurred at different times of the day, from a prolonged sunrise through to an equally prolonged sunset (tall mountains to the east and west ensures the sun "rises" and "sets" earlier than scheduled). The third trip revisited some of the walks in the first albeit extending even further north along the inundation section. When using GSV to visit Ōfunato, following the same paths immediately created comparisons.

Two-minutes-walk south of the hotel were two convenience stores that appeared closed in November 2019. Both had no signage or any indication of use. However, as the majority of convenience stores in Japan

tend to comprise pre-fabricated buildings, the design of these two closed stores indicated that one was formerly a Lawson (Figure 1); the other a Seven Eleven (Figure 2). Uncertain as to whether the stores were awaiting products and staff to fill them or whether they were to be demolished, both were photographed: one using color sheet film, the other in color using a digital camera.<sup>3</sup> Too close to the water's edge and too short to withstand the force of the water, it was clear that the convenience stores — as per the hotel and many nearby buildings — had been built since the disaster. During the third trip four months later, both stores were gone: Lawson had been demolished and paved over leaving only a difference in shades of tarmac (Figure 3), and Seven Eleven was in the final stage of being demolished (Figure 4). Browsing the locations in GSV initially presented an image captured from June 2013 revealing only empty plots of land filled with grass and rubble. Having witnessed the stores and subsequently their absence, it seemed appropriate that the next experience was one where they had never existed. Indeed, at the time of capture, the GSV vehicle operator nor anyone inspecting the location (in GSV or IRL) could have known the stores' fates. Without the "with store" and "without store" experiences in person, it would have been impossible to consider the 2013 GSV image capture as anything but a record of destruction. Instead, revisiting a place known to the researcher or user can encourage seeing an empty space for what it *will* become rather than what it wasn't anymore.

**Figure 1**

*A Lawson convenience store in the Nonoda area of Ōfunato as seen in November 2019.*



**Figure 2**

*A Seven Eleven convenience store in the Nonoda area of Ōfunato as seen in November 2019, very close to the Lawson convenience store in Figure 1. © The author 2020.*



**Figure 3**

By March 2020, the Lawson convenience store had been demolished and paved over. Traces of the store remained in the form of different color tarmac. © The author 2020.

**Figure 4**

By March 2020, the Seven Eleven store was in the final stages of being demolished. © The author 2020.

**Go forwards by going backwards**

Rephotographing IRL is as much about creating records that can be returned to in the future as it is about recording changes since a previous image was made. As noted above, when unable to identify locations in the inundated area as documented in previous photographs, it was necessary to make new photographs of what was seen that could be revisited later. In doing so, it is important to be mindful of potential changes to the landscape that might yet occur. The simplest example of this is photographing sites where construction is taking place. Conversely, sites of deconstruction or demolition serve as an indicator of possible change, such as the two empty convenience stores noted above. Seasonal changes in local plant life would also be a good example to photograph, but it is perhaps more valuable to note where such plants may be growing. Another instance is political posters, either in the form of local or national representatives. Rephotographing forwards in person is relatively simple were it not for restrictions on travel. However, rephotographing forwards in GSV is unlikely as the technicians at Google are not concerned with specific details of places being revisited over time. Rephotographing backwards is possible with GSV though, particularly if using the web-browser version of the software, which contains a history slider function, thereby

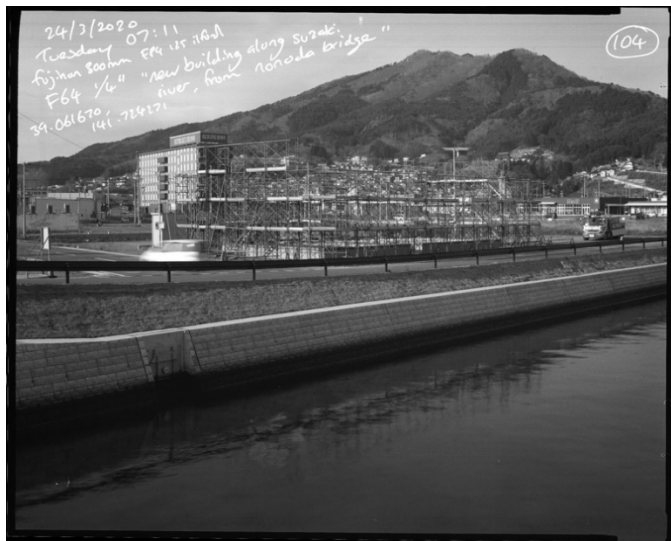


allowing the researcher or user to select and learn from alternative image captures of the same location.

During the third trip in March 2020, workers had erected scaffolding alongside the Suzaki River, which was photographed with anticipation for what would be constructed (Figure 5). A fourth IRL trip in November 2020 revealed a completed standalone restaurant that was serving customers (Figure 6). Although the location was not recorded during the first trip, panorama views made from the Ōfunato Port Community Center showed that nothing on that site indicated possible construction (Figure 7). Earlier captures in 2013, 2014 and 2015 (from another angle) also showed an empty space where surroundings suggested it was waiting to be razed (Figure 8).<sup>4</sup> The image capture in September 2011 revealed a pile of debris surrounded by skeleton forms of nearby buildings (Figure 9). Unfortunately, the 2011 image capture is also an ‘historical wall’ whereby — to the best of the author’s knowledge — there are no equally and readily accessible image captures before that time. As with many other towns along the coast, Ōfunato was only captured by GSV cameras following the disaster, as part of Google’s declared effort to document the ongoing recovery (Google 2011).<sup>5</sup> Any existing photographs from before the disaster are likely in de-centralized and personal archives, or worse, lost to the water. Naoya Hatakeyama wasn’t wrong when he noted that the ‘the world is now divided into before and after March 11, 2011’ (Whatley, 2018, para. 7). If the GSV images are taken to be the entry point into the visual history of Ōfunato, the researcher’s or user’s experience would begin with a record of the disaster’s aftermath, as if a version of Ōfunato did not exist beforehand. By way of contrast, going up to the roof of the Ōfunato Port Community Center in person can offer a rephotographic experience that acknowledges an earlier visual history. There, aerial and street-level views of the downtown area taken prior to the disaster can be compared to the present-day scene without the need for aftermath images. In this sense, virtual rephotography using GSV is limited and perhaps even unfair to how the city is visually represented: as a city destroyed rather than as a city that survived. Yet, starting with the most recent GSV image and working backwards can redress that concern.

### Figure 5

*Scaffolding along the Suzaki river in Ōfunato as photographed in March 2020. © The author 2020.*



**Figure 6**

*By November 2020, a standalone restaurant had been built where the scaffolding had been present. © The author 2020.*

**Figure 7**

*Detail of a panorama of Ōfunato made in November 2019. At that time, there were no visible indications that the restaurant in Figure 6 would be built. © The author 2020.*

**Figure 8**

*GSV image captures from 2013, 2014 and 2015 respectively, depicting an empty space where the restaurant in Figure 6 would eventually be built. The 2015 image capture is from a different angle. © Google 2020.*



**Figure 9**

GSV image capture of the restaurant's location as seen in 2011. The area is surrounded by the skeletal remains of buildings. © Google 2020.

**Go with glitches**

It is well known that GSV regularly contains glitches that can appear in a number of circumstances. Some of the most notorious may be errors in stitching together complex scenes, shifts in view when the GSV camera passes other vehicles, or even “messages” from members of the public given in full view and consciousness of the camera’s presence (e.g., Wolf, 2019). Moreover, it should be noted that few image captures follow exactly the same paths, making for diversity in weather conditions and lighting but also — in the case of places with great amounts of change — making for different road layouts. Nowhere is this as apparent as it is in Ōfunato, where the land has been elevated and new roads built. Even if the same routes were followed precisely, the software may not present a continuous experience. According to Google, “when you move to an area in the distance, the 3D model determines the best panorama to show you for that location” (Google, 2020). In the case of Ōfunato, as well as other places where change was significant, this makes for a shifting temporal experience. Expecting to continue walking down the same road in June 2013, the view transmogrified to a 2019 view of the same road albeit blocked by the BRT line, which is possible to cross on foot but not by car (Figure 10). What therefore appears visible in the 2013 model is not possible to ‘walk’ through in the 2019 iteration. This is not unique to Ōfunato, but its commonality depends upon which temporal point of the history slider the user is currently ‘in’.

Continuing to “walk” around Ōfunato using GSV can eventually become an unnerving experience; the researcher or user is uncertain about how the view will change. While the history slider offers a modicum of control in that the researcher or user can switch back to the time of the image capture they were browsing, the model will continue to determine what can be viewed and when. For as long as the experience remains, the researcher or user is condemned to “jump” from one time period to another, much like a vaunted time traveler of science fiction. Analogy aside, the experience can be informative but notably disorienting without on-site knowledge. There is a danger of likening such an experience to the rephotography found in video games and parody works noted earlier. Therefore, a key difference is that the rephotographic experience remains unpredictable and random according to the quirks of the software and the modelling/mapping process. Such glitches may be unnerving but they also present opportunities to learn through contrast between the expected and unexpected.



**Figure 10**

A GSV image capture in June 2013 unexpectedly transmogrified to a 2019 view of the same road albeit blocked by the BRT line, and no longer accessible by car upon which the camera was mounted. © Google 2020.

**Discussion**

Despite being aware of virtual rephotography, it was never the author's intention to adopt such an approach until it became impossible to do the research in person. When necessary, it was found that GSV brought value to an existing visual project in unexpected ways; but it also encouraged a more critical eye of its affordances. Chief amongst concerns is that GSV is highly limited in that it captures only one time frame out of a whole year's worth of possibilities. Moreover, those choices are usually banal as the GSV camera operator cannot select a view in the way that an everyday camera user can. It is likely then that a GSV image capture cannot and should not stand as representative of a place's diversity. Assigning GSV images with any kind of finality is to forget that very visual and very apparent fact. Despite the ability to 'roam' around the streets, the images are technically photographic 'stills' gathered and presented in a sequence that is not that of the researcher's or users, making for an experience that might otherwise risk a form of psychosis were it not for the screen reality being distinct from that of the researcher or user.

It is also worth remembering that in the wider discussion of visual tools for aiding virtual experiences, GSV is not, and will not be, the definitive form that virtual rephotography can take (as examples earlier in the paper made clear), although similar software such as Baidu Total View in China likely has inherited similar particularities. It is also worth noting that places *absolutely* existed before GSV cameras visited. While perhaps an obvious point, the power of companies to potentially replace existing archives with GSV image captures (no matter how fantastical that sounds) — or at least control which is likely seen first — should be a cause for concern and discussion in terms of visual literacy. Those learning through making photographs should be amongst some of the first to question such a possibility were it ever to arrive.

In sum, GSV is inherently photomedia, and like all photomedia, it has limitations beyond its compositional differences. Many of those differences are temporal and become discoverable through the virtual experience of rephotographing. The notable particularities that emerged in revisiting Ōfunato by way of GSV contribute to the growing need for a photomedia literacy. Photomedia may differ in cost and convenience, but it is in their temporal differences where learning takes place. As a tool for learning visually about a specific location without going there, GSV remains useful. In virtually rephotographing, it becomes a temporally complex yet valuably imperfect tool for that visual research.

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### Footnotes

1. Funded by the Japan Society for the Promotion of Science (JSPS), number: 19K22994.
2. It should be noted that use of the terms 'in real life' (IRL) and 'virtual' may appear to reinforce what Nathan Jurgenson (2019) has referred to as a 'digital dualism' where the online world is routinely, but inappropriately, considered unreal and the offline world somehow more real. Jurgenson's argument is that the online world has very real influence offline and vice-versa. This is an interesting framework in which to reconsider rephotography and will be the subject of another paper.
3. Circumstances and lighting primarily dictated which camera was used to make these photographs. Seven Eleven was initially photographed as a visual note to the author to return with the large format camera. When returning, the position of the sun did not warrant exposing a valuable sheet of color film.
4. Although image captures were made in Ōfunato in 2019, a relative view for 2019 at the time of writing would not appear from this vantage point.
5. Google Street View had been deployed in Japan since 2008 but had concentrated on major cities and sightseeing locations. Parts of the city of Sendai were affected by the tsunami and these had been added in 2008. Ōfunato, however, was not.

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# Virtual Construction Kits

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## Abstract

*The “Studio of art designing” develops and publishes electronic creative education programs for children and young people. All virtual kits represent miniature programs each designed for a small but clear task. The main purpose of each construction kit is to reveal the meaning of some aspect of the creative process. Virtual construction kits suggest the user making their own work of art. However, this creative process is done with the help of means and methods that develop the user’s thinking. Thus, the user gets to know this phenomenon “from the inside.” Virtual kits have found application in textbooks for a comprehensive school and as an accompaniment to museum projects. Projects related to the Russian Avant-Garde, antique vase-painting, steampunk, infographics, animation, “laterna magica” and visual storytelling are used in many secondary schools and museums in Russia.*

**Keywords:** *electronic creative education, virtual construction kits, art education, creative thinking, artistic thinking*

## Introduction

The art of the past is the thing in itself. How to work the way through these borders and discover an opportunity to perceive the visual heritage, to turn hidden and unnecessary into the actual and essential? Virtual construction sets, which will be discussed below, were created as an answer to this question. A diverse range of projects for the implementation of Information and Communication Technology (ICT) in higher and secondary education, museum projects, art and curatorial projects in the field of new media led me to this form of digital tools.

I refer virtual construction sets to the class of tools designed for creative modeling of new images but limited to a given framework of visual and semantic contexts. In my teaching practice, this class of instruments also includes museum role-playing and board games. Such tools are aimed at the active perception of the semantic content of culture within the process of heritage interpretation. After all, works that are easily created by users of virtual construction sets become part of their reality, they directly affect their picture of the world and begin to control their behavior (Korzybski, 1995). Once abstracted into various representational forms, reality returns to the process of actual thinking, bringing with it a meaningful cultural experience.

It is in this sense that we can say that the development and use of virtual construction sets were aimed at the practical solution of visual literacy issues. I see construction sets as effective means of revealing the perception of artistic heritage, which operates on a pre-verbal level. Here we can recall Buhler’s hypothesis about pre-speech instrumental thinking, about “subjectively meaningful, that is, consciously purposeful activity” (Buhler, 1924, p.100), which in this case is stimulated and carried out with the help of virtual construction sets.

I define the functionality of virtual construction sets as the action of “second-level stimuli” (Vygotsky, 1984, p.503). That is, the use of virtual construction sets is aimed at establishing a connection between a sign and its meaning in the process of combinatorial activity with visual elements that stimulate and direct the thinking process. The result is the creation of a new image and a new semantic situation, which manifests itself in the context of the cultural context set by the design. In this way, a connection is established for the perception of the visual heritage.

The characteristics of the given examples of virtual construction sets by their goals, topics, and recommended age are placed at the end of the text.

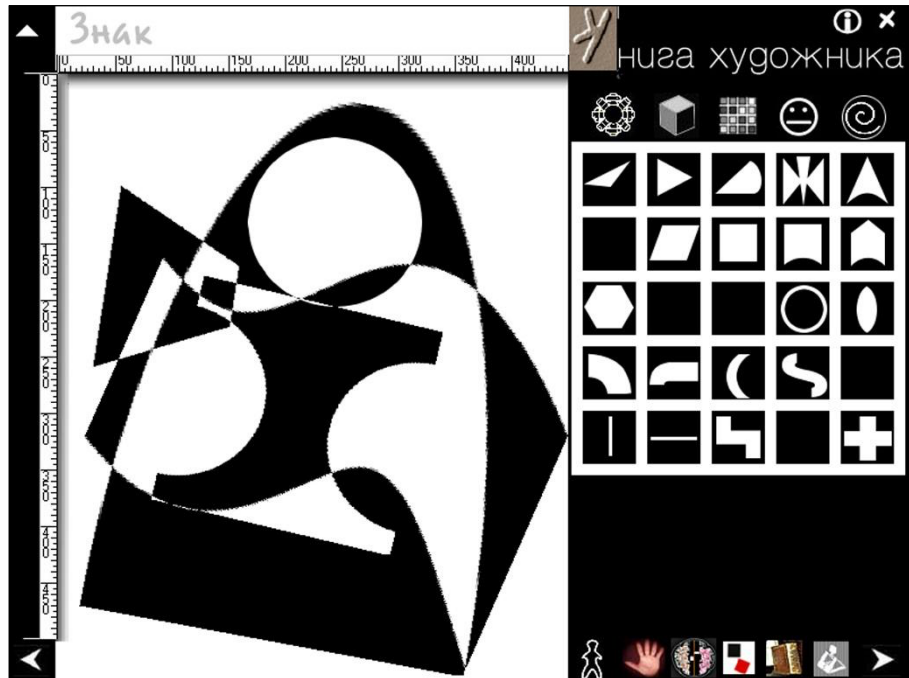


### The emergence of the idea and the development of the concept of virtual construction sets

An idea of the virtual construction kit is associated with undertaking one project. The project was aimed at holding a workshop for secondary school students, without any specific artistic skills. The creative task was connected with an intricate genre of contemporary art – artist's book. Artist's book was positioned as a complex media nonlinear hybrid. The teenagers were asked to create an object that would combine text, color, pictograms and illustrations into a single structure. It was no less important to come up with a special sequence of "reading" this object.

**Figure 1**

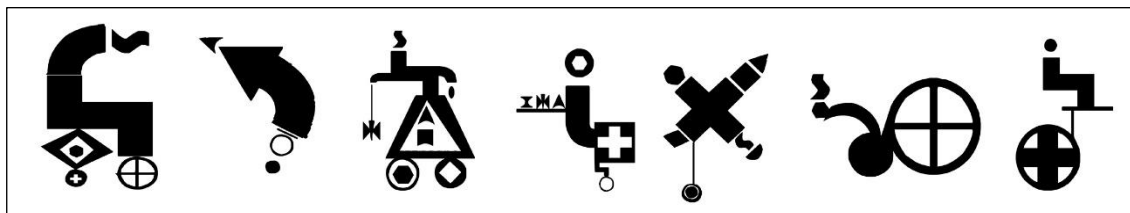
*Virtual construction kit. "Artist's book", 2004*



The large-scale participation of this workshop and time limits forced me to invent the way to manage the creative educational process. I have prepared a presentation and tried to explain the task and describe the possibilities for constructing such an object using a construction kit. At that time, I was a frequent user of the Macromedia Director program and benefited from its capabilities to create unusual interactive presentations. Then, I made several construction kits for the workshop, with the help of which I was able to explain the main steps of the proposed task.

**Figure 2**

*Pictograms created with the virtual construction kit. "Artist's Book", 2004*



The set of these first construction kits consisted of the sign, form and color construction kits. The sign construction kit was especially interesting, and I've been constantly using it in my work with children since

then. With this construction kit, I was able to see the possibilities of this construction kit that allowed me to see the possibilities of the development of children's brain building. As shown in Figure 1, I made a small set of parts of an unusual shape for it; moreover, each of the parts was in a single copy which led to a limitation of design possibilities. This limitation has proven to be a very effective way of stimulating creative imagination and combinatorial thinking. All the details in the kit are random. These are irregular geometric shapes or polyhedrons, which resemble the scraps of paper after collage work. Angular, curved shapes do not evoke any associations, do not resemble any specific items or details. While creating these elements I aimed precisely on ensuring that they did not orient the students' imaginations in any particular direction. The purpose of a kit of such shapes is to create the basis for unexpected visual discovery. Another goal in using random shapes is the impossibility of creating a naturalistic image. The result is always expressive, but conditional and rather abstract (Figure 2). The graphic expressiveness and uniqueness of the images created with the help of this sign construction kit is the result of a special effect - the inversion of the colors and the forms when they are superimposed on each other. All parts of the construction kit are initially black, but when their parts hit each other, these parts turn white. Such an inversion can be used as a special visual technique with multiple superimpositions of silhouettes on top of each other (Figure 1).

Unfortunately, the electronic application "Artist's Book" was created a while ago, when the standard screen resolution was very low. It was not possible to create complex graphic works on a small working tablet of the construction kit. Parts of this constructor can only be scaled and rotated.

### Figure 3

Stepan Ageev. "Artist's book". Academic work, 2016



Students are always involved in the tasks associated with this construction kit with interest and enthusiasm, because it becomes a challenge for them and engages them actively. I realized that the virtual construction kit is an effective tool for creating the very possibilities of thinking that Vygotsky defined as "psychological tools" (Vygotsky, 1984) – tools directed inward to the development of their thinking. I define virtual construction kits in the same way - these are digital tools that form psychological tools.

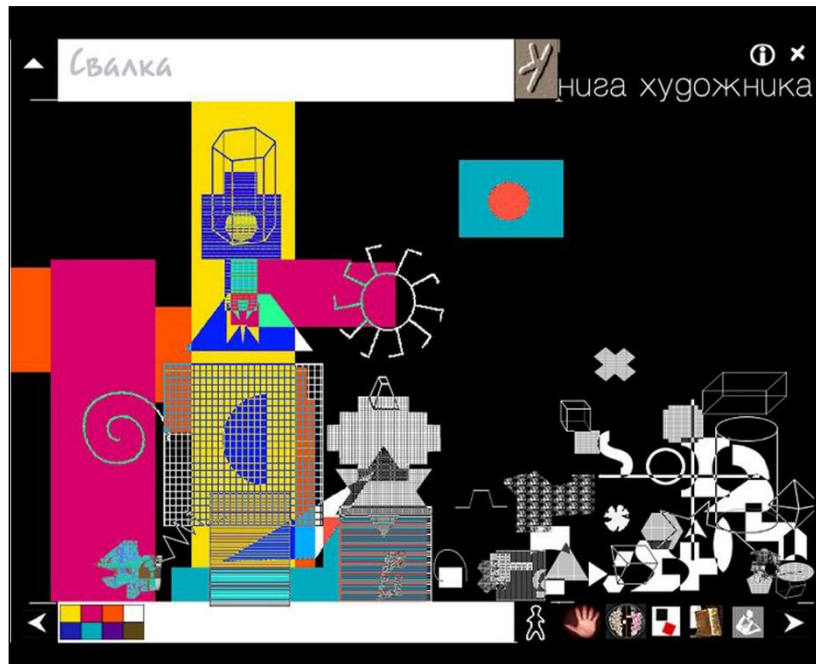
The electronic system "Artist's Book," which includes these virtual construction kits, remains relevant for our activities with children, in which questions of creative work with information, the design of icons, and the creation of visual narratives are raised. Working with construction kits from the "Artist's Book" is also possible for young children. Therefore, often the first acquaintance with the computer, as a creative tool, we carry out with the help of the "Artist's Book."

Another important aspect that was revealed in the "Artist's Book" is an ability to create real objects using these construction kits. Thus, with the help of the color construction kits, students select necessary colors for their projects, with the help of the form construction kits, they think over the shape of the object and the

sequence of its disclosure, and with the help of the sign kit they create graphic content. Graphic images can be printed, and you can create a real object – an artist's book (Figure 3). But in the "Artist's Book" there was not yet a module for working with text, so the text is created in any graphic editor. Later, when preparing the electronic system "Artist's Book" for publication, I supplemented the set of construction kits with one more, with the game purpose. This is a construction kit called "Dump" (Figure 4), in which the details of all the construction kits are mixed and there is an opportunity to use color, and I made some of the details move. It seemed to me necessary to supplement the set of construction kits with one more – providing the possibility of free action. The fact is that simultaneously with the work on these constructors, I carried out my first game museum project. The theme of the game, as the territory of creative freedom necessary for design, influenced all subsequent developments of virtual construction kits.

**Figure 4**

*Virtual construction "Dump". "Artist's book", 2004*



The idea to use the construction kit method to issue an assignment for the Workshop of the Artist's Book was naturally not accidental. Back in the mid-nineties, I was struck by the acquaintance with the outstanding pedagogical experience – the construction kit "Gifts" by the Austrian teacher of the first half of the 19th century Friedrich Fröbel.

Friedrich Fröbel (1838) suggested the usage of construction kits to develop child's thinking (Brosteman, 1997). But since then, I have been developing these ideas in several directions, one of which is virtual construction kits. I define the kit by Friedrich Fröbel as a construction kit of the eidetic type (from Eidos), aimed at the developing of sign-symbolic representations of the child with the help of abstract forms that the adult gives meaning to during the game (Figure 5).

In virtual construction kits, myself as a developer, play the role of an adult. In this sense, my task is complicated by the fact that I cannot communicate with a child using the virtual construction kit directly. Therefore, my project task for developing kits includes not only creating a set of elements, but also creating a semantic context that determines the content of the game with a construction kit. This context in the mind of a child is formed in two ways – by a small description and, most importantly, by means of visual design.

**Figure 5**

*The explanation of task meaning with aid of the construction kit Gifts by Friedrich Fröbel.*



The next virtual construction kit became part of a large research project called "The Return of the Magi" (Figure 6), which I carried out together with my student Olga Rozmakhova, a medievalist. This was the first experience of creating a semantic construction kit. We wanted to make a magical game with precious decorations of the most famous medieval relics. The set of details for the kit was to represent the semantics of the objects used at the Christian liturgy. But we have not achieved this very result, because the construction kit is designed for children, and the content — for high school pupils and students. But this kit suddenly began to develop a special functionality. Based on the given elements, we began to develop tasks for working in real space - to design, print images and make objects. The hybridity of this kit was unexpectedly embodied in a scenographic task using a computer monitor.

**Figure 6**

*Virtual construction kit of gifts. CD "Return of the Magi". 2004*





### Virtual construction sets for artistic propaedeutics

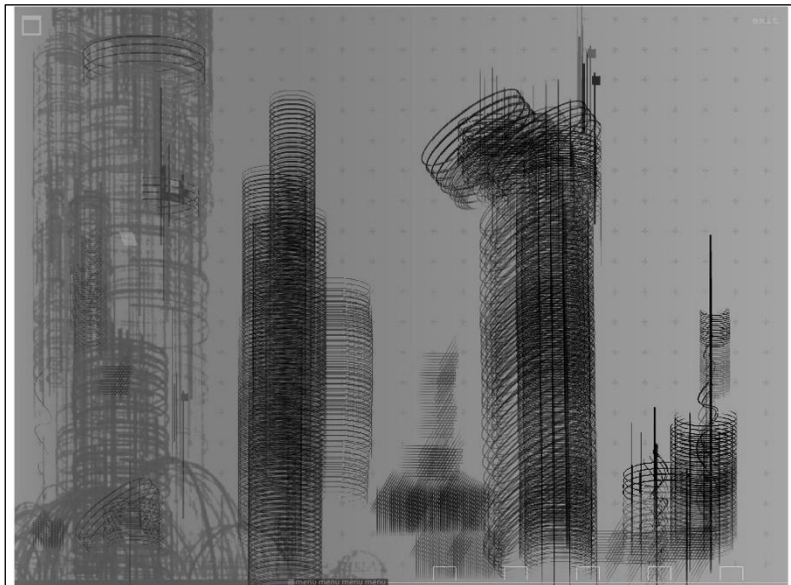
An important step in the development of virtual construction kits was the project aimed at interpreting the heritage of the Russian Avant-garde by means of computer technology. It was an art educational project for teenagers, which we carried out together with the State Tretyakov Gallery. The young project participants had to develop various media projects that interpreted works from the museum collection. I suggested participants use my concept of virtual construction kits as one of the possible forms of participation. The kits created within this project have significantly expanded the understanding of the capabilities of this tool. Primarily it refers to the varied experience of designing the interfaces of these small applications. In the illustration, I show some of these works, so different and interesting in their capabilities. In these construction kits, for the first time, the goal was set to interpret the artistic heritage in the process of identifying and demonstrating the characteristics of the artist's method or artistic direction.

The most unusual in its imagery and the most difficult to create was the construction kit dedicated to the work of the architect Yakov Chernikhov. Chernikhov's graphic fantasies with skyscrapers are especially famous. To create these graphic sheets architect uses multiple repetitions of method identical lines - straight lines and ellipses. The effect of dynamic growth of structures is created, the images of colossal structures seem to be created right in front of our eyes.

This kit combines two directions of the architect's work – projects of the utopian skyscrapers (Figure 7) and fantasy on the theme of machines and mechanisms. Several types of details are used to create the mesh structures of skyscrapers, which are extracted from the already started construction. The details are also movable.

#### Figure 7

*Virtual construction kit "Yakov Chernikhov". 2006*



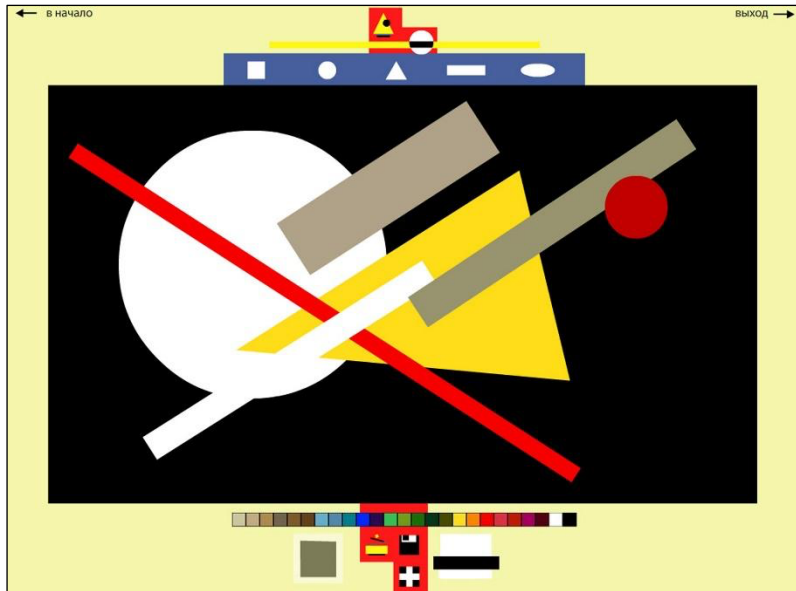
Another construction kit created as part of this project was later refined and became one of the main educational tools for our work with students. This is a kit offering acquaintance with one of the main directions of the Russian avant-garde – Suprematism (Figure 8).

At first glance, this is a fairly simple construction kit in which an image is created from a small set of geometric shapes. But the possibilities of color, tonal and compositional combinations are endless. We use it to introduce students to the problems of formal composition, geometric abstraction, to explain the basics of the rhythmic organization of images and many other themes. This kit also has a new type of

functionality that we have made the main standard for all future developments.

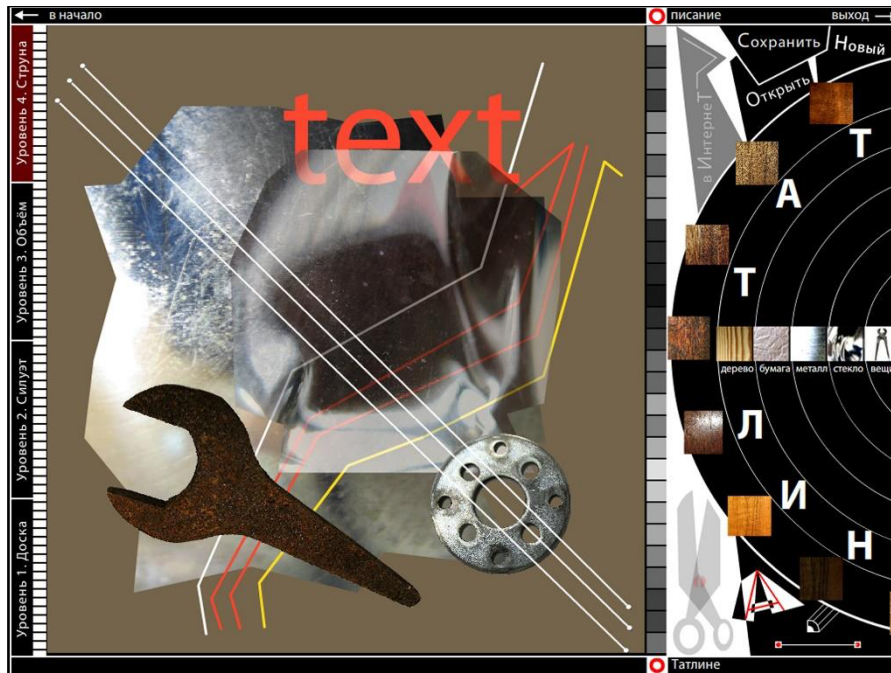
### Figure 8

*Virtual construction kit "Supremus". 2006-10*



Later, this construction kit was supplemented with one more function – on-line usage, with the ability to directly publish the created works at a virtual exhibition. Another important aspect of this kit for us is a question of saving the work. The author of the work is invited to give a name to his creation, using one of the names prepared by us in advance. This is an important educational issue, which gives students an idea of the peculiarities of the artistic method of the Suprematists, who symbolize their works using industrial, technogenic metaphors. The continuation of work on the interpretation of the heritage of the Russian Avant-garde with the help of virtual kits was the work on a rather complex construction kit based on the work of the artist Vladimir Tatlin (Figure 9).

The complexity of this project lay in the fact that the artist's language was expressed with materials – iron, wood, glass and ropes. How to interpret such a pictorial language in virtual form? The selection and grouping of materials by their type was not difficult. But it became possible to express the properties of materials presented in virtual form by combining them with the material "glass," which Vladimir Tatlin used rarely. The set of glass parts in the kit and the adjustment of their transparency opened up the possibility of creating multilayer assemblies. The inclusion of glass in the composition immediately gave the impression of the authenticity of the materials, emphasizing the texture of rusty iron and rough wood. But the most important tools that made it possible to feel the specificity of the artistic language of Vladimir Tatlin were scissors and a string. Scissors is a tool using which you can cut out any silhouette. The scissors were made in such a way that you can only cut roughly – in straight lines, like scissors cut for metal. It was proposed to work on virtual assemblies at several levels, when details of the work are fixed on one of them. At the topmost, "finishing" level, it is proposed to complete the work by pulling the "string." Vladimir Tatlin designed stringed musical instruments and was very fond of introducing a stretched wire into his works. For example, in "Corner relief" (Tatlin, 1914). The string tool is only activated in the topmost layer, and setting this line feels like pulling on a string.

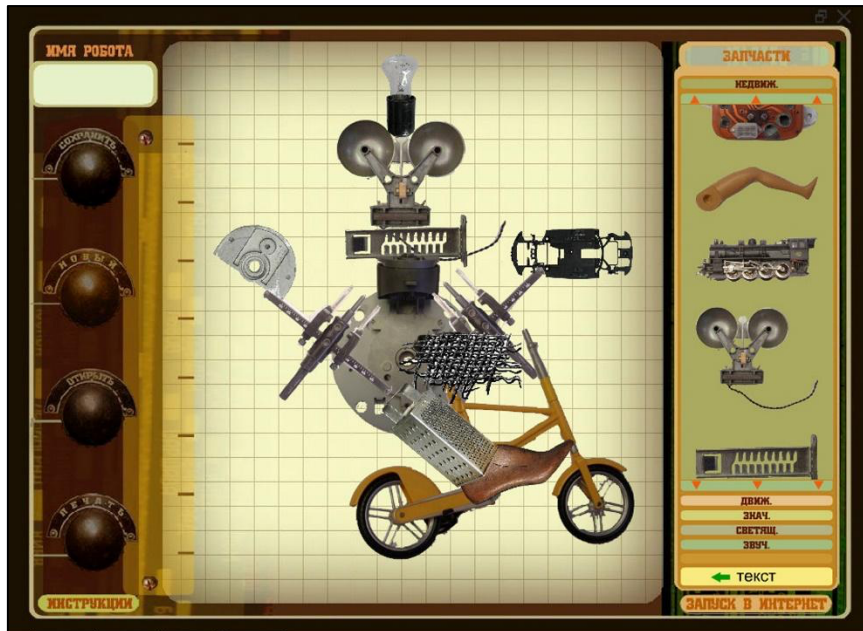
**Figure 9***Virtual construction kit "TATLIN". 2011*

Today I think that the theme of the Russian avant-garde and constructivism will be continued in our virtual kits. The experience of the avant-garde was forcibly forgotten for a century due to the circumstances Russian art education faced. Today the enormous public interest in this heritage forms a demand for the reconstruction of the educational and methodological experience of the era of modernism. And it seems to me that this reconstruction of history should start from the beginning - with the construction kit of Friedrich Froebel. For now, this is how I understand the evolution of ideas that shaped the art culture of the 20th century and remain influential for art education in the 21st century.

#### **Virtual construction sets for a wide audience**

Somewhat earlier than the TATLIN construction kit, we developed a semantic constructor in which the meaning of the used items was of prime importance. This kit is very different from all our other projects. It was created by my students Alexandra Selivanova and Fedor Mikhailov for fun. The construction kit is called "Robots" (Figure 10) and the user is invited to assemble his robot from various household items. But not any everyday things, but things that have become obsolete and long forgotten, which were used in the thirties and eighties of the 20<sup>th</sup> century, and which for modern adolescents are a rarity and a wonder. The visual design of the program is reminiscent of an old radio. When the program starts, the sound of the tuned radio wave is turned on. The user is transported several decades ago, in the era of the first space flights, small-screen TVs, radio tubes. All parts in the kit are divided into groups – stationary, moving, glowing and sounding.

**Figure 10**  
Virtual construction kit "Robots". 2011



The construction kit allows you to create an audio collage from various technical noises. And from all this diversity, the author can create a unique image of a mechanical person or any device, odd, funny and very expressive. To save the work, you need to give a name to the robot, sign the name of the author. And the most interesting thing is to send the robot to an online exhibition on the Internet. Each robot is assigned a unique number by which, having switched to the exhibition screen, you can see your work among the works of other authors moving along an endless conveyor (Figure 11).

"Robots" has become one of the most popular among all our developments. This kit turned out to be interesting not only for children and adolescents, but also for adults, and is also used in family leisure time. Elderly people can explain what kind of objects they use to create their robots.

**Figure 11**  
Virtual construction kit "Robots". On-line exhibition. 2011





This construction kit stimulated communication between people of different ages and, even, was used as a creative leisure for professional groups. We have also considered the possibility of using this construction kit to work in real space. Each of the created images can be printed in two different forms: as a brochure cover and as a poster. The cover of the brochure is designed to create custom instructions for the created robot. Our students are happy to come up with different purposes for their robots, describe its capabilities, invent funny names for its parts. The play upon words that accompany the invention of the robot, when students compete in their wit, turns out to be very fruitful for unexpected semantic discoveries. This work exploits the natural interest of children and adolescents in old things that keep traces of time and the history of their parents. The weirdness and incomprehensibility of these old things for young users stimulates their imagination and creative energy. The project "Robots" was accompanied by a short history of steampunk, in line with the ideology of which this ironic virtual construction kit was developed.

### Virtual construction sets for general education schools

The next type of construction kits was developed by me and my colleagues when one of the largest Russian publishing houses (Russkoye Slovo – Uchebnik, 2012) became interested in our developments, seeking to create a new type of visual art textbooks that would include electronic applications.

We developed three virtual construction kits that were aimed at secondary and high school students. The first one was the construction kit of fantastic creatures, based on the ancient Greek vase painting (Figure 12). The set of details consists of different fragments of the Greek vases.

The kit was called as a fantastic sea creature Hippocampus, the seahorse. Combining parts of different creatures into new images is the creative task of this constructor. Wings, tails, torsos, heads and hooves, fins – everything can be used to create your own mythological creature. But first, the author is asked to choose a vessel on which he will place his work. After choosing a vase or dish, a fragment of its surface intended for painting turns into a tablet for work. This is part of the silhouette of a vase (Figure 13).

### Figure 12

*Virtual construction kit "Hippocamp". 2012*



**Figure 13***Virtual construction kit "Hippocamp". 2012*

The author can choose the color on which to work. In general, all elements used in the painting can be painted in one of four possible colors – black, white, brown, purple, which corresponds to the colors of the ancient Greek vase painting. After that, construction begins. All parts are located around the working area, they can be rotated, enlarged, scaled, mirrored, connected and attached to each other. The finished work can be printed. The printed works created in this constructor are distinguished by special elegance. Also, as in the robot constructor, the new image needs to be given a name, and, following the name of the constructor itself – the Hippocampus, which consists of two parts, you need to come up with a complex name for your creature. We tried to solve another important task for all subsequent work, fundamentally replacing the instructions for using the application with a video clip. Better to see once than hear 100 times.

The second virtual construction kit for visual arts textbooks was one dedicated to the visual arts of the text. It is called Typographer (Figure 14). It helps to create different graphic compositions from letters, signs and a variety of symbols. This kit has a conceptually important function that visually explains its purpose. Here need to enter a word in the text box. When you press a button, the word scatters chaotically on the working tablet. Some letters become large, some small ones, turned in different directions. It is proposed to collect a graphic composition from these letters that could reveal the meaning of this word. This is how the futurist artists of the early 20th century scattered typography typefaces, collecting their avant-garde verses from letters of different sizes. And it was the beginning of a new era in the visual presentation of text, which laid the foundations for modern graphic design.

Among the set of elements for design in the typographer there are ancient Egyptian hieroglyphs, signs of alchemists, modern electronic pictograms, signs of electrical engineering. The color of all elements can be changed using a limited color palette. Items can be displayed, flipped, rotated and scaled. The set of elements is supplemented with a few simple geometric shapes. We have used this kit many times in our work on a variety of projects with children and teenagers.

A particularly unexpected result was the work on illustrations for the fairy tale "About Tsar Saltan" by Alexander Pushkin (Pushkin, 1968). In this task, the idea of constructing from random forms, which I formulated in my first kit from the "Artist's Book", was continued. How actively fantasy should work so that, with the help of letters and numbers, a variety of typographic signs, to depict a scene from a fairy tale in which a prince, turned into a mosquito, bites the culprit of his exile on the nose (Figure 15). But in this case, typographic signs are used as an abstract building material. In other assignments, the task was to use different typographic signs to build an expressive visual composition. The quiet work develops an understanding of the visual features of written text. And some authors want to create their own typeface or secret sign system. But projects related to the development of their own sign systems by teenagers are already beyond the boundaries of the topic of virtual construction kits.

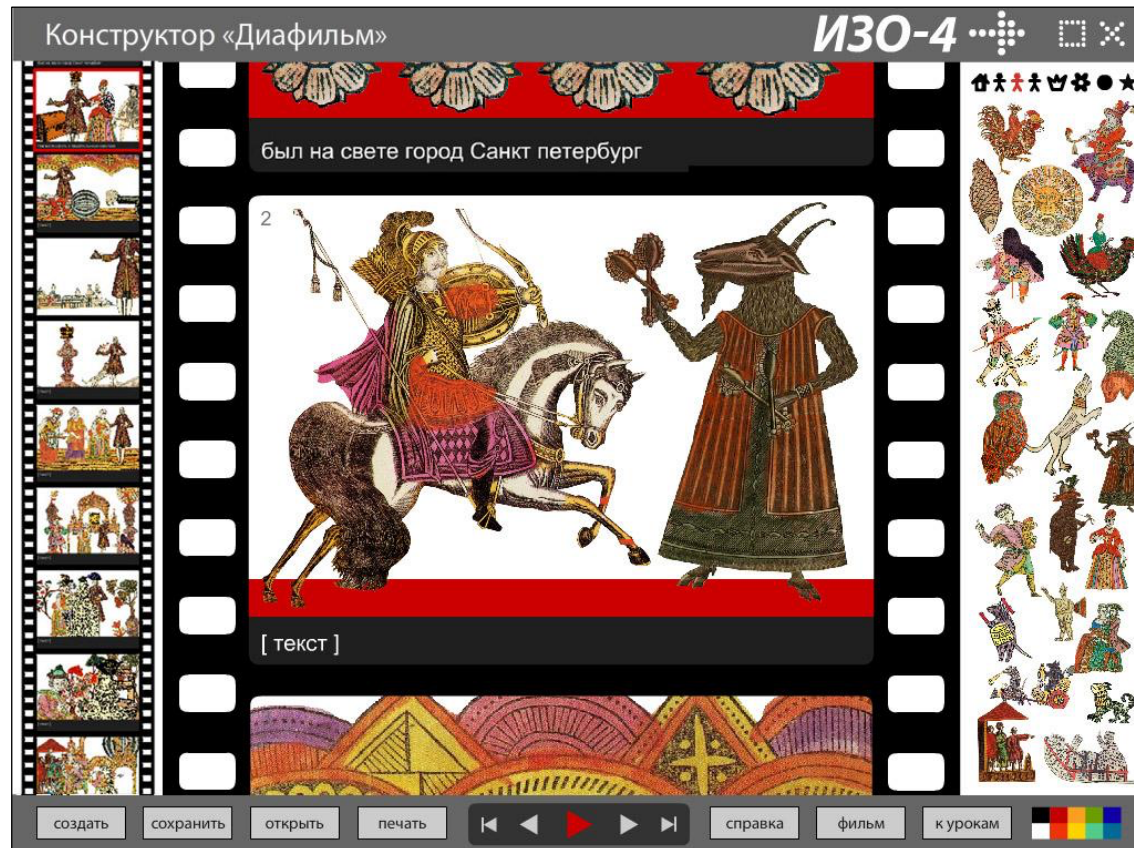
**Figure 14**  
Virtual construction kit “Tipograph”. 2012



**Figure 15**  
Virtual construction kit «Tipograph». 2012





**Figure 16***Virtual construction kit «Diafilm». 2012*

The next kit developed for the visual arts textbooks is called Filmstrip (Figure 16). It is named after the forgotten technology of frame-by-frame viewing of a film, popular in the USSR in the middle of the 20th century. Derived from the magic lantern, this technology is based on projecting an image onto a wall, accompanied by oral narration. In a film strip projector, the film is manually scrolled frame by frame. Each frame is examined, the caption is read aloud and the storyteller comments on it. The visual interface of the "Filmstrip" kit is made in a similar way. The goal of working with the kit is to create a short story consisting of 12 frames. Each frame is filled with characters and different objects and must be supplemented with a signature. By pressing the scroll key to change frames, the child sees the smooth movement of the perforated film. An unexpected decision of choosing the details was made by the designer of the kit. To express the antiquity of the tradition of creating visual narratives, fragments of Russian folk splints pictures are used as details for construction. These folk pictures, funny and ridiculous, with fairy-tale characters and animals were brightly painted by hand. Thanks to the brightness of color and expressiveness of elements for construction, "Filmstrip" looks very decorative and cheerful. This positiveness is transmitted to all the stories that are composed with the help of the kit. Naturally, among the works created, most are fairy-tale subjects. But there are very curious attempts by young authors to tell completely different stories, endowing the characters of folk pictures with functions that are not peculiar to them. There are examples of creating detective stories about Sherlock Holmes, descriptions of military adventures and travels. These experiences show a strong desire among children to tell their own story with a bright and inspiring instrument. You can print the entire feed created in the Filmstrip Designer by turning the screen story into a small book with a cover. "Filmstrip" allowed us to carry out project activities with children, using only a virtual construction kit, because creating a story, even a small one, is a whole project. A large number of different virtual kits help us sometimes to conduct public workshops in museums. Teenagers work with interest, but gradually, in the process of work, more and more visitors switch to the most popular ones –



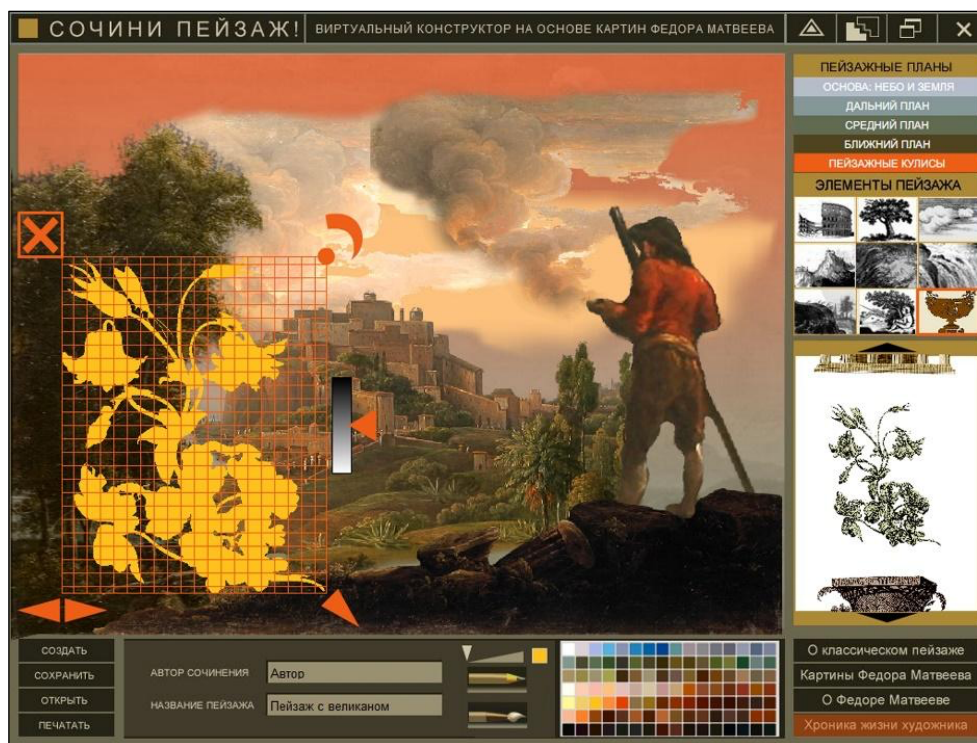
these are the "Robots" kit and the "Imagine a landscape" one.

### Virtual construction sets in museum activities

"Imagine a landscape. Virtual construction kit based on the works of Fyodor Matveev" is the full name of the most successful and popular kits we have created (Figure 17). This kit was created specifically for the exhibition of a Russian painter of the early 19th century. The work of Fyodor Matveev fully fits into the historical boundaries of classicism painting, created within the famous canon – four plans of the picturesque space, the so-called "backstage", staffage. Following this clearly defined system of organizing the pictorial space, we have developed a virtual construction kit that allows you to feel like a master of a classic landscape. The main issue in a kit is a set of elements for construction. The set consists of eight sections with fragments of Matveev's paintings – Architecture, Plants, Clouds, Mountains, Earth, Water, Backstage, Staffage. There is also a ninth section with graphics from the 19th century.

**Figure 17**

*Virtual construction kit «Imagine a landscape». 2008, 2017*

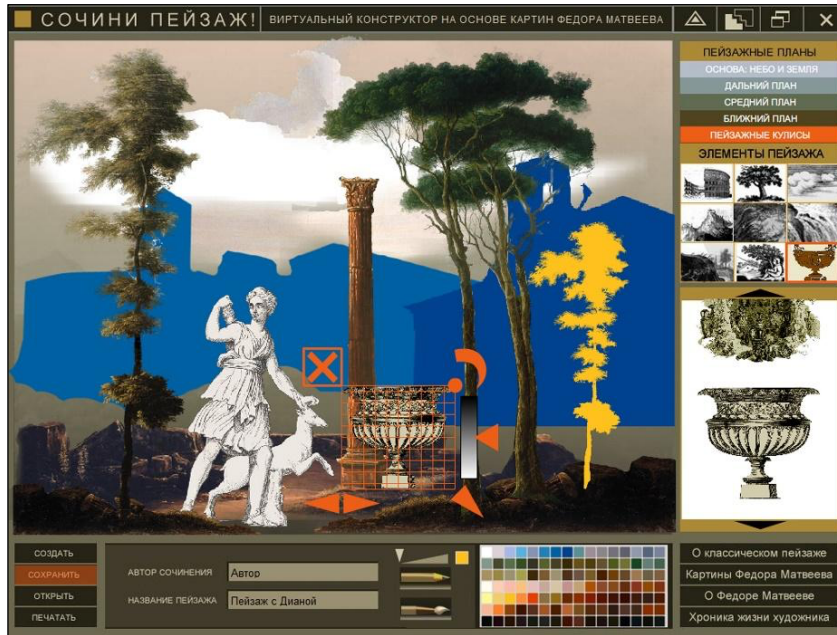


The work begins with setting the horizon line, which can be raised and lowered. The horizon line sets the proportional relationship between the earth and sky. The earth and sky can be illuminated using a palette of selected colors. Then we are ready to move on to the very spatial plans of painting of classicism - there are only four of them. In the background we set blue and lilac mountains, golden clouds. They cannot be edited while on other planes. Then we begin to collect the landscape, establishing hills and waterfalls, ancient temples and copses. We place trees in the foreground, creating a whimsical composition and staffages – figures of people and animals, giving a sense of scale. We complete the construction of the image with the help of dark "wings" of dense thickets and bushes – left and right. The wings create the illusion of depth in space. Here, in the foreground, you can install a vase, column or capital from a set of additional parts. In this process of assembling a landscape and joining parts from different paintings by Fyodor Matveev, we will really need a tool for working with tone. Chiaroscuro is the foundation for creating aerial perspective and for connecting parts. With this tool, you can change the tone of the selected part from white to black. After completing work on the landscape, the result can be framed, as artists of the past did, and then printed.

The toolbox also contains a palette with the colors of Fyodor Matveev's painting, which you can use to fill details with color (Figure 18). If desired, any detail turns into a colored silhouette. And this simple tool works like a time machine that transports us to the present day. The place of tonal harmony – chiaroscuro, is taken by the main method of modern visuality – collage (Figure 19).

### Figure 18

*Virtual construction kit «Imagine a landscape». 2008, 2017*



This feature motivates the user to experiment and play in the space between the art of the past and the present. Speaking about the "Imagine a Landscape" kit, I would like to raise the issue of the semantic context necessary for working with construction kits. This problem has two aspects: a description of kit's capabilities and a description of the phenomenon to which this kit is dedicated. We solved the problem of describing tools and opportunities for work by creating video clips built into each kit. I have mentioned this above. We have added a function to automatically start the movie when there is a long pause in work. When used in exhibitions and public workshops, this feature is very useful, making our kits more spectacular.

The second task – revealing the context of the phenomenon to which the construction kit is dedicated – is much more difficult to solve. Moreover, the optimal solution to this problem is associated with the use of virtual construction kits in the context of educational content. This is how the visual arts textbooks were designed. Construction kits from the "Artist's Book," construction kit "Robots," construction kit «Imagine a landscape" can be used without intermediaries. In the Artist's Book, the appearance of construction kits is preceded by a large theoretical material – several chapters devoted to the history of visual communication. The construction kit "Robots" is clear enough to use and comprehend the phenomenon to which it is dedicated. A small article about dystopias and steampunk complements this construction kit, but in principle it is superfluous for work. The construction kit "Imagine a Landscape" directly represents the artist's work, including a complete electronic catalog of his works. The work with the kit is preceded by a small chapter describing the canon of classicism painting, accompanied by several schemes. However, the problem of using virtual construction kits without an adult middleman remains challenging. While using a virtual construction kit without an intermediary, it is necessary to create detailed educational material, which will turn into the very necessary semantic context. Such an approach is closer to me. Although small and very simple kits, placed, for example, in the context of the exhibition and existing only within its limits, significantly expand the information capabilities of any project. When developing virtual constructors, I strive for technological simplicity.

**Figure 19**  
Virtual construction kit «Imagine a landscape». 2008, 2017



Construction kits are like wet sand boxes, ancient drawing tools. On the surface of the sand, you can easily create images with a stick, then level the sand and again on a flat surface continue to come up with new images. The most interesting thing about virtual kits is playing with visual elements. More precisely, these are game actions, free manipulations with the details. As a result of these actions, two new entities appear – a visual image and an idea of an artistic phenomenon, to which each construction kit is dedicated. It creates new content and assimilates the experience of culture, combining everything into a single process of cognitive play.

Virtual construction kits are part of a more general idea that any construction kit is a tool for creating new models, individual art projects. After all, each artist creates their own unique kit, consisting of a set of elements developed by him and methods of assembling these elements into a whole work. For the loggia's paintings in Vatican, Raphael developed a "grotesque" construction kit based on archaeological findings – the paintings of the Golden House of Emperor Nero. Eugene Delacroix developed color systems for his paintings, the so-called plaques. Giorgio Morandi painted bottles in the colors he needed, which he used for many years for his still lifes. Rembrandt, Picasso, Joseph Beuys, Malevich, and El Lissitzky had their own construction kits – in general, all artists who create a unique author's project. It is impossible to create a unique style in art without developing your own exceptional construction kit. While creating virtual construction kits, I think about possible reconstructions, interpretations of such artistic construction kits. It seems to me that today it is very important to find new ways to understand the artistic heritage and to open up new approaches to the perception of art.

### Characteristics of virtual construction set examples

#### **Artist's book (2004)**

The thematic context for the "Artist's book" system is the global change of the main medium of information when the digital environment comes to replace book printing. The goals of the "Artist's book" are aimed at the formation of ideas about sign-symbolic construction and hybrid forms of information representation, uniting different media.

The "Artist's book" system is aimed at adolescents interested in contemporary art and design, students of art colleges, and art departments of universities. The recommended age is 12 years and older.



***Return of the Magi (2004)***

The thematic context of the educational system "Return of the Magi" is the development of European imagery, late antiquity, Christian ritual.

The goals of "Return of the Magi" are aimed at forming an idea of the evolution of the sign-symbolic content of Christian ritual from late antiquity to the Renaissance.

Return of the Magi can be used by two different age groups. Elementary school pupils can use only a construction set. Students of high school, colleges, and university art departments first master the historical and symbolic context, after which they experiment with a virtual construction set. The recommended age is 8 years and older.

***Yakov Chernikhov (2006)***

The thematic context of the virtual construction set «Yakov Chernikhov» is the utopian project of the Russian Avant-garde and paper architecture.

The construction set introduces the imagery of industrial culture, forming an idea of the author's visual technology.

The construction set is intended for secondary and high school students, as well as for specialized art studios and art schools. Recommended age is 14 and older.

***Supremus (2006, 2010)***

The thematic context of the virtual constructor Supremus is the imagery, symbolic system, and pictorial methods of Suprematism. The construction set aims to form basic concepts of visual composition, propaedeutics of the Russian Avant-garde. "Supremus" introduces the art of Suprematism to high school students and is used to learn the basics of composition in specialized art studios and art schools. The recommended age is 12 years and older.

***TATLIN (2011)***

The thematic context of the virtual construction set "TATLIN" is the art of Constructivism. The construction set forms an idea of the meaning of material and construction as the basis of the semantic and figurative structure of a work of art. "TATLIN" construction set is aimed at secondary and high school students, used to teach the basics of composition and design theory in art schools. Recommended age is 14 years and older.

***Robots (2011)***

The thematic context of the virtual construction set "Robots" is steampunk, pop art, post-industrial art of the late 20th century. The goals of "Robots" are the formation of an idea of irony as a means of semantic construction of art objects, the symbolization of old household items, the experience of constructing from waste. The "Robots" construction set can be used by a wide range of members, for joint activities of parents with children, for classes with children with limited mobility. The recommended age is 7 years and older.

***Hippocamp (2013, 2015)***

The thematic context of the virtual constructor "Hippocamp" is the ancient Greek vase painting, the mythology of Ancient Greece, polymorphic mythological creatures. The construction set is aimed at creating images of new polymorphic creatures and their symbolization in the context of ancient Greek mythology. Constructor "Hippocamp" is designed for the visual arts in elementary school. Besides, the construction set is used in history and literature classes in secondary and high school. Recommended age is 9 years and older.

***Tipograph (2013, 2015)***

The thematic context of the virtual constructor "Tipograph" is the history of writing, sign systems, infographics, and typography.

The construction set forms an idea of the sign as a visual object, the construction of graphic compositions from pictograms introduces the basics of graphic design. The "Tipograph" construction set is designed for visual arts classes in high school, as well as for classes in the basics of composition in art schools. The recommended age is 10 years and older.



***Diafilm (2013, 2015)***

The thematic context of the virtual construction set "Diafilm" is an oral culture, narrative art forms, popular prints, comics, magic lantern. It develops skills in creating visual stories, organizing the composition of each screen, and projecting an image of the entire sequence of frames. The construction set "Diafilm" is designed for the visual arts in primary and secondary schools. Also, the construction set is used in literature classes in middle and high school. The recommended age is 7 years and older.

***Imagine a landscape (2008, 2017)***

The thematic context of the virtual construction set "Imagine a landscape" is a painting of the era of classicism, the problem of the canon, and innovation in art.

The construction set forms an idea of the methods of organizing landscape images that had developed in European painting by the beginning of the 19th century.

"Imagine a landscape" was intended to be undertaken in the halls of the museum during the exhibition of the artist Fyodor Matveyev (State Tretyakov Gallery, 2008). After the exhibition, the constructor is used in different cultural contexts for edutainment programs. Recommended age is 9 years and older.

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