VRA Bulletin

Volume 47
Issue 1 *Spring/Summer 2020*

Article 2

August 2020

Seeing Surrogacy: Digital Image Quality & Student Visual Literacy

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Seeing Surrogacy: Digital Image Quality & Student Visual Literacy

Abstract
This paper expands upon a survey administered to undergraduate art students at the College for Creative Studies in Detroit. The survey sought to ascertain if students notice digitization artifacts within digital images and if they can discern whether the flaws are part of the digitization process or inherent in the original. Results from this study indicate that students do not have the training or skills to be able to discern this, and those working within visual resources would benefit from replacing poor quality images with more accurate surrogates of the original. The results of this survey were discussed in a presentation at the Visual Resources Association's 2019 Annual Conference in Los Angeles.

This article has undergone a double-blind peer review process (although the author is an editor of this publication, she was not involved in the peer review of this work in any way).

Keywords
visual resources, digitization, workflow, research, visual literacy, digital image quality, digitization artifacts, digital surrogates, surrogacy, art students, survey

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Introduction

As academic institutions deal with legacy art and design images in patron-facing databases, is it worth it to expend resources to replace older, lower-quality images with newer, higher resolution versions? Although answers may vary from institution to institution, research into students' ability to assess if an image is of good quality is lacking. This is important because educators need to know if students have enough visual literacy skills to judge if an image looks amiss because of artifacts from the digitization process or if they will not realize this and conclude the oddities are inherent in the original. While research into visual literacy as a whole is expansive, this particular facet is underexplored.

When providing visual literacy instruction, visual resources professionals and librarians need to have a baseline understanding of the skills patrons already possess. For our patrons to truly comprehend the original work, any artifacts resulting from a physical medium intervening between the original artwork and the digital surrogate need to be understood.

Without an understanding of the difference between the original and the surrogate, we are in danger of fundamentally, if accidentally, misleading patrons. If a viewer does not understand that slides undergo color shifts or that scanners can introduce digital noise or moirés into an image of an artwork, it is possible they will erroneously believe that, for example, a purple monochromatic landscape from the eighteenth century was painted in that hue rather than the color being a by-product of the degradation of the slide. In order to explore this possibility, therefore, I designed and administered a survey for art students featuring works with digitization artifacts, in order to ascertain the level of visual literacy patrons actually possess.

Background

Low image quality is a systemic problem due to several factors, including the rush to digitize in the 2000s, technological changes since the initial digitization, and the current increased accessibility of better-quality images of artworks via the internet. Much has been written about poor image quality within electronic journals - specifically aggregated, digitized print journals - but there has been less focus on databases solely of images.

My institution, the College for Creative Studies (CCS) is an art school in Detroit and has traditionally obtained images via: slide digitization; book scans; and vendor purchases. This type of workflow is common for image databases; Artstor, the colossal subscription database, started because of academia's need for digital images. Their website states, "In the late 1990s, scholars and institutions [...] were struggling with migrating from analog slides to digital images. In response, the Andrew W. Mellon Foundation introduced Artstor, an initiative focused on how digitization and use of images could support teaching and research in the arts and humanities at scale."[i] Its core collections at the time were based on slide digitization - approximately 190,000 images from the University of California, San Diego - and copywork from ten art history textbooks.[ii] [iii]

Another historically important image database is AMICA (Art Museum Images from Cartography Associates), formerly AMICO (Art Museum Image Consortium), which provided paying subscribers with access to thousands of images from participating (primarily North American) museums in one place starting in the late 1990s.[iv] AMICA is still available to the public,

free of charge, via Luna (coincidentally, this is the software used at CCS). While AMICA hosts images supplied by the holding institutions and museums, the quality of its works is irregular. Even though many of these artworks have been rephotographed and uploaded to museums' websites in much higher quality, poor representations persist within AMICA.

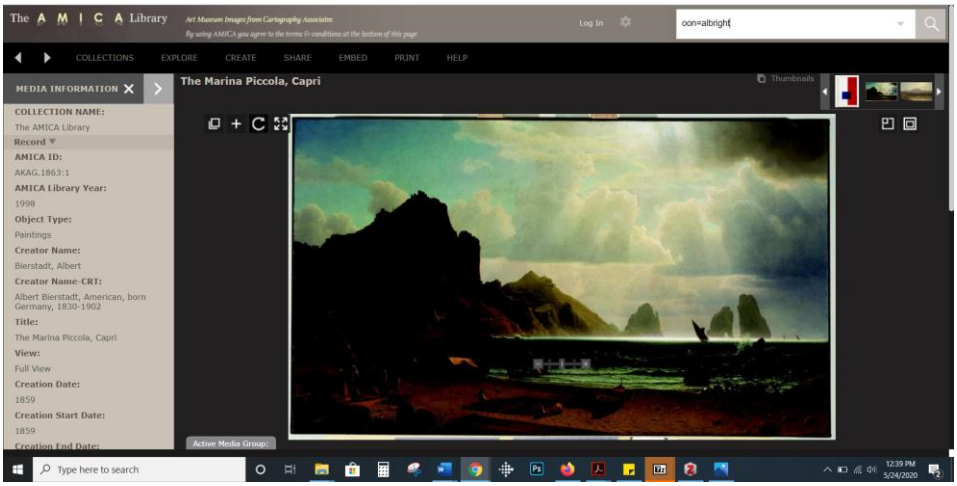

Figure 1: Screenshot of "The Marina Piccola, Capri" by Albert Bierstadt (1859) in AMICA via Luna, May 24, 2020

An example of this is the Albright-Knox Art Gallery; within AMICA, *The Marina Piccola, Capri* by Albert Bierstadt (1859) is incredibly dark and hard to read - details of the painting are lost in monochromatic dark swaths (this image was uploaded in 1998, per the metadata - fig. 1). The same artwork, however, is available for download via the museum's website; it is considerably brighter, with many more details visible, and embedded metadata indicates the work was rephotographed in 2017 (fig. 2). This type of discrepancy has the potential to both confuse and frustrate our patrons, or even mislead them if they only see the poorer quality version.

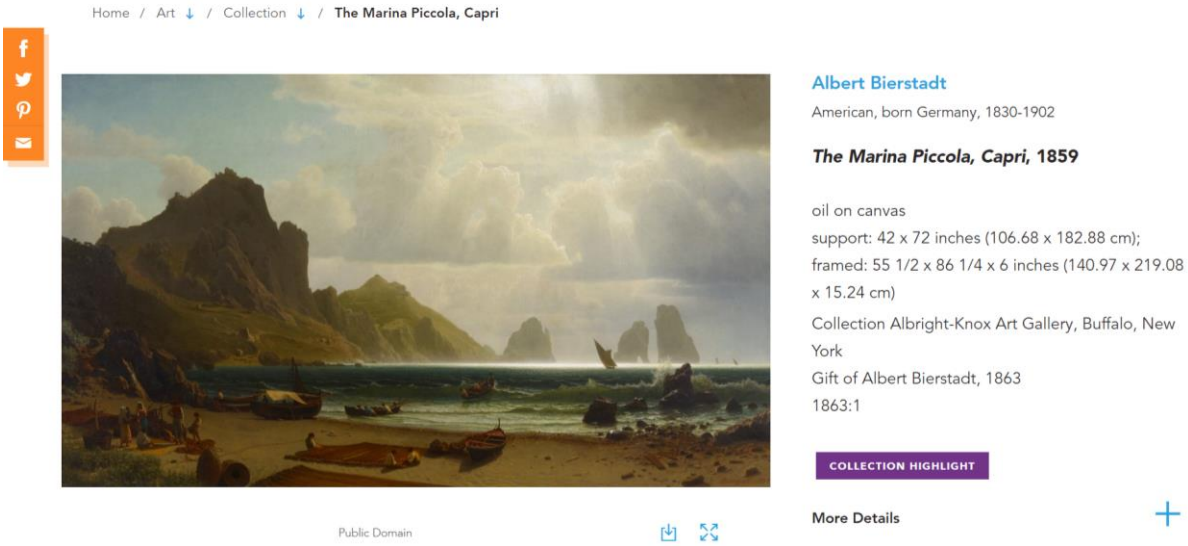

Figure 2: Screenshot of "The Marina Piccola, Capri" by Albert Bierstadt (1859) via Albright-Knox website, May 24, 2020

At CCS, the workflow to obtain images has changed within the last four years to include extensive internet searching. Many images, particularly in the fields of art and design, are now available for download online, either from holding institutions for public domain works, or, for

contemporary artworks, the artist's website, gallery websites, or other aggregators such as Artsy. This is not to suggest that image professionals should direct their patrons to Google Images; on the contrary, search engines can make it difficult to find accurate representations of the original artwork and lack the convenience and authority of a centralized image database like the ones discussed above. Rather, this author believes that institutions should prioritize the replacement (or supplementation) of earlier images with ones of higher quality.

Overview

Students and faculty are presented with a plethora of images during their studies and research, no matter where they look. A good example of this is Gustav Klimt's *The Kiss* from 1897 (fig. 3). A cursory search of Google Images returns dozens of variations of the work, many of which are actually reproductions of the original for sale. When faced with such a bevy of images, do students have enough visual literacy skills to determine which image is closest to the original painting? My research suggests this may not be the case.

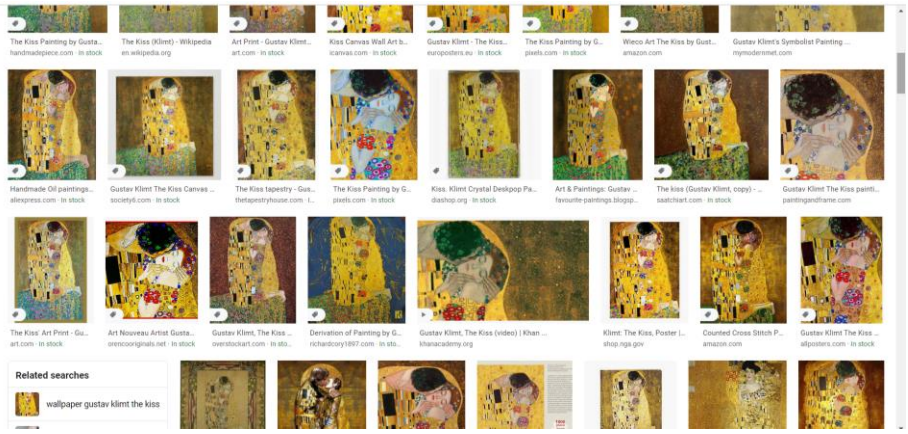

Figure 3: Screenshot of Google Image results for "The Kiss" by Gustav Klimt (1907-1908), May 24, 2020

To ascertain students' levels of visual literacy and their ability to distinguish between the original artwork and the intervening medium, I designed and administered a survey to undergraduate art students at CCS. The survey was available online and all data was collected anonymously. The survey first sought to elicit students' familiarity with the concept of visual literacy and then presented them with example images and accompanying questions.

Each of the sample images prominently featured some type of distortion due to digitization. The first featured a prominent multicolored moiré; the second, a spread from a book with a gutter in the center; the third, a purple-tinted scene from a decayed slide; the fourth, another moiré with monochromatic diagonal stripes; and the fifth was a comparison of three versions of the same image from varied sources in (unintentionally) different hues.

Given to the massive number of images in academia that bear artifacts of the digitization process - whether in image databases or digitized print periodicals assembled by vendors - knowing if our audience understands the underlying artwork is crucial. While surveys have been conducted on how image quality affects reading comprehension for faculty and student groups, there is not much information on how students perceive isolated, flawed images. It seemed appropriate to conduct a

survey of this sort at an art school, where all students are creators of visual art in some shape or form, and have, at the very least, some basic exposure to art and art history.

Literature Survey

Almost any discussion of visual literacy nowadays must, by necessity, use as a starting point the "Visual literacy competency standards for higher education" by the Visual Literacy Standards Task Force of the Association of College and Research Libraries. Approved in 2011, it provides a basis for research into visual literacy. Of the seven standards outlined in the document, the ones most relevant here are Standards One, Three, and Four.[v] Standard One references students' need to be able to articulate criteria for an image, including color and resolution,[1] while Standard Three includes being able to tell if an image is an original or a reproduction and whether it has undergone editing or manipulation.[2] Finally, Standard Four deals with the technical characteristics of images and evaluates the quality of a reproduction based on color, resolution, manipulation, and comparison to other reproductions.[3]

While there is a lack of literature related to image quality within image databases, many institutions and researchers have assessed the quality of images in journal databases (which feature textual information accompanied by the occasional illustration). These studies include Ladd (2010, 2018), Joseph (2006, 2011), Erdman (2006), and Robinson (2010), among others; most were conducted to evaluate eliminating print subscriptions in favor of electronic ones to save space.

These studies have consistently found that image quality in digitized periodicals is significantly lower than print. Indeed, this has been acknowledged by vendors - Elsevier redigitized thousands of pages to provide higher quality visuals.[4] That this issue is multidisciplinary is evident in the corpus mentioned above: Ladd looked at journals with holdings in: the humanities; social sciences; science; technology; and medicine.[vi] [vii] Joseph[viii] [ix] and Erdman[x] focused on geological journals, and Robinson studied holdings for an art and architecture library.[xi]

Some more comprehensive studies have also included interviews with academics. These sought to ascertain the effect of image quality on reading comprehension of art history faculty and

[1] Standard One: "The visually literate student determines the nature and extent of the visual materials needed." Learning Outcome C: "Articulates criteria that need to be met by the image (e.g., subject, pictorial content, color, resolution, specific item)." Performance Indicator One: "The visually literate student defines and articulates the need for an image."
[2] Standard Three: "The visually literate student interprets and analyzes the meanings of images and visual media." Performance Indicator 3: "The visually literate student identifies the physical, technical, and design components of an image." Learning Outcome B: "Identifies techniques, technologies, or materials used in the production of an image;" C: "Determines whether an image is an original or a reproduction;" D: "Examines an image for signs of editing, alteration, or manipulation (e.g., cropping, color correction, image enhancements)."
[3] Standard Four: "The visually literate student evaluates images and their sources." Performance Indicator 2: "The visually literate student evaluates the aesthetic and technical characteristics of images." Learning Outcomes B: "Evaluates the technical characteristics of images (e.g., resolution, size, clarity, file format);" C: "Evaluates the quality of image reproductions, based on indicators such as color accuracy, resolution, manipulation levels, and comparison to other reproductions."
[4] Initially intended to replace poorly scanned images on a case-by-case basis, Elsevier quickly realized problem images (poor quality scans, color images scanned entirely in black and white, etc.) were "...more widespread than originally thought, and a larger-scale solution was deemed necessary." The project ended up utilizing an algorithm to analyze some 19 million pages, resulting in the replacement of roughly 600,000 images between 2006-2009. See Ellen van Gijlswijk and Ben Clark, "ScienceDirect upgrades 600,000 Backfiles pages," Elsevier Library Connect newsletter, January 2010: 4, https://libraryconnect.elsevier.com/sites/default/files/lcn0801.pdf.

students (McCann and Ravas)[xii] and humanities faculty (Kachaluba et al.).[xiii] One faculty member interviewed by Kachaluba et al. stated that "...if the [poor quality] image is an important piece of…[an]...article, then [the article] is almost useless."[xiv]

What served as the foundation for this survey and paper, however, is Steve McCann and Tammy Ravas' "Impact of Image Quality in Online Art History Journals: A User Study." In this project, McCann and Ravas were charged with deducing which print journals at the University of Montana could be eliminated in favor of their digital counterparts. A serials review, however, revealed that many of the art and art history journals - across numerous databases - included very poor-quality images. This led the authors to ask how damaging a bad image was; does it affect understanding of the article?[xv]

Interviews and surveys of eight members of the university's art history department (faculty, undergraduate, and graduate students) led McCann and Ravas to the startling conclusion that a full 75% (six out of eight participants) were unable to tell that a severe moiré was the result of digitization and instead assumed it was inherent in the original artwork (a nineteenth century print with a "corduroy" pattern).[xvi]

Walter Benjamin, in his seminal discussion of the aura of an artwork, pointed out that reproductions are seen in a different way than the original and "captions have become obligatory" since it is no longer completely clear what is being viewed.[xvii] Making reproductions of artworks readily available via academic journals and image databases democratizes knowledge, but we do our patrons no favors if we fail to discuss how that transformation may affect the resulting artwork and its authenticity. If image professionals wish to provide patrons with authoritative resources, it is imperative that we have the most accurate versions of artworks possible.

Given that faculty and graduate students were fundamentally mistaken about the appearance of an original artwork, I began to question if undergraduate art students could determine if digitization flaws were a secondary issue or an intrinsic part of the original. As the McCann and Ravas research showed, patrons who lack the visual literacy skills to identify when an image is of poor quality may be unintentionally misled by misrepresentations of the original.

Methodology

In addition to working in the Digital Scholarship unit in the Library at CCS, I also am an adjunct faculty member there. As such, I have direct access to art students of every major. Majors range from transportation design, to interior design, to crafts, to fine arts. One curriculum requirement for all students is that they must take an introduction to western art history as well as a non-western art history class (either Asia and its diasporas, or Africa and its diasporas). I alternate between teaching western art history in the fall and African art history in the winter.

As a teacher, I was able to elicit a high response rate amongst my class by incentivizing the survey with one extra credit point. The survey was completely anonymous, and answers were in no way tied to students' grades in class.[5] Curriculum requirements meant I had access to students in a

[5] In order to receive the extra credit while keeping their answers anonymous, students were instructed to submit a screenshot of the "thank you for your response" screen that appeared after submission.

wide variety of majors, but my respondents were self-selecting and participation was not completely disinterested.

A further limitation was the lack of oversight from an Institutional Review Board - CCS did not have one at the time the survey was administered. I attempted to mitigate this by including a disclaimer that the data collected was completely anonymous and that there were no "wrong" answers. Finally, students had to "opt in" rather than "opt out" of the survey.

Survey Instrument

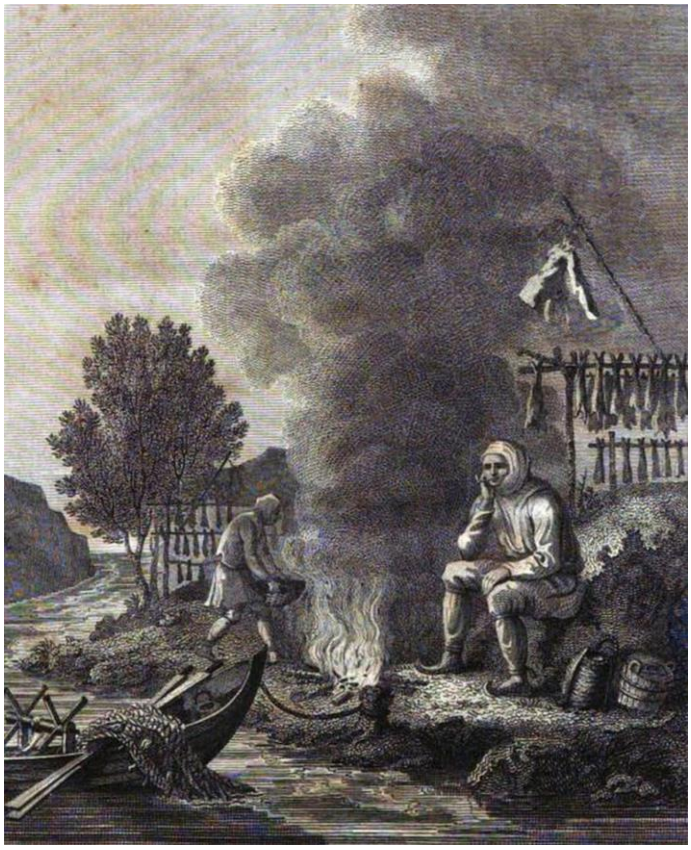

Figure 4: Print from "Travels through Sweden, Finland, and Lapland, to the North Cape, in the Years 1798 and 1799;" by Giuseppe Acerbi (1802), screenshot from Google Books showing moiré (first image in survey)

The survey's introduction explained that it was intended to analyze the *quality* of the images rather than their *content*, stating that the survey was designed "...to determine if the quality of the image (a digital reproduction of an original artwork) alters how you perceive the artwork itself (i.e. the original painting, print, etc.). It is not intended to discuss the formal characteristics of a work of art, etc., or how well the artist has created the artwork." Further, the introduction explained that any references to "the image" in the survey referred to the digital reproduction rather than the original artwork. Finally, students were asked if they had completed the mandatory western art history course, to better understand the extent of their exposure to art history at a college level.[6]

The survey was divided into six sections: the first sought to establish a baseline understanding of the respondents' evaluation of images: (1) how important respondents felt image quality was; (2) the standards they use to evaluate images (options included clarity, color, size, and other/fill in the blank; respondents could select more than one or none); and (3) if the respondents had previously considered the difference between an original artwork and its reproductions. The second part of the survey sought to elicit information on the quality of flawed digital images by presenting images with five questions each.

[6] Although this was redundant for the fall 2018 western art history course, it was useful for the winter 2019 African art history class.

All the images included asked the following: (1) what is depicted in the artwork (landscape; portrait; still life; mythological or religious scene; other/fill in the blank; respondents could select more than one); (2) if the respondents felt that the image was an "accurate representation of the original artwork;" (3) why they answered question (2) the way they had and anything that stood out to them; (4) rating the quality of the image (on a scale of one - poor - to five - great); and (5) how respondents determined the rating for question (4). In the heading for each image, respondents were again instructed to answer questions based on their observations "about the digital image (i.e. this is not the original artwork but a reproduction)." The appropriate metadata was provided for each image in addition to a reminder that answers were neither right nor wrong but based solely on their observations.

The first image was taken from Google Books and featured an extensive and colorful moiré. The image depicted a print from Giuseppe Acerbi's 1802 book *Travels through Sweden, Finland, and Lapland, to the North Cape, in the Years 1798 and 1799*; all this information was included in the caption (fig. 4). This work sought to ascertain if students would perceive the type of artifact caused by slide digitization.

The second image, *Cornard Wood (Gainsborough's Forest)*, 1748, by Thomas Gainsborough, was taken from the local image database at CCS and identified as a painting in the caption (fig. 5). This specific image was a two-page spread scanned from a book. Because of the layout of the painting, a very prominent gutter is visible in the center of the image and a portion of the painting is concealed within it. Artworks scanned from books are another common element of local image databases, and this was included to judge if students can perceive materiality and the limitations of digitized print materials.

Figure 5: Painting "Cornard Wood (Gainsborough's Forest)" by Thomas Gainsborough (1748), local database image showing gutter in spread scanned from a book

Figure 6: Painting "Landscape" by John Robert Cozens (c. 1780s), local database image demonstrating slide color shift

Landscape, c. 1780s by John Robert Cozens, was the third image included and identified as a painting (fig. 6). This artwork was from a digitized slide in the local CCS database; the slide, however, had undergone a color shift prior to digitization. As such the painting is tinted purple, resulting in a nearly monochromatic work. Including an example of the deterioration of the actual film of the slide was intended to ascertain students' familiarity with the materiality of

slides as well as their art historical critical thinking skills (i.e. how likely is it that an artist intentionally painted an entirely purple landscape in the 1780s?).

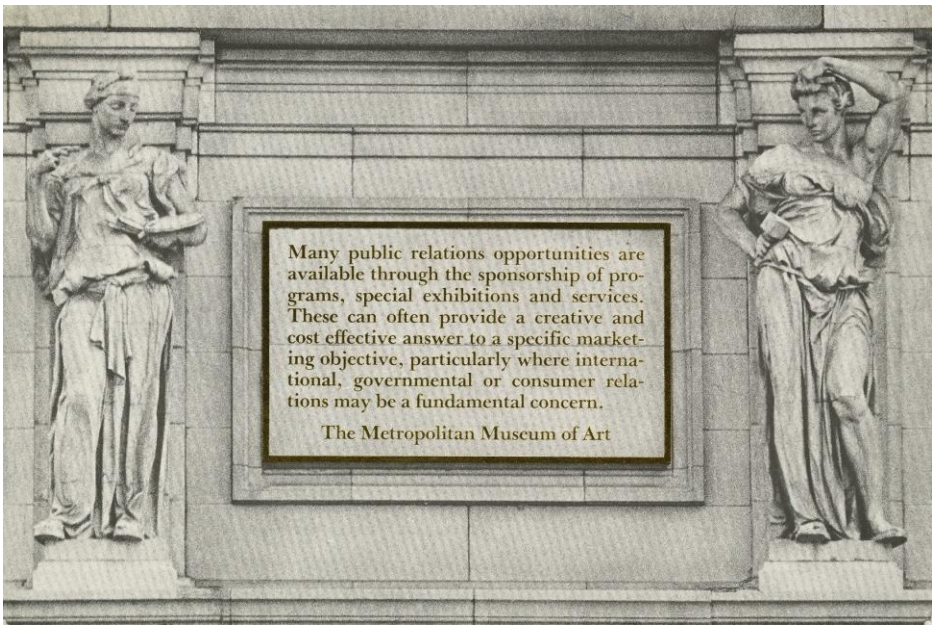

Figure 7: Print, Announcement card for Hans Haacke exhibit, May 4-25, 1985, local database image showing moiré

The last image in this section was an announcement card for a Hans Haacke exhibition, held May 4-25, 1985, and identified as a print (fig. 7). This image, from the local CCS database, featured another moiré, but with diagonal stripes. It was included to ascertain students' abilities to detect artifacts of the digitization process.

The last section of the survey presented three versions of *Dinamismo di un cane al guinzaglio (Dynamism of a Dog on a Leash)*, 1912, by Giacomo Balla (fig. 8). The depictions were taken from the CCS database, but only one was from an image digitized in-house; the others were from the AMICA collection - included in the Luna software that hosts the CCS database - and a 2018 digital download from the Albright-Knox itself included in the local CCS database. These

Figure 8: Comparison of three versions of "Dynamism of a Dog on a Leash" by Giacomo Balla (1912), local database images and AMICA via Luna, showing color differences

three images were presented side-by-side and students asked to identify which "best represents the original artwork" and explain their reasoning. Each image featured different coloring: the AMICA version (upper left, "Image 1") is tinted purple with blue instead of gray highlights; the digitized, older CCS version has cyan coloring (upper right, "Image 2"); the third, a relatively recent photograph downloaded from the Albright-Knox website, is the best representation of the original (bottom, "Image 3").

Survey Results

I administered the survey over two consecutive semesters, first in my western art history class in fall 2018 and again in winter 2019 to my African art history class. I was fortunate to have a high response rate of approximately 45 individual responses (out of 55 students for both semesters).[7] 24 of the 45 responses were from fall 2018, and 21 were from winter 2019. Of the winter responses (i.e. students taking African art history), only two had not completed the mandatory western art history course. At the very minimum, then, 90% of the winter 2019 respondents had had at least one semester's worth of exposure to formal art history at a college level and had presumably been introduced to many of the styles prevalent in the eighteenth to twentieth centuries.

In the first portion of the survey, the majority (all but three) identified image quality as being "important" or "very important" and clarity, color, and image size were all marked "important" (44, 33, and 28 respondents, respectively; students could select multiple options). Most students (36) had also thought about the difference between an original artwork and its reproduction prior to taking the survey.

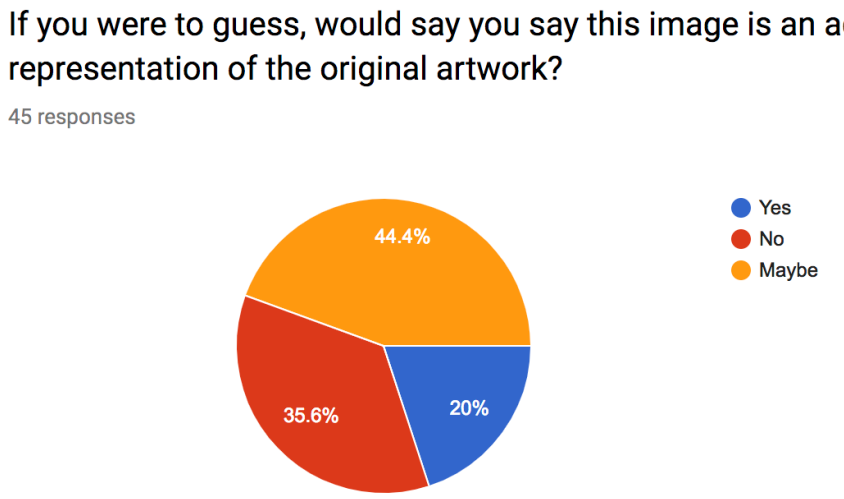

Figure 9: Results for Fig. 4 (print with moiré)

Many students (20 out of 45) were unsure if the first image (fig. 4 - the multicolored moiré) was an accurate representation of the original, and 16 identified it as inaccurate. 20 explicitly noted

[7] The uncertainty stems from the anonymity of the survey; of the 45 responses, 2 were strikingly similar and probably from the same student. Slight differences in wording, however, ruled out accidental double submission. It is also possible that offering extra credit was somewhat detrimental to the survey's integrity. Because students were instructed to screenshot the automatic "thank you for your response" message in order to receive extra credit, one of my students informed me he took the survey a second time because he "forgot to take a screenshot the first time."

color was an issue and of those, 15 used some combination of the words: digital; computer; screen; scanner/scanning; camera; or pixel(lated/s/ation/ly).[8]

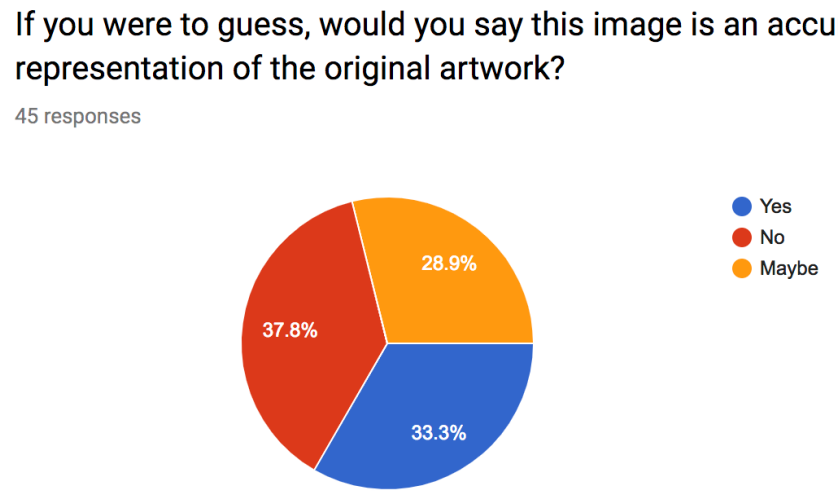

Figure 10: Results for Fig. 5 (painting with gutter)

For the second image (fig. 5 - the gutter image), responses were roughly evenly split as to whether it was an accurate representation of the original. This was one of the easiest for the students to identify the issue - 21 explicitly referenced the source material with the following words: crease; fold; seam; book; or magazine. An additional nine students identified the line as a problem but did not reference what might have caused it. This image was also more directly split on students identifying if it was good quality; interestingly, six of the nine who mentioned the line also indicated it was a good quality image, despite realizing the flaw did not belong in the original. This would seem to indicate students may be able to identify and ignore issues introduced by printed materials or more familiar issues of materiality, at least.

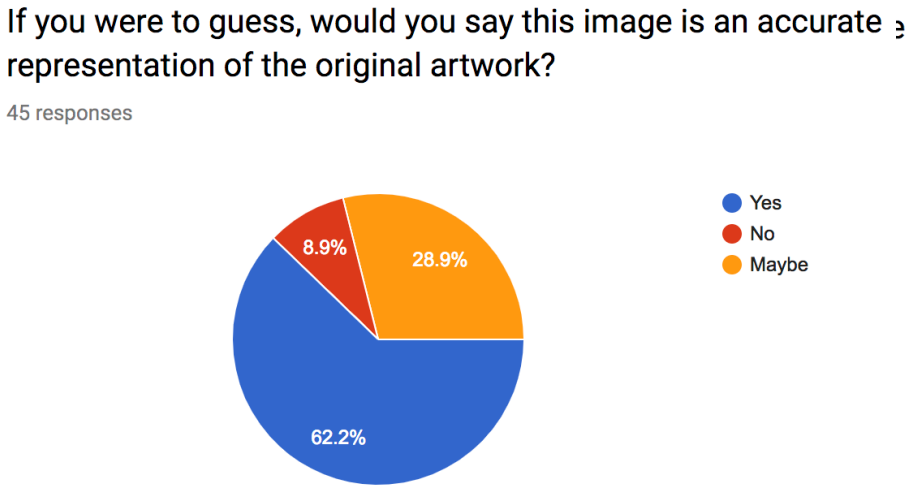

Figure 11: Results for Fig. 6 (painting with color shift)

28 felt the third image (fig. 6 - the color shift) was an accurate representation of the original. Those who mentioned color do not necessarily track to those who identified it as bad; while 21 students mentioned color, only five indicated that it was not a good representation of the original, either by indicating "no" to the multiple choice question, or in their comments ("is the color off?" "colors seem wrong," or "the

[8] Additionally, three respondents noted the foxing in the upper left corner but were not able to identify the cause, calling these instead "dirt-like stains" or "spots," although whether they believed these stains were in the original or introduced during digitization is unclear.

color of it looks distorted"). Two mentioned the image being purple or monochromatic but did not indicate if they thought this was representative of the original or not. Eight of the other students actually cited color as one of the reasons they felt it was a good representation of the original, and gave it either a four or a five for accuracy (five being the highest score); only two students indicated that it was, in fact, an inaccurate representation of the original.

Of the last image presented singly (fig. 7 - the moiré with diagonal striations), half the respondents said it might be an accurate representation ("maybe"), followed by "yes" (15), then "no" (eight). 11 students mentioned either lines or computer mediation introducing a "film" or "filter;" other words used to describe this work included: pixel(ated); diagonal lines; screen tones; and computer screen. Decoding responses to this image was more difficult because the students seemed confused by the content. Despite the introductory paragraph differentiating between the original artwork and its digital surrogate and asking students not to judge the *content* of the original, the text on the wall proved confusing. Several mentioned the "Photoshopped" nature of the words, or that it looked "cut-and-pastey" (observations not relevant to the goal of the survey).

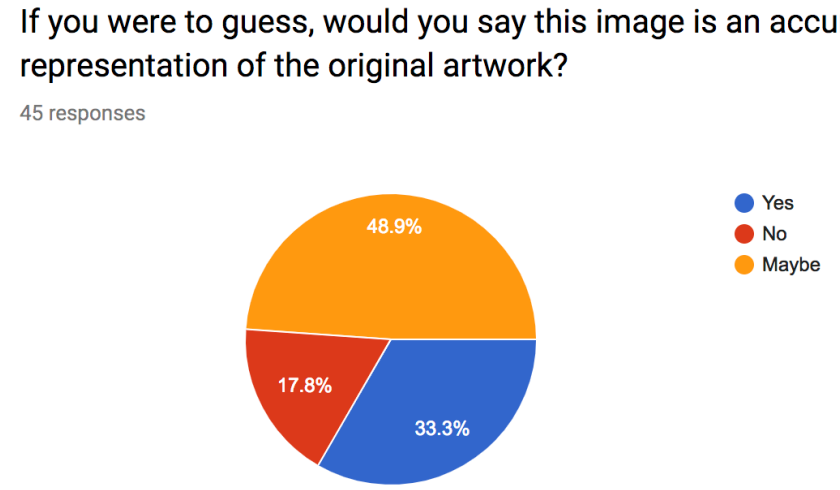

Figure 12: Results for Fig. 7 (print with moiré)

Finally, the last image presented three versions of the same work in different hues (fig. 8). 42 students correctly identified the most accurate version of the piece (bottom - "Image 3"), with only two selecting an inaccurate version.[9] Comments made by the vast majority who correctly identified the accurate version mentioned more "accurate and natural" or "neutral colors;" "the tint of the image;" the contrast; and "filters."

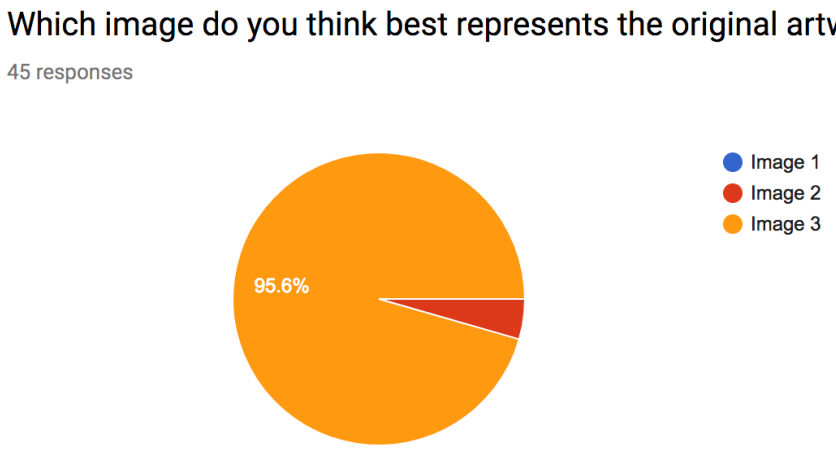

Figure 13: Results for Fig. 8 (comparison of three versions of the same painting in different hues)

[9] While the survey recorded 45 responses, two were strikingly similar in their wording and likely from the same student; one of these responses was therefore disregarded in the summary provided here.

(Interestingly, the term "filter" came up three times, twice for fig. 8 and once for fig. 7. It is assumed that this references effects or overlays in apps like Instagram that are explicitly titled filters.)

Conclusions

This survey sought to explore whether art students have enough art historical knowledge and understanding of surrogate materiality to apply critical thinking to the interpretation of images. While most students stated that image quality was important to them and that they regularly used measures such as color and clarity to determine the quality of an image, this claim was often contradicted by the survey results. It is possible that art students, due to their enhanced exposure to print and digital representations of art, are better able to identify issues when those flaws are caused by technology or other familiar mediums. A strong example of this is the Gainsborough image with the gutter (fig. 5); students most easily identified this image (out of the initial four) as being inaccurate or, at the very least, having a non-original element due to the source's materiality. While not all respondents identified a print source as the cause of the "line," their identification of it as an oddity indicated that they did not perceive it as part of the original painting.

This holds somewhat true for images with moirés; some students accurately identified that oddities in these images (figs. 4 and 7) were introduced through technological mediation, positing that the cause was the computer screen (most common), a scanner (uncommon), or a camera (mentioned once). Finally, the concept of a color shift due to a deteriorating slide was the most difficult for students to identify. It is possible that this is because students nowadays are unfamiliar with the materiality and substance traits of film, but this is supposition.

The last image proved the easiest for students because it involved a comparison of three versions of the same image. In this case, students were readily able to identify the correct version, and indicated that the other versions were inaccurate due to their coloring. That this reflects art historical knowledge is doubtful, however; it is more likely based on their knowledge of color values and the like, given their comments.

What does seem clear, however, is that students generally do not have the visual literacy skills to be able to consistently tell when an isolated image is not an accurate representation of the original or at least suspect it is an inaccurate representation. If visual resources professionals and librarians seek to present themselves and their resources as authorities in the field, it is crucial that the resources provided are accurate. Patrons are too easily led astray by poor quality images and struggle to determine if the artist's intent is accurately represented (if the question even occurs to them). Those of us in a position of authority need to ensure that the resources we provide adequately meet the needs of the patron. It is crucial that the resources meet the patrons at their knowledge level, not where we expect them to be or hope that they are.

Although training to increase visual literacy and critical thinking will undoubtedly assist in this area, the idea that students might be led by us to think that an eighteenth century landscape and buildings would intentionally be tinted a vivid purple by the artist is disturbing.[10] Even in instances

[10] For a discussion on the ethics of editing the colors of copywork images, see Amy Lazet, "The Unexplored Ethics of Copywork Image Manipulation," *VRA Bulletin* vol.43: Iss 1 (fall 2016), https://online.vraweb.org/index.php/vrab/article/view/9.

where students are able to tell which image is the most accurate through comparison of different versions, we cannot count on our patrons possessing the knowledge to determine this. Also worthy of note is that not all databases will have multiple versions of images, thereby helping users determine the correct one.[11]

While over 80% of this survey's respondents indicated they had previously considered the differences between an original and its surrogate, it is not clear what all this entailed. Increasing student awareness of the differences between the original and its reproductions would help with visual comprehension and an understanding that what they are seeing cannot, by its very nature, perfectly emulate the original. To this end, visual literacy instruction would benefit from a grounding in Benjamin's discussion of the aura of the original. By having this as the basis of their approach, students may be more willing to view images skeptically and apply critical thinking skills to works that seem "off."

In the meantime, and in the absence of ongoing visual literacy instruction sessions, the data suggests we should focus on providing images that are as close as possible to how the original artwork appears. For some of us, this will translate into having to do the work to replace earlier images in databases.[12] The changes in technology since the initial push to digitize slides, and the ready availability of many of these works via the internet, indicate the need for us to replace old, flawed images and present the most accurate versions of artworks possible for our patrons. Whether this will continue to be the case in the decades to come is not clear, but the quality of the reproductions made using current technology is such that I hope continued duplication of these efforts will not be necessary in the future, although we should be prepared to assess if this is truly the case in the years to come.

[11] At CCS, the only representation of the Bierstadt artwork (figs. 1 and 2) in the database is the AMICA version, as it is not currently cataloged in our in-house collection.

[12] If conditions exist that prevent the actual replacement of an image - at CCS, faculty create curated slideshows within Luna that are dependent on the original image being maintained in the database - the better quality image can at least be appended to the same record to allow users to see the variations and decide for themselves.

Notes:

[i] "About: Mission and History," Artstor, accessed May 24, 2020, https://www.artstor.org/about/mission-history/.
[ii] "Artstor Slide Gallery," Artstor, accessed July 15, 2020, https://www.artstor.org/collection/artstor-slide-gallery/.
[iii] Alida M. Pask, "Art Historians' Use of Digital Images: a Usability Test of ARTstor" (2005): 3, accessed May 24, 2020, https://doi.org/10.17615/k8sg-k591.
[iv] Matthew Mirapaul, "Far-Flung Artworks, Side by Side Online," *The New York Times*, May 22, 2003.
[v] "ACRL Visual Literacy Competency Standards for Higher Education," Association of College & Research Libraries (ACRL), October 27, 2011, http://www.ala.org/acrl/standards/visualliteracy.
[vi] Ken Ladd, "An Examination of the Failure Rate and Content Equivalency of Electronic Surrogates and the Implications for Print Equivalent Preservation," *Evidence Based Library and Information Practice* 5, no. 4 (2010): 7, https://doi.org/10.18438/B83P6V.
[vii] Ken Ladd, "A Re-Examination of Online Journal Quality and Investigation of the Possible Impact of Poor Electronic Surrogate Quality on Researchers," *Evidence Based Library and Information Practice* 13, no. 3 (August 24, 2018): 53, https://doi.org/10.18438/eblip29449.
[viii] Lura E. Joseph, "Image and figure quality: A study of Elsevier's Earth and Planetary Sciences electronic journal back file package," *Library Collections, Acquisitions, and Technical Services* 30, no. 3-4 (2006): 162, https://doi.org/10.18438/eblip29449.
[ix] Lura E. Joseph, "Improving the Quality of Online Journals: Follow-up Study of Elsevier's Backfiles Image Rescanning Project," *Library Collections, Acquisitions, and Technical Services* 36, no. 1–2 (January 2012): 18, https://doi.org/10.1016/j.lcats.2011.08.001.
[x]Jacquelyn Marie Erdman, "Image Quality in Electronic Journals: A Case Study of Elsevier Geology Titles," *Library Collections, Acquisitions, and Technical Services* 30, no. 3-4 (2006): 171, https://doi.org/10.1016/j.lcats.2006.08.002.
[xi] Adam Robinson, "University of Kansas Print and Electronic Journal Comparison Study," *Art Documentation: Journal of the Art Libraries Society of North America* 29, no. 1 (April 2010): 37, https://doi.org/10.1086/adx.29.1.27949537.
[xii] Steve McCann and Tammy Ravas, "Impact of Image Quality in Online Art History Journals: A User Study," *Art Documentation: Journal of the Art Libraries Society of North America* 29, no. 1 (2010): 41, http://www.jstor.org/stable/27949538.
[xiii] Sarah Buck Kachaluba, Jessica Evans Brady, and Jessica Critten, "Developing Humanities Collections in the Digital Age: Exploring Humanities Faculty Engagement with Electronic and Print Resources," *College & Research Libraries* 75, no. 1 (January 2014): 91, https://doi.org/10.5860/crl12-393.
[xiv] Ibid, 98.
[xv] McCann and Ravas, "Impact of Image Quality," 41.
[xvi] Ibid, 45.
[xvii] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, ed. Hannah Arendt, trans. Harry Zohn, New York, Schocken (1969): 5, 8.

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