Playing the "Data": Constructing Interactive and Enjoyable Experiences of Social Justice-Oriented Contemporary Art

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ABSTRACT

Many art educators are committed to engaging students with social justice issues to guide them "to know themselves and their worlds, and to live and act as part of community and society as critical citizens" (Garber, 2004, p. 6). This paper details an action research that utilizes an interactive and playable Contemporary Artwork Data Visualization (CADV) tool informed by Critical Multicultural Art Education and Dewey's "Art as Experience." The author suggests that this tool supports undergraduate students' engagement with contemporary artworks that address social justice. Using varying, diverse artists as points of departure, the CADV tool initiated students' open dialogues about social justice issues. Furthermore, using the CADV tool as a class built a learning community for students to understand various perspectives concerning social justice issues in the context of different experiences and cultures.

KEYWORDS: social justice issues; critical multicultural art education; enjoyable experience; contemporary art; data visualization.

An inquisitive undergraduate student who enrolled in my digital artmaking class asked me after class why I chose so many social justice-oriented contemporary artworks as a source of inspiration for their art project. He then explained that he only wants to select relaxed and happy topics for his photo project. The students' inquiry made me consider creating a new teaching tool that can assist students in understanding the correlation between contemporary art and social justice. To create an open and enjoyable space for students to explore their own "big idea" (Stewart & Walker, 2005) of social justice issues through direct and personalized contemporary art engagement, this study designs and examines an innovative and playable Contemporary Artwork Data Visualization (CADV) tool as a pedagogical device to support learning experience.

Literature Review

Social Justice Education

Social justice education is regarded as a goal and a process that involves students and educators in a democratic and collaborative way to change the unfair distribution of resources that trammel the equal right of all social groups (Bell, 1997; Desai, 2010). It is

widely recognized that the arts offer students a way to experience and understand their worlds, to better understand themselves and to become better human beings (Willis & Schubert, 1991; Albers, 1999). Especially over the past three decades, young people across the United States are creating artworks that aim to question and challenge inequality and injustice and make a significant impact (Dewhurst, 2011). Art practices focused on social justice issues allow individuals to establish a personal connection to justice and equity issues, then use their imagination to understand the world, create meaning in life, and eventually re-create a better world (Lee, 2012). Thus, implementing social justice-related art practices in art education classes to better help students' understanding of social reality has become imperative.

Critical Multicultural Art Education

Critical multicultural art education is the primary theoretical framework that guides how contemporary art could be experienced socially and culturally. It is a "transformative" teaching framework that brings different students' preexisting social experiences and voices to the center of classroom discourse. This framework enables students to criticize and challenge universal social norms (Kincheloe and Steinberg, 1997; Ghosh, 2002; May and Sleeter, 2010; Banks, 2015). Kraehe and Acuff (2013) note that numerous art educators and scholars attend carefully to ways "art education is deeply implicated in the production and maintenance of social inequalities" (p. 295). For art educators who aim to pursue educational equity and inclusivity, how to envision a suitable and comprehensive "art education discourse" under the premise of inclusion becomes particularly important (Acuff, 2013). Hence, art educators should conduct their practice and research within the framework of critical multicultural art education to question institutional power, cultural creation, knowledge ownership, and educational and community resources (Acuff, 2013). Meanwhile, students in art classrooms should be encouraged to understand how society is structured hierarchically to help them conceive social changes in their classrooms and communities (Desai, 2010). Therefore, this study examines a new tool with specific classroom exercises to enable students to explore their lives, experiences, and social justice issues from a critical multicultural perspective in a low-risk, enjoyable environment.

Art as Experience

Experience is a central concept of Dewey's educational philosophy, and "to learn from experience" and "learning by doing" (p. 145) is the core concept of his educational advocacy of experiential learning. Dewey (1997) used *Experience* against the idea of *Expert,* defining *Experience* as something that personally affects people's lives. He proposed that

students should be allowed to explore knowledge consciously and actively in the actual teaching and learning activities. Furthermore, students should be encouraged to take deliberate actions in his or her environment and to acquire new ways of knowing through the interactive process of experimentation and experience (Wu, 1998). In talking about how and why art education and art experiences should connect with people's lives, Dewey (1997) stated that learning in the classroom setting relates to the experience outside of it. However, "We do not learn from experience. We learn from reflecting on the experience" (p. 78), and art is the most effective form of reflection and communication. Therefore, an interactive and experiential teaching tool that could allow students to directly experience and interact with artworks plays a crucial role in creating open, even enjoyable, spaces for students to explore social justice issues through contemporary art engagement.

Data Visualization as a Teaching Technology

There is a rapid growth and interest in information design and data visualization as a technology and a discipline over the past 30 years. Numerous fields such as finance, transportation, and business intelligence have been using this new technique to help people better understand "information" and "big data." In the art education field, the establishment of the NAEA's Data Visualization Working Group (DVWG) indicates that more and more art educators have begun to use either "infographics" or "data visualization" to teach in their art classrooms. Tufte (2001) defines that infographic "display measured quantities by means of the combined use of points, lines, a coordinate system, numbers, symbols, words, shading, and color" (p. 12). "Data visualization" is typically used to express big data or complex logical relations in a visualized form that makes data more accessible as well as comprehensive, which provides an interactive experience for users. Thus, "the use of computer-supported, interactive, visual representations of abstract data to amplify cognition" (Card, Mackinlay & Shnerderman, 1999, p. 6) is referred to as data visualization.

Taylor (2017) incorporates data visualization with assessments, stating that teaching and learning strategies and environments will be encouraged and informed by using assessment information. Grodoski (2018), one of the research commissioners of the DVWG, is interested in "using data to link theoretical foundations of visualization to the practical aspects of teaching and learning" (p. 37). He suggests that the application of data visualizations is beyond a tool to visualize artistic information or a transformative way of assessment. In general, however, using computer-supported interactive data visualization to teach art courses involving various learning objectives is still very rare in art education classrooms. Therefore, the research question turns to: How can the use of data visualization to introduce contemporary

art impact students' engagement with social justice issues in a digital artmaking class? Is it possible to use the new data visualization tool as a pedagogical model in art education courses outside of digital artmaking?

Methodology

This study is positioned as action research. It requires observation and note-taking on students' real-time responses to the new teaching tool, Contemporary Artwork Data Visualization (CADV), that I designed for the digital artmaking class. What inspired me to choose this research methodology is my attempt to rely on the "feedback loop" (Figure 1) to revise the course content of the digital artmaking class. The nature of the feedback loop is consistent with the cyclical nature of action research. Action research seeks to "depicting the context, change processes, resultant learning and theorizing of individual or groups in the process of mutual change and inquiry" (Fisher & Phelps, 2006, p. 158). As Figure 2 illustrates, the process of action research is cyclical and usually involves two or more cycles. The cycle includes planning, implementing the plan, observing and reflecting on results (Kemmis & McTaggart, 1990).
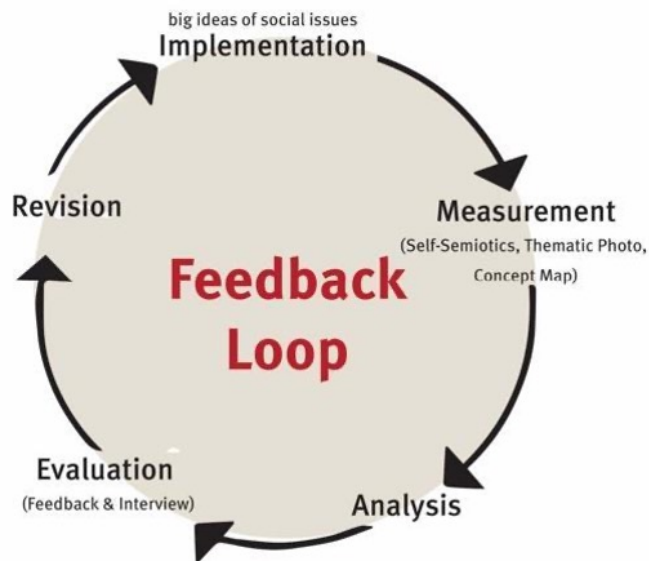

Figure 1. "Feedback Loop" of implementing a new teaching tool in the digital artmaking class.
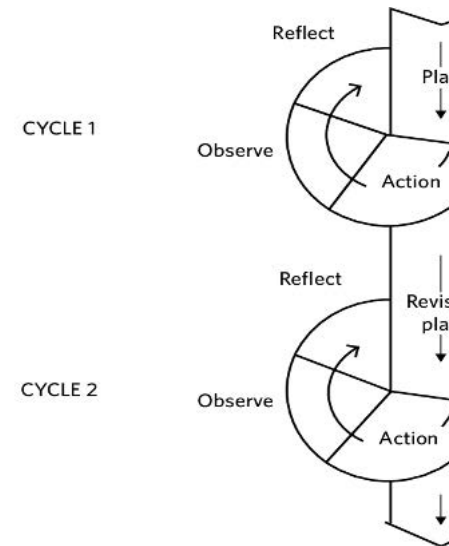

Figure 2. Stephen Kemmis and Robin McTaggart's Action Research Model.

I collected data throughout the semester using qualitative tools, including semi-structured interviews, project journals, case studies, document collection, discussion posts, and field notes (Winter & Munn-Giddings, 2001; Young, Rapp & Murphy, 2010). The data collection process involved two fundamental components: Contemporary Artwork Data Visualization (CADV) and Thematic Photos. Students' interaction with the CADV provided data on how the tool helped them position their "big idea" of social justice. Then, "Thematic Photos" allowed students to reflect their critical consciousness of social justice on their photo-taking and creation. Hence, to stimulate students to take the initiative to connect social justice issues to their thematic photos and then collect students' "user experience" as the primary research data, the design and the implementation of the CADV in the digital art class was decisive.

Design and Implementation of the CADV

This section details the interactive and playable design project, Contemporary Artwork Data Visualization (CADV), which aims to increase the presence and sophistication of student engagements with and inclusion of social justice-related issues in students' art practices.

Components of the CADV

Glossary of Key Terms. The CADV tool includes two primary components: 1) selected contemporary artists and artworks, 2) and social justice themes (Figure 4 & 5). However, to keep the

thematic coherence of the two components, developing a specific glossary of key terms that contains a sufficient number of accurate, relevant keywords to precisely "filter" the artists and social justice topics is indispensable. Specifically, the glossary refers to language choices that contemporary artists, educators, and scholars, use to demonstrate their concerns and standpoints regarding social justice issues (colorful bubbles shown in Figure 3). I created this glossary by combining existing glossaries and extracting new keywords from selected articles and books that discuss contemporary art movements. The first glossary, Diversity & Social Justice Glossary, collected terminologies from people's conversations about diversity and equity in terms of the lived experience (UWT, 2015). Notably, this glossary included various resources of universities, community centers, and experiences of diverse people engaged in social justice, which had great significance to the CADV. The second glossary, Racial Equity Tools (2019), is one resource of the first glossary. As the title implies, it collected languages related to racial equity and provided the source of each word including articles, books, websites, and other types of glossaries. Undoubtedly, the two glossaries laid a solid foundation for constructing the CADV's glossary, which aimed to connect contemporary art and social justice topics.

In addition, *Artwords: A Glossary of Contemporay Art Theory* (Patin & McLerran, 1997) provided valuable references for finding the meeting point between social justice and contemporary art. This book explained more than 400 terms and phrases related to contemporary visual art aiming at helping contemporary art learners, art critics, and even artists themselves better defined theories and criticism of this new era of art and culture (Patin & McLerran, 1997).

I then explored keywords and phrases from the literature that contains contemporary art movements, art theories, and artists' work explanations. In the process, I was thinking of two central questions: What is the internal relationship between contemporary art concepts and social justice topics? In subsequent data mining, can the summarized and extracted keywords filter the expected social justice-oriented artists and artworks out? It is important to note that the process of keyword extraction is subjective because the understanding of social justice and contemporary art varies among researchers. Despite this variable, the results were not affected since modifying and adding new terms to the glossary based on students' learning experience is the most advantageous attribute of the CADV, which makes this study an ongoing process.
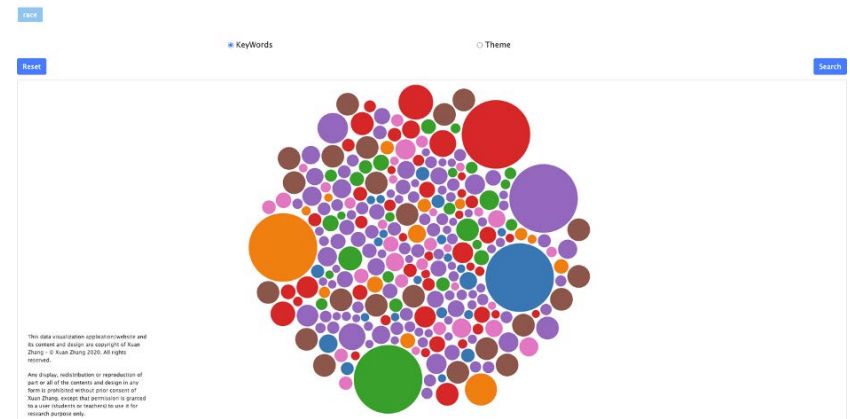

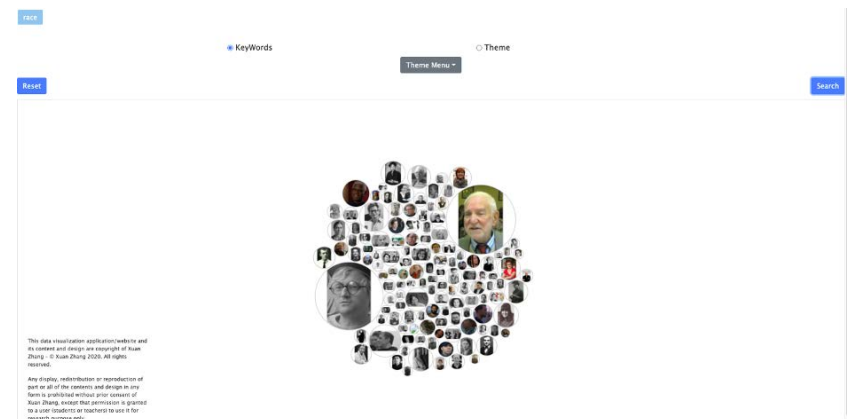**Figure 3.** Keywords of social justice and contemporary art on the homepage of the CADV.

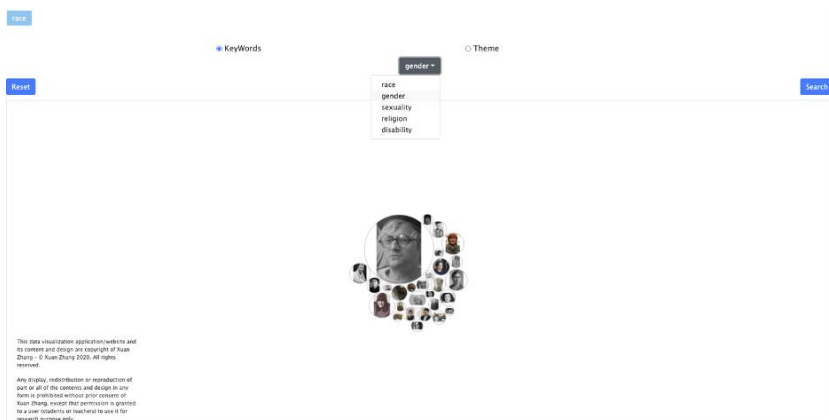**Figure 4**. The artist results of searching the keyword "Race."

Figure 5. Intersection between the theme of "Race" and "Gender."

Databases of the CADV. To make the CADV function, I connected the glossary of keywords and phrases to three selected databases, Art21, The Art Story, and the MoMA online collection. I considered three criteria to select databases:

1. The database needs sufficient numbers of contemporary art forms as the digital artmaking course content covers.
2. The database needs diverse artists and their artworks.
3. The database needs enough textual information of artists and artworks so that students could click on the keywords and phrases bubbles to "filter" the most relevant artists.

"Filter" here means that the process of searching contemporary artists and artworks relies on programming tools I used to code the CADV. Thus, students' exploration of their interested keywords of social justice is vital to the search result of the contemporary artwork and artists when using the CADV. As students were able to modify keywords of the CADV, each student then could construct their own specific interest-driven database of contemporary artworks. Eventually, the CADV directed students to the specific artist's profile page offered by the three external databases. The overall results indicated that the glossary and selected three databases of this study were successful and effective. Notably, if the keywords failed to filter relevant contemporary artists and artworks through the three databases, the databases can also be easily changed.

Instructor's Selection of Artists and Themes. In addition to providing students an interactive platform to explore their "big idea" of social justice, the CADV also included my selection of artists and social justice themes as an instructor. Guided by critical multicultural art education and my teaching engagement with social

justice, I selected five themes of social justice: Race, Mental Health, Gender, Sexuality, Religion. Under each of the topics, I searched 20 contemporary artists through keywords related to each theme in the CADV. Moreover, I picked one representative artwork for each artist to offer students the most specific information from the teacher's perspective (Figure 6). Students were able to sort the 20 artists by different art forms, including photography, sound art, installation art, video art, and so forth (Figure 7).
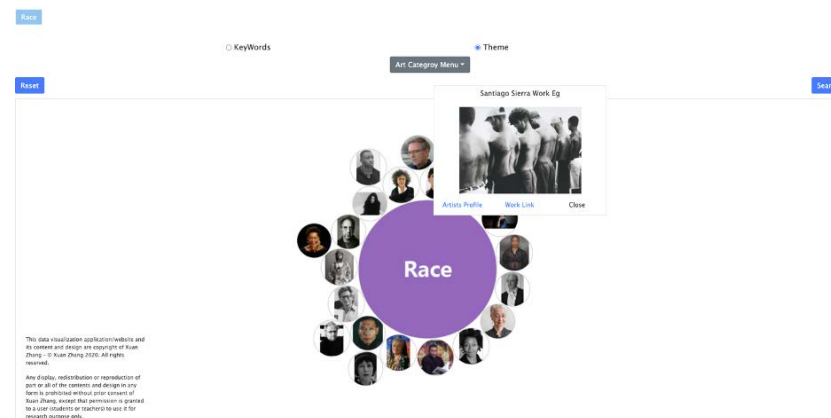

Figure 6. Artists and selected artworks under each social justice topic in the "Theme" section.
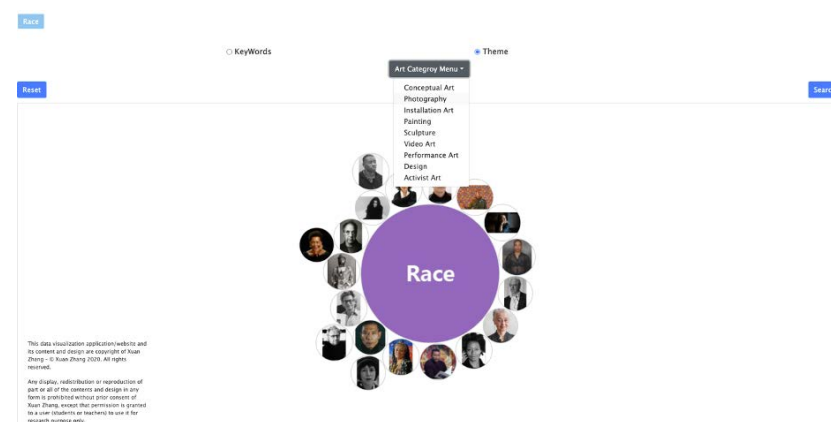

Figure 7. Artistic forms covered in the Digital Artmaking class.

Implementation of the CADV

In implementing the CADV, I guided students to play with the CADV exploring their "big ideas" of social justice in three rounds. The first round of exploration allowed students to randomly select color bubbles, keywords/phrases, based on their pre-existing experience and interest in social justice. Specifically, I divided 24 students of the class into five groups, with each of them have both American students and Asian students to achieve ethnic diversity. Then, I asked the five groups to first "play" with the CADV individually for 10 minutes and then share their used keywords and filtered artists with their group members for another 15 minutes. Additionally, I provided students several prompts to help students further communicate with their group members. These prompts were:

1. Before you start to search these keywords in the CADV, do you have any ideas on the social justice issues that you expect to explore first?
2. What kinds of keywords/phrases have you tried to search? (At least ten items, in addition to the five main themes: Race, Gender, Sexuality, Religion, Mental Health).
3. What is the result of searching for artists? Does the result surprise you? Please provide an example to talk about it in detail.
4. What social justice issues did you and your group members find that mainly need to pay attention to? Why?

Students' responses to the prompts showed that they were highly interested in "race," "gender," and "mental health" (Figure 8) in the first-round exploration.

Then, the second-round exploration first started with a comprehensive introduction of the "Theme" section (Figure 9) of the CADV, as it contains my selection of social justice topics and artists as a class facilitator. I intentionally highlighted some artists that coincided with students' first-round search results of artists, such as Kehinde Wiley and Santiago Sierra. After that, I let students explore the CADV for 25 to 30 minutes and expected them to further refine their keywords and artist search results from the first round, in order to find their "big idea" of social justice for the first two sets of thematic photos. Figure 10 shows that "mental health" replaced "race" as the most frequently searched topic in this round. Additionally, "gender inequities" emerged as another prominent topic among students, particularly female students.

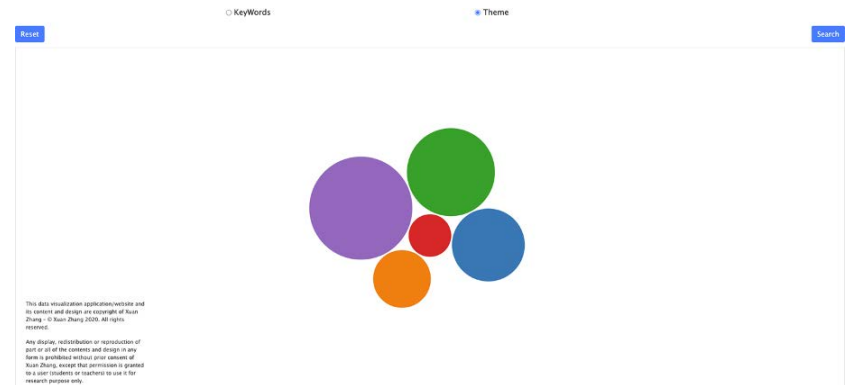**Figure 8.** Students' interested social justice topics in the CADV.

Figure 9. The instructor's selection of artists on five themes of social justice issues (race, gender, sexuality, mental health, religion).
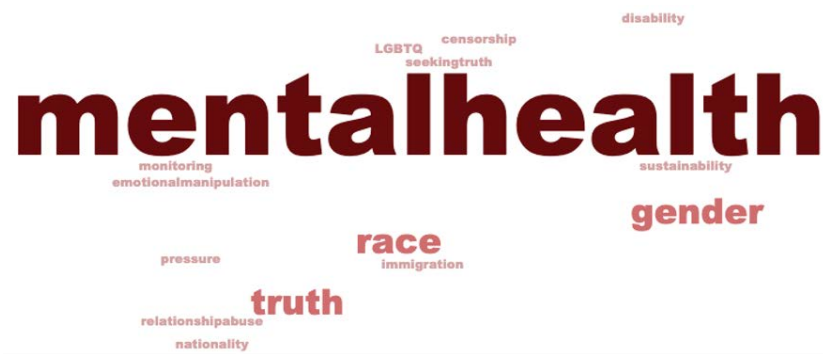
Figure 10. Students' second-round "big ideas" of social justice issue

After students finished exploring and discussing their chosen big ideas of social justice, I encouraged them to think of some new keywords that they would like to add to the CADV. Though not all students contributed new keywords, their input to the glossary integrated into the CADV has taken a giant step towards providing students' direct learning experiences and personalizing their most fascinating social justice topics. Statistically, 13 students out of 24, 54%, chose social justice topics as their themes of the first two sets of photos.

The third-round exploration of CADV was conducted one week after the first two rounds and following students' completion of their first two sets of thematic photo-taking and creation. This round aimed to help students continue exploring the "big idea" for their photos and artistic ways to convey the idea, given the observed phenomenon that some students were struggling with how to express their thoughts about social justice issues through photos. Furthermore, I intended to motivate students who did not select a social justice topic for the first two themes to develop a deeper understanding of their chosen artists' inspirational sources and artistic styles. Thus, I added a discussion task titled "Borrow an idea for the third theme from selected artists." Essentially, this task required students to keep exploring the CADV, then targeting a specific artist's central idea and borrowing this idea to create the third set of thematic photos.

Before students started this round's exploration, I first provided two examples that were shown under the "Theme" section of the CADV. I told them that they can also find the artist they would like to borrow an idea from my selection of artists if they want. The two artists I discussed were Kehinde Wiley's "Portrait of Barack Obama" and Felix Gonzalez-Torres's "Untitled (Portrait of Ross in LA)". Then, students were able to explore the CADV in class for 30 minutes, and

my role as a facilitator was to observe their actions and offer them help when needed. As a result, eight more students decided to make social justice their photo theme. The total number of students who voluntarily planned to carry out social justice-oriented photo-taking has reached 21, which was 87.5% of the class. The new strategy of the "borrowed idea" played a crucial role in helping students find a feasible approach to convey their ideas of social justice.

Discussion and Conclusion

This section discusses the impact of the innovative CADV teaching tool on the discussions and art practices related to social justice issues in the digital artmaking class. The analysis includes several dimensions: feasibility, effectiveness, and application. Data analyzed from interviews with student and teacher participants, and samples of students' thematic photos.

Feasibility

Direct and Interactive Experience. This study integrates design thinking and strategies into art education teaching. "User experience" centered applications employ "interaction design" as a strategy to help users achieve their goal through pleasurable, smooth, and convenient interactions with an object or a machine (Inc., 2018). It is clear that the CADV tool is designed with a commitment to providing a comprehensive and enjoyable "user experience" for students "to do," organizing their own knowledge; and "to learn," incorporating personal experiences, through an interactive process of "play," and eventually construct for themselves an accumulative system of knowledge. In other words, the CADV tool provides a more visual and interactive way to present "data," which allows students to directly interact with the artworks and reflect on their experiences in an enjoyable context.

Most of students mentioned how the CADV helped them achieve autonomy in their artistic experience and practice in the interview. One of them said,

> When I glanced over all the topics and subjects [on the homepage of the CADV], it was all there. And then I wanted to click on them and see where that takes me to get a feel on how the site was laid out and what information can be found from it. I liked visiting different artist pages and see how they were set up and see what information you could gather from them.

Accessible Searching and Learning. The CADV provides students with more targeted searching and accessible learning of the subject

matter. A notable phenomenon in many classrooms nowadays is that students, and even some teachers, heavily rely on Google search to acquire information. Although using search engines is one of the most important channels for students to gather information, it requires students to use appropriate keywords, which is one of the fundamental components of the CADV. Inputting the most relevant keywords to search for accurate and effective results requires a high degree of understanding and knowledge accumulation of social justice and contemporary art. Contrarily, the CADV enables students to focus more efficiently on learning about the artists and artworks that they are genuinely interested in, instead of struggling with which keywords to use. Furthermore, the CADV tool allows students to add their own keywords to the CADV's glossary, which means using the CADV as a personalized search engine. The student participant mentioned in the interview,

> For someone like me, who does not have a lot of prior experience with social justice, I think the amount of information the CADV provides is simply sufficient. Because these keywords contain a lot of content that I never thought about before, it seems like it has everything, and we can search through them to find numerous artists and numerous artworks underneath each artist. When I found the artist that I am really interested in, I was able to explore more by myself.

Indeed, there are some existing contemporary art websites, but most of them only display basic background information about the artists and their key artworks. What these platforms lack, is the ability to provide users with a big picture of relational connections among different contemporary artists, topics, and artistic forms. I believe that the CADV tool achieves the goal of data visualization, which is to provide a more straightforward and accessible way to observe and understand data (Taylor, 2015), and "to reflect and inspire deep understanding and engagement – compelling the viewer to look critically and thoughtfully" (Taylor, 2017, p. 60).

Effectiveness

Opening Dialogues and Building a "Buffer Zone." Sanders and Vaz (2014) assert that opening the conversation of controversial social justice topics in the classroom comfortably is the essential step to begin with. The CADV successfully helped both students and teachers open the dialogues of social justice issues and contributed to constructing an open and enjoyable classroom atmosphere. Students showed great enthusiasm in classroom participation, group discussion, and individual discussion posts regarding their exploration of social justice topics. Furthermore, using the CADV tool as a class successfully built a learning community that allowed

students to construct a shared experience of understanding various perspectives concerning social justice issues in different cultures. Such an inclusive and enjoyable learning environment further motivated students to develop more ideas and new opportunities to discuss social justice topics. As a result, students actively provided many new keywords (brown and pink bubbles shown in Figure 3) for the CADV, which further demonstrated the tool's effectiveness.

When interviewing five teacher participants, all of them stated that "learning all arts and all social justice issues is impossible, and our own biases and interests become apparent." Unquestionably, art teachers' choices of social justice issues and relevant artworks can never cover every student's interest; rather, it can sometimes trigger topics students are not willing to bring up. Thus, the CADV effectively served as a critical "buffer zone" in helping students and teachers eliminate the fears and potential "minefields" that might arise when confronted with controversial social justice issues, making the teaching and learning experience easy and enjoyable.

Motivation of Extended Studies. After students' enthusiasm for learning about social justice issues has been fully activated through playing the CADV, there is a greater possibility for them to learn more and deeper. Students' knowledge of social justice can only be generated through their interests in the topics because knowledge and human interests are forever linked and inseparable (Habermas, 1971; Herr & Anderson, 2005). As the CADV was linked by keywords and databases, students also had to discover the "visible connection" between the keywords and the filtered artist's work contained in the database. In other words, if students could not find valid and direct keyword-related content in the database, they had to look outside of the CADV to find evidence to prove whether or not the connection that the CADV proposed was correct or incorrect. Hence, such a process of seeking the relevance or irrelevance of the CADV results led students to do much necessary in-depth research to ensure a more accurate interpretation of the work they searched out. Additionally, students demonstrated a great interest in doing additional research out of class to support their ideas of social justice issues presented in

Critical Reflection in Photography. After students gained a more profound experience and understanding of social justice through surfing on the CADV, students were intrigued to critically reflect on their experiences and illustrate concerns about social justice through their digital art practices. This is the most important indicator of the effectiveness of the CADV tool. As a result, students' thematic photos touched on all of the five social justice themes, of which I added to the CADV followed by the theoretical framework of critical multicultural art education: race, gender, sexuality, mental health, and religion. In analyzing student works that focused on racial issues, one thematic

photo named "We are the same on the inside" (Figure 11) captured my eyes immediately. For most, apples are simply a common fruit that people see and think nothing else of, but student A used it as a metaphor to express his thoughts and demands for racial equity. He explained in the photo description,

> This is a rather simple picture at first glance, but it has a deeper meaning once it is given more thought. No matter what color the apple is on the outside, it is clear that they are still the same fruit and pretty much the same on the inside. I think this can be an analogy to the human race. It does not matter what race a specific person is, every human is essentially the same. A human is a human like an apple is an apple.

This work used straightforward objects to express the profound truth in the way of understatement. It explains why we need the language of art, the visual symbols, to show our thoughts on controversial topics, especially when verbal languages or writings cannot simply convey those thoughts to audiences. As A-17 reflected his critical consciousness of social justice in his essay, "Photography can be an effective and emotional medium where feelings are expressed to the world. Often, these feelings have to deal with social justice."

Figure 11. Student A's thematic photo, "We Are the Same on the Inside," Spring 2020

In addition to racial inequities, discussions about mental health featured prominently in the students' thematic photos. The most representative example is from student B, as he described how this issue has been widespread and affects everyone, including himself. He originally got inspired by Frida Kahlo's *Then Broken Column,* in which the artist exposed her inner struggles and pain through "symbolism of outside elements." He highly resonated with this work and hoped that his thematic photos would convey the same message. In this layered photo, "Inner Battle" (Figure 12), student B tried to show his commentary towards mental health. What he aimed to express in this photo is that while everything looks good on the outside, "When the person opens up (as symbolized by opening of the shirt) you can see the chaos going on inside." He further explained, "For people struggling with mental health issues, their biggest enemy is sometimes themselves, as they are tearing themselves apart from the inside out."
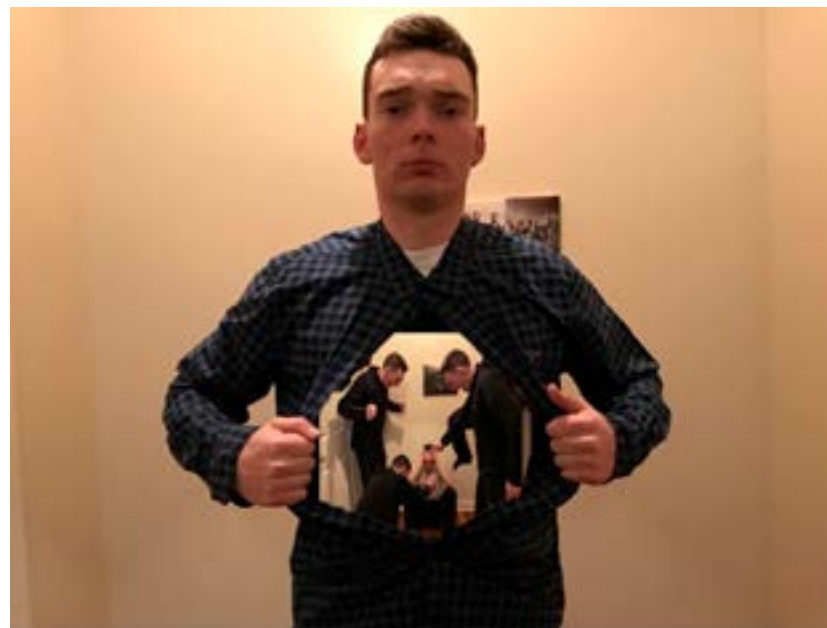

Figure 12. Student B's thematic photo, "Inner Battle," Spring 2020

Four female students out of six actively showed their desire to discuss gender equity issues in this class. Among these students' thematic photos, I can think of no better demonstration of this theme than the example of student C's work that addressed the issue of compensation discrimination in the context of gender equity, "What a Woman's Worth" (Figure 13). In this set of photos, student C

intuitively layered the number "0.79" on top of three headshots of her friends to represent the fact that "on average, women in America make 0.79 cents to every dollar a man makes." She also thought that this photo could also fall under education equity issues because while "both women and men have access to the same education, they do not make the same amount."

Figure 13. Student C's thematic photo, "What a Woman's Worth," Spring 2020

These representative photos above manifest the importance and effectiveness of using the interactive and playable CADV tool to inspire students' explorations and understandings of how artists infused their own personal and social experiences into their works. Most importantly, the CADV tool motivates students to critically reflect their own experiences and observations of social reality on art practices.

Application

The CADV tool demonstrates its feasibility for being applied in different art classrooms other than the digital artmaking class as a pedagogical model. Due to its design flexibility, the keywords and databases can be customized to meet various course content and learning objectives. One of my colleagues who had already implemented the CADV in her arts integration class for two semesters mentioned that the tool provided students "personal connections and dynamic learning experiences to specific social justice topics."

Most importantly, the CADV allows students to improve their ability of self-learning. It makes students stay engaged because the tool primarily requires students' participation to function. Compared to traditional teaching approaches, the interactive data visualization technology employed by the CADV has shown its irreplaceable superiority after the worldwide outbreak of the Covid-19 pandemic, during which online education became an irreversible trend over the next five years. It is an effective way to help teachers and students trapped in the predicament of the inefficiency of online teaching and learning find a viable means to improve outcomes and make

education more engaging. Therefore, the author suggests that the application of the CADV and the technology of data visualization should be implemented on a broader scale of the art education field as early as possible.

In today's education climate, scholars from different fields always consider the actions we should take to fight against social inequalities and discrimination in our society. This study and the design project, Contemporary Artwork Data Visualization, was the action I successfully took in the art education field. The employment of data visualization technique was a practical and feasible means to facilitate dialogues and relevant art practices surrounding social justice issues.

Meanwhile, students' learning interests toward social justice had been greatly stimulated. They were able to position their "big idea" of social justice in the process of exploring contemporary artists and relevant artworks guided by the CADV, and eventually, successfully applied the "big idea" into their art projects. Furthermore, the study indicates that using the tool as a class built a learning community for students to understand various perspectives concerning social justice issues in different experiences and cultures. Therefore, the author proposes that social justice education in art classes should be conducted through a "user-experience" oriented digital learning tool, such as the CADV, in order to increase students' participation and reduce teachers' burden to present and promote a focus on social justice on their own.

References

Acuff, J. B. (2013a). Discursive underground: Re-transcribing the history of Art Education using Critical Multicultural Education. *Visual Inquiry: Learning & Teaching Art, 2*(3), 219–231.

Ballengee-Morris, C., & Stuhr, P. L. (2014). Experiencing Indigenous Ways of Knowing as Embodied in a Museum. *Multiculturalism in Art Museums Today,* 259-270.

Banks, J. A. (2015). *Cultural diversity and education: Foundations, curriculum, and teaching.* Routledge.

Cahan, S., & Kocur, Z. (Eds.). (1996). *Contemporary art and multicultural education.* Psychology Press.

Card, M. (1999). *Readings in information visualization: using vision to think.* Morgan Kaufmann.

Desai, D. (2010). Reflections on Social Justice Art Teacher Education. In T. Anderson, K. Khallmark, & D. Gussack (Eds.), *Art Education for Social Justice* (pp. 172-178B). NAEA.

Dewey, J. (1997). *Democracy and Education: An Introduction to the philosophy of education.* The Free Press.

Fisher, K., & Phelps, R. (2006). Recipe or performing art? Challenging conventions for writing action research theses. *Action Research, 4*(2), 143-164.

Ghosh, R. (2002). R*edefining multicultural education*, 2nd ed. Nelson Thomson Learning.

Grodoski, C. (2018). Visualizing Data in Art Education: Research, Practice, and Advocacy. *Art Education, 71*(2), 36-45.

Gu, P. (2015). *Introduction to Art Curriculum*. Liaoning Fine Arts Press.

Inc, A. (2018). Principles of Interaction Design: What It Takes to Create Positive Human-Computer Interactions. Retrieved October 27, 2020, from https://uxplanet.org/principles-of-interaction-design-what-it-takes-to-create-positive-human-computer-interactions-1a5af16b51c3

Kemmis, S., & McTaggart, R. (1988). *The Action Research Planner* (3rd ed.). Deakin University Press.

Kincheloe, J. & Steinberg, S. (1997). *Changing multiculturalism*. Open University Press.

Kraehe, A. M., & Acuff, J. B. (2013). Theoretical considerations for art education research with and about "underserved" populations. *Studies in Art Education, 54*(4), 294–309.

May, S. (1999), *Critical Multiculturalism: Rethinking Multicultural and Antiracist Education*. Falmer Press.

May, S. & Sleeter, C. (Eds.). (2010). *Critical multiculturalism: Theory and praxis*. Routledge.

Mu-Kun Wu (2009). The Insights of John Dewey's Empirical Philosophy for Curriculum and Teaching. *Journal of Taipei City University of Education*. 35-54.

Patin, T., & McLerran, J. (1997). *Artwords: A glossary of contemporary art theory*. Greenwood Publishing Group.

Sanders III, J. H., & Vaz, T. G. (2014). Dialogue on queering arts education across the Americas. *Studies in Art Education, 55*(4), 328-34.

Taylor, P. G. (2015). What does learning look like? Data visualization of teaching and learning. *Maximizing cognitive learning through knowledge visualization* (pp. 523–543). IGI Global.

Taylor, P. G. (2017). Artistic Data Visualization and Assessment in Art Education. *Visual Arts Research, 43*(1), 59.

Tufte, E. R. (2001). *The visual display of quantitative information*. Graphics Press.

UWT. (2015). *Diversity & Social Justice Glossary*. Tacoma: UWT's Diversity Resource Center.

Whitfield, T. W., & Whiltshire, T. J. (1990). Color psychology: a critical review. *Genetic, social, and general psychology monographs*.

Winter, R., & Munn-Giddings, C. (2001). *A handbook for action research in health and social care*. Psychology Press.

Young, M. R., Rapp, E., & Murphy, J. W. (2010). Action Research: Enhancing Classroom Practice and Fulfilling Educational Responsibilities. *Journal of Instructional Pedagogies, 3.*