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Virtual Gallery – A Multidisciplinary Approach

Ivy Chia
June Tay
Singapore University of Social Sciences, Singapore

Abstract
The COVID-19 pandemic has led to a new era where applied learning has to go virtual. This hastened the need for students to be equipped with virtual skillsets, including the ability to manage 3-D augmented reality tools for future work. This paper introduces the virtual art platform as a means to prepare students for the new world, which requires a multidisciplinary approach to solving problems and digital skills to work within the virtual environment. The paper will examine the multidisciplinary practice and perspectives involved in setting up the virtual art gallery, introduce features of Virtual Art Gallery platforms and finally consider the potential benefits of using these platforms for the student's professional careers.

Keywords: 3D virtual reality, multidisciplinary learning, virtual art exhibition, studio-based practice, art-based learning.

Worldwide, the COVID-19 pandemic accelerated the need for Universities to adapt and deliver the university curriculum beyond physical campus and for students to be able to horn in on practical skillsets for future proof careers. What COVID-19 has done was to ramp up digitalization efforts, especially in the use of virtual reality, which is an emerging trend that will fuel the future of the workplace in

terms of virtual presentation, marketing, and engagement. The takeaway lessons are that we need to prepare students with multidisciplinary skillsets, which will help them remain resilient in the future workforce. COVID-19 also hastened the uptake of the Fourth Industrial Revolution Age (4IR) technologies which also created opportunities for mutating disciplines where the future of work requires knowledge and skillsets from the different areas.

The COVID-19 pandemic resulted in Universities worldwide ramping up digital efforts in the face of the pandemic. This has resulted in Universities taking the leap of faith to design programs with virtual elements that are not only cross-disciplinary but also to potentially design those that are multidisciplinary, cross-functional, and cross-industry in nature.

We believe that arts in all their various cultural forms nourish us in times of the COVID-19 pandemic during the lockdown. There is also immense value in the art supporting interdisciplinary or multidisciplinary work. We would argue that art has been reshaping 4IR, given that future generations would need to be well versed in empathy, imagination, and creativity. This requires lifelong learning, which allows us to deep dive into the various possibilities of the future. The more recent years have seen art and design being embedded in the heart of conversation on what the future of curriculum entails, touching on areas from technology to culture and society at large. The interface of art and other disciplines provide a broad range of collaborative projects and interdisciplinary experiences not often found elsewhere.

We have been exploring the use of virtual reality platforms through a project which introduces multidisciplinary skillsets using immersive virtual training. Virtual immersive training in curatorial design, when embedded within the curriculum in higher education, can offer tremendous opportunities for 21st-century multidisciplinary skillsets and perspectives to be acquired (Papanastasiou et al., 2019; Antonaci, 2013). The last century has seen a dramatic increase in projects requiring the need to utilize design or art-related expertise to contribute to contemporary practices or even contemporary issues. There is currently an abundance of literature on how art supports interdisciplinary work and equips students with interdisciplinary skillsets. To liberal art educationists, art is a way of thinking that both imagine possibilities and impossibilities. It also introduces abstract, non-material ways of being and thinking. Both are immensely useful for students across disciplines in a real-world situation.

The multi- and inter-disciplinary possibilities for learning through the Arts support the curricular restructuring discussion is now taking place. It calls for teaching in ways that reflect the interdisciplinary nature, the project focus, and the connection to the real world even more closely (Sakatani, 2005). At the same time, the emphasis on 21st century digital literacy and the significance of the 3D virtual environment for the modern world points towards the need for students to be digitally equipped (Papanastasiou et al., 2019). Virtual learning and multidisciplinary learning are making significant strides in the world of higher education. Within the higher education sector, multidisciplinary approaches have taken root, and these tended to be located in the applied sciences, engineering, or medical sciences (Hero & Linfords, 2019; Burden & Ornas, 2016; Admiraal et al., 2019). Students work together in small groups in virtual labs or other forms of virtual platforms using multimedia technologies to address a common issue. However, not all multidisciplinary projects are issue-driven to solve a problem. We also sometimes find courses contrived as they are based on a hypothetical situation and/or are sometimes too instructional, leading to a one-tracked solution, lacking in opportunities for creative explorations and interactions. They might also be too technologically centered on the use of the tool and not sufficiently pedagogically-driven to trigger transdisciplinary thinking and practices.

The objective of this paper is to introduce an arts-related project building on three design principles: multidisciplinarity, authentic task situation, and social interactions. Using the virtual gallery as a platform, students will work together to generate different creative options for a virtual Arts Gallery showcase, using business, finance, and logistics skillsets acquired in other courses. The course "Curatorial Practice," requires students to interpret and see the relationship between artworks, exhibition spaces, and audiences. Students also had to appraise collaborative-led work and assemble their programme collaboratively, reflecting coherence at a personal and group level. They also had to decide on the market segment for the programme, how to procure the art pieces and how to market the art exhibition. The learning outcomes are such that the lessons had to be activity-driven. Through the collective design and constructions, and bringing complementary expertise from different discipline, students had to negotiate meanings and utilize cross-contextual skillsets to complete the project. The virtual platform is a means for students to explore and work together. As such, the virtual platform is a tool to facilitate cross-

disciplinary learning. We strongly believe in using the Arts as a means to create multidisciplinary possibilities for learning.
In this paper, we will introduce the process for setting up the virtual gallery, including introducing the features of the 3-D virtual reality platforms the students could use. Finally, the paper will consider career opportunities arising and provide our personal reflections.

Gallery Design as a Multidisciplinary Practice and Pedagogy

According to SEGD (2020,), curatorial or art exhibition design is "the process of conveying information through visual storytelling and environment. It is an integrative, multidisciplinary process that often combines design experience, multimedia and technology, lighting, audio, and other disciplines to create multilayered narratives around a theme or topic"(p.1). Unbeknownst to many, behind the scenes of curating and displaying art pieces are multidisciplinary skillsets that could be taught as different students from different disciplines come together. These could be classified as core skills and contextual skillsets, which are essential for the 21ste century workplace (Rios et al., 2020 ; van Laar, 2017), and these include core and contextual skillsets essential for 21st century contemporary workplace. The core skillsets primarily consist of context-specific skillsets developed for a specific task as well as cross-contextural skills which could be applied to a larger domain of social activities, and these include the following:

- Planning skills: The curation of the art gallery takes effort, and this requires meticulous planning in terms of creating meeting plans, budget and time estimates, resources plan and briefs.
- Time management: the ability to keep track and adhere to timelines for the completion of tasks
- Creative skills: Creative ability to test how different combinations of pieces work together to hone in on the perfect exhibition for a targeted audience
- Organizational skills: Organizational skills to catalog and organize the collections of artwork
- Market Analysis skills: Such skills are needed to identify the potential audience, and this may well include the audience's degree of knowledge and topics, as well as their needs so that this could be factored in when designing the gallery space.

- Narrative skills: The success of the art gallery depends on how the student narrates the artist's story and connect the audience to the artists' works.
- Communication skills: The ability to work with other groups to get the exhibition launched
- Targeting Customer's Needs: The ability to identify potential clients in the market and may well include understanding the target audience's needs and the degree of knowledge and interest.
- Critique skills: The ability to critique artwork and art collections for the purpose of setting up the art gallery based on a given theme
- Visual and spatial sensitivity: The ability to identify and interpret space structures for art and the placement of art pieces for display
- IT technical skills: The ability to navigate around the 3D virtual space where students are able to move and perform interactions within 3D spaces, including the manipulations of objects in virtual spaces
- Problem-solving skills: This refers to the ability to manage and handle complex or unexpected situations or challenges encountered at the workplace.

Complementing the core skillsets are the contextual skillsets, and these are existential skills that could be applied throughout the lifetime in different situations. These include the following:

- Ethical awareness: This includes the skills to behave in a socially responsible way, demonstrating the ability to apply legal and ethical principles when carrying out work tasks
- Cultural awareness: The ability to respect different cultures when working collaboratively with peers
- Flexibility and adaptability: This refers to the ability to adapt one's thinking in response to changing contexts
- Self-management or self-direction: This refers to the ability to develop, manage and reach one's goals set.
- Lifelong learning: The skills to constantly explore new opportunities for continual learning and gather ideas to apply in an ever-changing environment.

The above skillsets and experience are essential for every discipline, including the area of management, media, or even research.

One of the best approaches for instilling creativity is to simulate work conditions that allow for the testing of ideas and problem solving, and the use of a 3D virtual art gallery is one of the emerging virtual learning spaces for students to do so. Students learn to navigate around the 3D virtual space where students can move and perform interactions within 3D spaces, including the manipulations of objects in virtual spaces.More galleries than ever are bringing their art pieces to the virtual audiences, especially during the COVID-19 pandemic period, where art institutions are forced to explore alternative digital spaces. The pandemic has also made virtual galleries go viral. The new normal in the art world calls for students to be equipped to work with contemporary technologies with 3D Augmented Reality tools and within virtual space to develop new aesthetic experiences.

According to Piacente and Lord (2014) and Iaonnou (2018), setting up an exhibition or gallery is an ongoing process that welcomes open practices such as group discussions and spontaneous tutor-students interaction across different disciplines. Modeling after studio pedagogy, setting up an exhibition or gallery is also a socially active environment of experimentation and collaboration amongst students to help create immersive, engaging experiences for the virtual audience. Teamwork is not only expected; it is also an essential evaluated practice where students work together in groups to complete a range of tasks requiring expertise across different disciplines. It brings together fields of socio- psychology, organizational management, marketing, and public relations related to the interdisciplinary skillsets mentioned above. In the East Asian culture, traditional artistry and art teaching are often apprentice-based, collective, and oral driven, and this approach could be adapted for interconnectedness in relation to each person's identity.

The Virtual Art Curatorial Activity

Clear guidance and framework are needed. The virtual gallery setup activity is adapted from Lu (2011) 's concept of the Integrated teaching model for 3D Virtual Reality. Unlike Lu's model, the tasks for this project involved defined tasks that take place in a real-world situation based on authentic cases. These cases are gathered from the world of Art and Exhibits. Within this activity, students are expected to work in a team to curate and design their projects presented in an exhibit, beginning with research and finishing using a virtual art design online platform. Students have the option of selecting different

artifacts (2D or 3D) for display. Incorporating Piacente and Lord's (2014) concepts to setting up exhibit involves the five steps: Theme development, design, installation, publicity, and event/assessment. These are elaborated further below.

Theme Development

In this first phase, identifying a theme is crucial as it serves as a conceptual basis for the exhibition. The theme could revolve around how COVID-19 has impacted lives at home and in countries worldwide, or it could revolve around a comparison of pre and post-COVID-19 experiences encountered by students. This involves students working in a team to study the theme and study the narrative surrounding the themes. They need to identify the targeted audience, capture the narration and imaginaries. Imaginary art pieces are created and chosen with the targeted visitors in mind. To guide thinking, the following broad format taken from the curatorial framework could be used: Issue-oriented, descriptive, metaphoric, didactic, emotive, or even honorific. Using a narrative that exemplifies the body of art that is presented, students decide on the story which best fits the virtual art exhibits and experience. Organizational skills are required to catalog and organize the collections of artwork and thematic ideas for display. During this phase, students would draft out detailed plans and timetables, which would guide them through the rest of the exhibition process. This phase involves planning skills and market analysis skills, and the ability to narrate.

Design Planning and Installation

With the targeted market in mind, students need to have the ability to create the concepts likely to appeal to the targeted profile and fit into the theme. The knowledge of the audience's profile, such as age level and profile, or even interests and aesthetic leanings, will enable students to decide on the artifacts (or art pieces) for display, and this calls for visual and spatial sensitivity. Curatorial skillsets kick in as students need to decide why, how, and where the art pieces should be placed. This requires much deliberate thought and discussion. Identifying, creating, and interpreting space structures for art and the placement of art pieces for display is another level of architectural skillset which students will also learn.

Navigating the 3D virtual spaces required the ability to work with virtual or augmented reality tools. Strategic thinking and the planning process play a critical role. Points to consider include how the objects should be displayed to tell the story and which art piece would make a strong opening statement. Students need to creatively map out the virtual spaces for display. The directional flow of visitors becomes important. He or she needs to consider if they wish to have guests mix and mingle around in the virtual space or whether there should be a virtual space for fostering dialogue with artists and participants.

In designing the installation, students need to consider if they wish to make connections between contrasting works to have visitors ponder more deeply to resolve the tension posed by the different visual pieces. In contrast, placement of collections could be arranged according to similar overall formal designs found (e.g., rhythms, balance, or color harmony). The students could also decide on a linear design without any connections made between pieces. However, such a design offers little incentive for visitors to make visual or cognitive connections to visitors. For each decision made, students need to rationalize and justify their choices.

Throughout the process, there is active experimentation and testing out how different combinations of pieces combined could result in the perfect exhibit for the audience. This requires both creative thought processes and visual sensibility. The tutor will act as facilitators to guide the thinking and to introduce vocabulary terms related to the art gallery and curatorial practice (UMD, 2020) and ethical design guidelines (Andreyev, 2016 and Gazi, 2014). The installation of the art pieces gets more varied with increased experimentation with the different genres or a variety of media or subjects given. The process is dynamic, which requires students to test how different combinations of pieces work together to hone in on the perfect exhibition for a targeted audience through manipulating the art objects in the virtual spaces. This required the negotiation of ideas and constant communication amongst team members.

Guided Tour

A guided tour pieces together a good story. It narrates the exhibition/gallery story in a way that connects the audience to the artwork. The virtual space and the highlights of the visual pieces will determine how the guided tour should proceed. In the authors' experiences, a sequential flow and design are needed, leading visitors

through the exhibits in a pre-determined order, from the beginning till the end. The artworks, therefore, need to connect to one another, along with supporting text information. Sequential design unfolds progressively, allowing each work to build upon preceding work ones and informing the work that follows it. For the students, the thinking process involves going through the various stages of development in installation and in various iterations, culminating in the final art piece.

Publicity

Usually, at the beginning, as soon as the theme of the event is confirmed, the student publicist pursues a two-fold mission. This includes whetting the public's appetite for the coming virtual exhibition. Through creative write-ups in reviews, publicity catalogs, and social media platforms, the student publicist attempts to draw the attention of the targeted audience. Networks are crucial in reaching out to different publicity platforms. As with marketing, publicity entails a wide range and variety of skill sets, most of which involve communicating with different agencies and creative writing units.

Event Assessment

According to Piacente and Lord (2014), this phase is the crux of the exhibition. The success of the event is dependent on the visitors' feedback and response to the gallery. Within the virtual space, this feedback is done through the online forum or chat groups. The feedback could also be found in the feedback or survey platform ending the guided exhibit. It could also be done through online poll pop-ups. There are varying means of achieving feedback for improvement and gathering comments for publicity purposes. The students need to decide which avenue to pursue and the degree to which visitors are persuaded into providing feedback.

As shown above, the outcomes of the virtual art exhibition program are cemented through the following interdisciplinary mechanisms, such as teamwork and collaboration, publicity, network, and logistic. Time management is essential to keep track and adhere to timelines for the completion of tasks. Throughout a sequence of virtual studio works, students collaborate in teams to solve a problem. Communication skills are important. Taking on problems requires students to learn how to communicate concerns, to take on other people's perspectives and views.

Leveraging on Different Virtual Gallery Platforms for teaching and learning

Interesting applications have been developed in recent years, bridging arts and 3D virtual worlds (Kim et al., 2007). Research has highlighted the positive effects that emanate from the use of 3D virtual worlds in the development of thinking processes related to art planning, learning, and assessment (Taylor, 2014). In pressured teaching environments, online platforms, such as Arts Steps, Artland, Roomful, 3-D Art Gallery 2, offer ready-made and immediate solutions for the student.

Virtual art spaces serve their purpose well. According to Julian and Crooks (2011,), the platform also creates "a sense of presence as well as offering opportunities to display art, to share aesthetic experience, to collaborate with others, and to connect over geographic distance" (p.5). Within the field of curatorial work, the exploration of space is essential. The virtual space allows one to experiment with space and experiment with the arrangement of artifacts without the fear of damaging artwork.

Added to this advantage is that 3-D augmented reality technology has now enabled artworks to be scaled to their actual size in proportion to other pieces of works and furniture found in the virtual space. The textures of the pieces can be made as photorealistic as possible. This allows the artworks to be presented as it appears in reality when they are zoomed in (Rahn and Kjaergaard, 2014).

Each piece can be accompanied by the information of the artwork, including its dimension, the author, the style of the artwork (e.g., oils, acrylic on canvas), as well as the write-up of the artwork. Introductory statements to the gallery could be made pasted onto the walls of the exhibit. Guiding the gallery walk is a combined walk tour that could be created. The "curator" could position each guiding point where commentaries on the artwork can be created.

Viewers could take their time to virtually move around the gallery, move back and forth between the artworks to gaze and compare the different art pieces. Within the virtual space, they could also share their thoughts and work with others. Thus, though geographically distant, the different visitors occupy the same virtual room and examine the same art at the same time (Julian and Crooks, 2011). The added layer to this platform presentation includes text comments by guests or visits to the gallery generated over time from student groups across different disciplines and other visitors. The

engagement could bring about rich discussions of the exhibits, along with interactive exchanges and feedback for the student curator.

Through the multidisciplinary learning approach, students are not only able to make connections between concepts across different disciplines; they are able to utilize the knowledge acquired and applied in one discipline to another as a way to enhance and deepen the learning experience. Other than surface learning, where students acquire the technical skillsets, deep structure learning also occurs through the constant negotiation/ confrontation of exhibition ideas and through the production of virtual space design ideas and artifacts and continuous feedback from their instructors or appraisals from the team panel.

Learning Opportunities from Art Gallery Project

Worldwide, internet use is achieving phenomena growth rates, 4.66 billion active internet users as of January. Southeast Asia represents a growing region with high internet penetration rates (Statistica, 2021). Universities in Southeast Asia have fast been adopting immersive technologies but have yet to fully capitalize on ways in which 3D Virtual Reality could be used effectively. According to a report by Technology in Asia, Asia is predicted to lead the augmented and virtual reality markets by 2020, which are estimated to be worth $120 billion by 2020.

According to Van Laar et al. (2019), the creative industries worldwide are at the forefront of applying new technologies, which are described as state of the art. This gives rise to exciting possibilities of ICTs use within the field of the Arts for interdisciplinary teaching. The identified 21st-century digital skills are technical, information, communication, collaboration, creativity, critical thinking, and problem-solving (Van Laar et al., 2017, 2019), as expressed through the above virtual art project activity. Through the process, students will learn to manage self-goals and adapt to a different environment, issues and problems encountered. They also learn to embrace differences, respect diverse perspectives and opinions from others of different races and cultures working in the same team in Singapore's multicultural settings. These are contextual skillsets mentioned at the beginning of the paper.

The virtual gallery multidisciplinary approach provides opportunities to develop creative skillsets. It is useful for students seeking a creative visual art career. It could also be a start to immersive

virtual training for other students wishing to venture further into the multidisciplinary work with visual and service design elements.

Students could assume a variety of roles that they otherwise not have the opportunity to do so. The activity can also be a strong introduction to a career within the Arts field. For non-artists, the opportunity to experiment in media, art can open a new help to determine their interests and move into an industry that requires multidisciplinary thinking. Students could also cultivate their talents in what will be the best and most rewarding field for them. To us, learning through virtual space is not considered just a cognitive process. It is also a product of socio-cultural interactions amongst different students. Through the exploration and interaction with a wealth of visual and contemporary ideas, students have the opportunity to build new cognitive schemas based on their previous experiences and perceptions (Mikropoulos, 2006). The virtual art platform could also potentially be a platform for virtual galleria projects created by the multidisciplinary community at University, further enhancing their learning experiences at the University.

Reflections on the Project

Our own personal observations are that setting up a multidisciplinary learning approach involving virtual learning could be challenging. It involves much time and effort in planning, executing and co-ordination with different parties across different schools. Tasks, activities also tend to be more complex, and this requires careful planning and collaborations between disciplines. Planning also has to be very tight, with stringent deadlines given at each stage of the project. The virtual learning dimensions could also entail further virtual training so that students are able to use the virtual platform. Given that the process involves diverse learners from different fields and backgrounds, considerations have to be given to support the diverse learners' needs, so as to negotiate the different disciplinary meanings and practices. The benefit of the process for students, however, is the valuable opportunity to gather cross-disciplinary experiences and the acquisition of disciplinary thinking outside of their own fields.

Broader Implications

We believe the proposed approach has curricular implications for international higher education sectors. The use of virtual learning need not to be expensive affair as the current virtual platform has low

barrier entry, and it does not require heavy investment in technological development and set ups. What is crucial is how we plan the activities around a project to offer possibilities of multidisciplinary opportunities for collaboration and learning. In addressing COVID-19 challenges, the virtual learning approach within a multidisciplinary setting holds much promise for educational administrators and policy makers in that it reduces the need for physical meet ups whilst ensuring safety amongst students and delivery of lessons in the most efficient manner.

Conclusion

This paper introduces a virtual art gallery pedagogy as a means to introduce interdisciplinary skillsets to students. It has provided some guidelines pertaining to how the virtual gallery platform could be used for interdisciplinary teaching. Situated within the worldwide trend of Universities needing to future-proof students with interdisciplinary skillsets and the rise of virtual reality use in Asia, the use of virtual art platforms will go a long way towards serving the needs of students at Universities as it continually evolves in enhancing tools for professional work. With the virtual world fast becoming a reality, there is a greater need to leverage immersive technology for multidisciplinary practice within the curriculum and teaching. The project-based virtual art gallery approach is one of them.

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Author Bios

IVY CHIA, Assoc Prof Ivy Chia is the current Head of Programme for Arts and Music Education. Her interest lies in exploring the different pedagogies for creative arts and interdisciplinary work. She has been pursuing the use of immersive technology and mobile platforms for enhancing interdisciplinary teaching and learning.
Email: ivychiasm@suss.edu.sg

JUNE TAY, Assoc Prof June Tay is the current Head of Programme for Digital Media. She currently works on immersive technology for teaching and learning. She has developed mobile apps for mobile teaching and learning, and has also explored the use of Blockchain Technology for educational and multidisciplinary uses.
Email: junetayhm@suss.edu.sg