CHAPTER FIFTEEN

Art Apart: Collaboration and Disruption
in the Virtual and Augmented Immersive Space

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Since 2003, there have been a number of academic papers discussing the adoption of new technologies into students' learning experience. A number of these papers have focused on augmented reality and virtual reality tools, and discuss how they can be utilised in educational settings. For example, Danakorn Nincarean Eh Phon, Mohamad Bilal Ali and Noor Dayana Abd Halim (2014) state the importance of collaborative learning using augmented reality. They review existing literature on augmented reality highlighting 'how it was used in previous researches and its potentials in the educational field' (2014:1) in terms of its application to art history, science, maths, language, literacy skills, animals and the environment. Julio Carero and Julio Barroso (2016) acknowledge the physical senses of sight, hearing, smell, touch and taste should be utilised within an educational environment using augmented reality and virtual reality tools. Jorge Martin-Gutierrez, Beatriz Anorbe, Carlos Efren Mora and Antonio Gonzalez-Marrero (2017) further discuss the advantages for using virtual reality and augmented reality in students' learning process. All these papers clearly explain the justification for using augmented reality and virtual reality for the learning environment. Carero and Barroso (2016) refer to generating a multi-dimensional learning environment that takes into consideration human perception. They briefly refer to the haptic method in the learning environment. Unfortunately, discussion of augmented reality and virtual reality within a fine art discourse or consideration of the diverse range of students entering university education with various disabilities appears currently missing from the

literature discourse that I have so far highlighted. The aim of this paper is to address these gaps.

Thinking About Haptic Possibilities and Collaborative Making

The act of making requires many sources that all creative people are familiar with in their various practices. The process of creating at times is a division of labour for people working independently, but equally the act of creating can function as a fully articulated collaborative process. Even though visual perception is important for collaborative work, this is not the only sense that can be used. Art students can have problems with hearing, can be visually impaired, autistic and have other issues that influence how other people engage with them.

Individual students with autism may have problems with social interaction, verbal and non-verbal communication. Engagement and understanding is one disruption because new forms of communication needs to be found. One way to consider how art students can engage in collaborative processes is to focus on a haptic sensory approach, which all students can benefit from. The haptic approach encourages the use of touch, in some cases smell, along with sound and sight for those students who use these other senses. The social construction of collaborative knowledge is involved in selecting multiple strategies for communication and engagement. When working within an augmented and virtual reality immersive environment the haptic sensory approach with other selected strategies are important. Augmented and virtual reality involve multi-modals for mobile phones, tablets, laptops and desktop computers. The engagement of multi-sensory and multi-modal collaboration relates to the pragmatism of human existence. According to William James, 'What really exist is not the thing made but the thing in the making' (1998:60) and 'putting yourself into the making' (ibid.). John Dewey has a similar idea of pragmatism; 'Knowledge and knowing are centred within the existential matrix of society, as in the examination of real things in everyday life, not abstract knowledge or abstract thought' (Dewey in Whale, 1967:9). He

limits the possibility of conceptual knowledge, while James allows conceptual thoughts to be part of the making process. Collaborative engagement requires both a subjective also objective interaction to develop ideas in an augmented and virtual reality immersive space. It is important to understand collaboration creates an inclusive teaching art environment that helps increase social situations and social support for all students.

Augmented reality is an interactive experience on a real-world environment whose augmented images are produced by computer generated perceptual information. Virtual reality is a computer-generated simulation of the real world. Augmented reality and virtual reality require visual spatial information. Mental mapping of spaces, navigating though spaces, is an essential for mobility skills and orientation. Visually impaired art students would have problems in generating efficient mental maps and navigating spaces without the use of multi-sensory strategies. Autistic students are good at engaging with multi-sensory strategies to develop spatial awareness, and deaf students use multi-sensory strategies to navigate their environment.

Haptic sensory approaches depending on touch provides information by skin. Now there are two terms used to describe how the skin supplies information. First, proprioception enables an individual to have awareness of their body's position in a given space and secondly, kinaesthesia enables an individual to have knowledge of the movement their body makes within a given space. Wireless technology for mobile phones, tablets and laptops improves the mobility experiences of the visually impaired. In addition, objects with different surfaces and shapes help to comprehend the environment. Virtual reality wearable devices such as wristbands and belts enable fingers to read or transmit information, while camera headsets creating 3D objects constructs distant spatial awareness, as well as creating a depth map and a tactile presentation of the objects by using a tactile interface. These tools work for autistic students as well. It is possible for art students to control the shape, density and texture

of the 3D object. Audio sensory approaches work for augmented reality and virtual reality. By combining automatic speech recognition, text-to-speech with either augmented reality devices or virtual reality devices, this form of communication can be useful for collaborative work for the visually impaired. For art students with hearing problems, the same approach is possible but instead the sound becomes displayed text that they can read. Letters on augmented reality markerless forms exist for this function. Augmented reality images are made between two distinct modes of tracking, known as markers or markerless forms.

Taking into account the various options available for augmented reality and virtual reality devices, collaborative work becomes more of a possibility for many art students interested in exploring collaboration. Working as a team on projects does require students to consider what strategies are useful for creative processes and what they aim to achieve. Working collaboratively requires each student in the team to listen, read and speak. It is possible for all students to do research on the idea or ideas they want to explore. Already, it is possible to assume that all students will do this in the same way but this is not necessarily true. Researching for collaborative work becomes another disruption. Yet, there are different ways of researching. Visually impaired and autistic students can listen to audio material. Unfortunately, not all research material is available in braille. Deaf students can read text or have people help them with research. Visually impaired, autistic and deaf students can touch objects. It is now common practice for students with some disabilities to have note-takers and study skill writers with any work involving textual communication. Educators have to engage with these additional supporters when setting up collaborative projects for their students. It also means able-bodied students equally have to engage with these additional supporters and include them in their decision making as well as strategies when working on collaborative projects. This point is made clear by Richard Simpson who states,

Collaborative consultation is the most efficient and effective means of supporting general education teachers working with students with ASD (autistic spectrum disorder), and preparing them to generalise and sustain problem-solving programmes learned in collaborative consultative relationships (Simpson et al, 2003:119)

This means that these other students without hearing or sight problems can read, touch and listen as part of their research. They might look at the same material or look at different material. The difference in the collaboration process is how each student collates the research information and shares the information with the team. Even though students might be looking at the same research material, they might not be seeing, reading or listening in the same way. Students can interpret their research differently.

Collaborative Making and Producing Research

As a team, they are already producing research for the project that is encountering its second disruption. They are all producers and transfers who have to give access to information. This information shifts from a sending task to a receiving task. It should not be forgotten, as receivers of information they are also the first audience taking in the information, making them participants and audience, which is having an impact on how they are learning as collaborators. They build a relationship with each other resulting in privileged access to information. The content of the project and its reception by the team can enhance the creative experience. Each creative experience process entails multiple simultaneous creative interactions. If visual mapping is used to explain research findings to the team, how the visual mapping is constructed will have to be considered to ensure visually impaired students are receiving the information. If visual mapping involves raised surfaces then it is important to consider what is going to be raised to ensure visually impaired students are

engaging with the information offered. If visual mapping involves creating 3D objects then it is essential to consider what information is turned into a 3D object. If visual mapping involves a PowerPoint presentation, how the presentations is put together requires consideration. Visually impaired students might want to take notes. If audio mapping is used to explain research findings to the team, how that information is made available to deaf students needs to be equally considered. In some cases, a student might have a person who can sign language that information but if this service is not available, other methods can be used. As this is research for the team, it might be easier to provide focused structured notes during the discussions but some students might want a full transcript to make their own notes. In addition, deaf students will engage with any form of visual mapping and could take different notes alongside notes handed to them or taken from a full transcript. Autistic students can work with visual material with the same consideration in ensuring the information is understood. Audio mapping might be difficult for autistic students because certain sounds might be distracting. It is important that those teaching, inform the team members what sounds may have negative effects on autistic students in the group. This makes it possible to choose the right sounds for these students to engage with audio material. Yet, autistic students can be shown how to listen by breaking the audio material down into sections and creating a pattern for autistic students to follow while they are listening.

The other possibility is performing the information to the team where touch becomes part of the performance. It might be possible to use the meeting space as a laboratory where touch, visual and sound are considered as textual contribution to the experience of language. The inarticulateness of human speech has its own touching equivalence in the human body. This approach can be seen as a device for discourses and organisational structures pertaining to cognition and embodiment. Sami Pihlstrom (2007) refers to this embodiment. He states, 'Actual practice on inquiry itself is theorisation firmly rooted in its human practical context'

(2007:2) and goes on to suggests that 'for some other purposes it might be better to adopt another scheme in which such elements do not exist irreducibly' (ibid.3.).

This makes the team's research process a subjective and objective one but also a combined quality of perception. To stress the point about textual language and perception further, Ruthlellen Josselson (2011) discusses how language is comprehended;

> A hermeneutics of restoration aims to be faithful to the text and restore its explicit and implicit meanings. The purpose is to absorb as much as possible the message in its given form and to the present, explore or understand the subjective world of the participants of the social and historical world they feel themselves to be living in. By contrast, a hermeneutics of demystification regards the text as disguised. Signs are read according to some procedure of meaning making…From the position of a hermeneutics of demystification, attention is directed to the omissions, disjunctions, in consistencies and contradictions in an account. It is what is latent, hidden in an account that is of interest rather than the manifest narrative of the teller (2011:6)

It is common knowledge that autistic students, in the main, do not want to be touched and the performative approach will not work with them. However, instead of touching visual material can be produced alongside the performative approach to help convey information and ensure understanding. Yet, another problem can arise with the visual material. Some autistic students might not like particular tactile visual material and team members need to be aware of this when working on a collaborative project. They might show a need to explore through touch but they will avoid things they do not want to touch. In the gathering visual material for the project, autistic students might need to move around and giving students the space to do so is important providing the space is managed by teaching staff but remains inclusive for all students involved in the project. Autistic students will need calm spaces and this can benefit

all students on the collaborative project. All students will have to understand how autistic students on the project relax and build this into their collaborative project. Time management becomes important to the collaborative project for all students involved. This will ensure that all students have enough time to process as well as absorb visual, textual and audio information.

Collaborative Making and Communication

Having prepared the ground for collaborative teamwork there is an awareness of working effectively. However, how does that translate into augmented reality and virtual reality environments? Both augmented reality and virtual reality construct different levels of reality. The overlaying of one reality on top of another becomes very structured. To comprehend what and how things are structured information needs to be gathered. To make sense of the world in pragmatic theory means human experience must involve a sense of inquiry to put 'yourself in the making' (James, 1998). Becoming part of the immersive space in augmented reality and virtual reality enables students to gather information. Sight is often the first sense considered with augmented reality and virtual reality forms. Patrick Licht (2014) suggests, 'in the experience/performance of AR [augmented reality], there is placement of one or many elements between the eye and the recognised target, as well as the gaze of the agent in experiencing the piece' (2014:100). Yet, becoming part of an immersive space can be described as emerging or evolving human experience where touch, sound and not just sight are used as part of that human experience. The embodiment of virtual reality similar to augmented reality require structural categorisation and flexibility: 'indeed, the significance of the concept of emergence itself arises from the human need to take seriously various different 'levels' of human experience and world experience in a heuristic sense' (ibid).

The hardware equipment of augmented reality and virtual reality are just as important as the software for students to work collaboratively. Hardware and software equipment requires understanding of their functions. Explaining the functions of hardware and software cannot involve all the strategies used in researching the idea or ideas of the collaborative project.

Using the visual mapping strategies could work providing the focus is on PowerPoint presentations with audio and 2D visual mapping along with text. This will enable visually impaired and deaf students, also other students to receive the precise information that is required to comprehend the functions of the hardware and software. The performative approach discussed earlier as a visual mapping strategy would not work well here, as the practical functional terminology of the hardware and software would be difficult to translate in this form.

To see how much information is comprehended, each person is required to do a presentation to the team, that fits their style of delivery, but they have to ensure their information is being received. This means that all students will have to do a visual, text base and audio presentation. Moving images and sound provide ways to experiment as well as engage the team. The team will support each student on their individual presentation at the beginning but afterwards they have to work on their own but at the end, they have to produce one report.

This is because the creative experience at this form of engagement and communication becomes more analytical in a systematic framework. At this stage, as a team they are still the first audience where they discuss and share their thoughts. They are producing information that focuses on techniques and ideas relating to their project. They are finding solutions and approaches for their project. Yet, they are also researching theory relating to their topic and discussing theories. The visual, audio text produced becomes a

combination of a report and essay. This written object is another form of disruption because in academic institutions students are asked to produce either a report, blog or an essay. This approach to the visual, audio text as a written object creates a more flexible creative engagement with the expectations of the project. It is created for the team members but also a bigger audience. The interpretation of the text is based on individual perceptions with each person using their own experiences and attitudes to comprehend it. The broader audience will engage with the written object in their own way depending on guidelines produced by the team. However, this approach to collaboration is linked to pragmatic theory. Collaboration requires inquiry, knowledge and action, allowing concepts to 'emerge as ways to solve a problematic situation' (Stepanov 2019:5) where things 'exist as tools and plans of action and are created by an experiencer' (ibid). Team members will have different experiences. To enable collaboration to work there has to be a unified cognitive understanding, where the interpersonal and personal perspective become one. The inter-personal perspective perceives the world in contextual frameworks. This is where inner-subjectivity and participation occurs.

The personal perspective perceives the world in contextual frameworks, but this requires subjectivity and existence to understand what is being perceived. However, there is the psychological process of inner-subjectivity, which emphasises shared cognition and consensus, the subjectivity of pragmatism requires individuals to be involved with the world with other people. Yet, objectivity equally plays a role because as individuals we have to acknowledge a pre-existence that becomes embedded into our knowledge and experience of the world through the process of making. Karl Popper (2005) states, 'objective reasons too many times serves as 'subjective causes of judging', in so far as we may reflect upon these reasons, and become convinced of their agency…but with events which on account of their regularity and reproducibility, are in principle inter-subjectivity' (2005:23). With this unified notion of pragmatic theory relative spatial operations when using augmented reality and

virtual reality become natural and intuitive, for instance, the movement of the head, finger gestures, the placement of feet and arm movements.

Once these collaborative relationships are formed, the project can develop further. All the team members have to deal with the real (physical) space, the augmented reality space and the virtual reality space. All these three spaces require action of the participants. They have to interpret the virtual space, the augmented space and the interactive possibilities these spaces create in the real space. They have to communicate with computer functions and become signs themselves to explain, show what these computer functions mean including do. The use of haptic sensory approaches enables surfaces to be created for visually impaired students; audio can be turned into visual signs and visual text for students with hearing problems. Audio can still be used as an audio tool for other students. All the students can use these approaches to work on a collaborative project. To stress these points further, each member of the team has the same common objective for the project. Their position in the team dynamics is the same. They have equal responsibility; everyone supports their strengths and weaknesses. They have to ensure the production of their project as the project cannot happen without the input of everyone.

To sum up, collaborative projects can have a purpose for all students when working with augmented reality and virtual reality. The reshaping of the creative and collaborative process can arrive at a more constructive engagement. At moments, there can be disruptions but these disruptions are not displacements. Instead, the disruptions are a more complex system of creative energy and communication. The disruptions give insight to the team members enabling them to develop the idea or ideas of their project. As the first audience communicating with each other, they need this way of working to ensure what happens at the next stage of engagement for another audience, is clearly communicated.

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