Virtual World Construction and the Relationship to Creativity in Art Education

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Abstract: This paper presents findings from a participatory observational case study with a perspective on creativity. In this research, high school students from Vancouver, Canada, worked in the virtual world of VCER (Virtual Commons for Education and Research), an Open Simulator, to create an ecosystem. The main research question of this study was: How can the virtual world creation process foster student creativity? The sub-questions were 1. How do students express their creativity through the virtual world creation process? And 2. What can teachers do to further student creativity?

Keywords: Virtual worlds; Creativity; Technology.

The strong relationship between creativity and art has been recognized for decades. According to Freedman (2010), art education is about the value of creative thought and action. Especially with the booming digital technology of the 21st century, creativity has become one of the most important skills for students to develop (Partnership for 21st Century Learning, 2018). Creativity and innovation require students to develop creative thinking skills and working styles and to have the ability to implement innovations (Partnership for 21st Century Learning; see also Bastos, 2010). Teaching art-making in school helps students to develop these skills (Csikszentmihalyi, 1996). Zimmerman (2009) also states that creativity in the digital age is not only about creative self-expression, but art educators need to foster students' imagination and creative thinking to help students to find and solve real life problems.

This paper presents findings from a participatory observational case study with a perspective on creativity. In this research, high school students from Vancouver, Canada, worked in an Open Simulator virtual world to create their ecosystem. The main research question of this study was: How can the virtual world creation process foster student creativity? The sub-questions were 1. How did the students express their creativity through the virtual world creation process? And 2. What can teachers do to further student creativity?

Literature review

To provide a clear conceptual framework for the readers of this paper, the literature review focuses on creativity in relation to art education and technology. I specifically focus on creativity in using technology, creative self-expression, responsibility, problem solving and finding, peer-assisted learning and group collaboration, intrinsic motivation and play, and creativity in educational environments to provide a foundation for this research.

Definition

Creativity "is not a scientific concept, it's a culturally and historically specific idea that changes" according to place and time (Sawyer, 2011, p. 36); hence, the definition of creativity has changed throughout time (Freedman, 2007). Many articles have discussed the history of creativity in art education in depth (Zimmerman, 1999, 2005, 2006, 2009; 2010; Bastos & Zimmerman, 2015; Davis, 2015); therefore, I am not going to repeat this discussion here. Instead I will define

what creativity means for this study. Csikszentmihalyi's *systems model of creativity* is adapted as the theoretical framework of this paper. Creativity is a sequence of ideas and actions that leads to new ideas or products (Guilford, 1950). According to Csikszentmihalyi, creativity results in interaction among "the group of gatekeepers who are entitled to select a novel idea or product for consideration" (as cited in Csikszentmihalyi & Sawyer, 2014a, p. 68), the domain or "symbolic system of rules and procedures that define permissible action within its boundaries" (p. 68), and the individual "who brings about some change in the domain" (p. 47). In Zimmerman's (2010) words, creativity is not only about self-expression; it "is a complex process with relationships among people, processes, products, and social and cultural contexts relevant to a domain of knowledge" (p. 84). Similar to Csikszentmihalyi (1996), Sawyer (2011) identifies individual creativity as little-c, when creativity focuses on the individual level and occurs on a daily basis. On the social-cultural level, when creativity is recognized by the field or domain, it is recognized as Big-C. Creativity is about "problem-finding, problem-solving, divergent and convergent thinking, self-expression, and adaptability in new situations" (Zimmerman, 2009, p. 392). Using Demir's (2005) argument, creativity can be strengthened and needs to be nurtured and exercised. To conclude, creativity is not only about individual self-expression, but also occurs when an individual or individuals bring new ideas to benefit society that are accepted by experts in the field.

Creativity in Using Technology

Many research papers show how, through the creative digital process, students transform something known into something previously unknown (Freedman, 2010; Shin, 2010; Zimmerman, 2009; Marshall, 2005). Black and Browning (2011) also state that the interaction with technology develops students' "problem-solving skills, visual reasoning skills, and creative thought exploration and expression" (p. 20). According to Tillander (2011), "digital technologies are changing what it means to create and what is promoted as cultural innovation" (p. 40). For Tillander, it is important to explore the innovative uses and misuses of technology and to uncover the hidden possibilities of technology.

By completing creative digital assignments, students can become skilled in using the tools while gaining knowledge of ways in which to use technology creatively (Lu, 2013). They can combine past experiences with new ideas and express themselves while learning new software. Through the process of digital creation, students can build self-esteem and approach digital art education assignments more confidently (Black & Browning, 2011, p. 21). Black and Browning also suggest that it is not necessary for the teacher to know everything about a particular software, but teachers should be willing to learn from and with their students.

Creative Self-expression

According to Zimmerman (2010), creative self-expression became dominant in the art education field in the late 1930s, and this dominance lasted for over 50 years. "Creativity was regarded as being innate and developing naturally without imposition of adult interventions. A teacher's role in a visual arts program was to provide motivation, support, resources, and supplies, but not to interfere directly in students' artmaking activities" (Zimmerman, 2009, p. 384). Eisner (2002) agrees that the arts are about expression, in that art helps humans discover their emotional selves: "all art students are entitled to freely develop their own bodies of work, become enlightened through critical thinking and creative art processes, and be able to express their own creative reactions to the world about them" (Zimmerman, 2010, p. 90).

Responsibility

To be creative is to be useful to an individual or a group (Freedman, 2010; Milbrandt & Milbrandt, 2011; Manifold, 2015). In other words, creativity is not only about the individual, but how the individual's creativity changes the field or domain (Csikszentmihalyi & Wolfe, 2014; Mockros & Csikszentmihalyi, 2014; Nakamura & Csikszentmihalyi, 2014). According to Nordlund (2013), creativity involves people turning their attention not only to themselves but also to the society. In summary, creative individuals are not only concerned with their own problems but with social responsibilities.

Problem-solving and Finding

As many scholars highlight, one of the most important elements of creativity goes beyond exploring novel ways of problem-solving by considering innovative thinking on problem finding within a particular cultural context (Black & Browning, 2011; Demir, 2005; Tillander, 2011; Zimmerman, 2009). According to Freedman (2010), creativity in visual arts involves risk-taking and requires courage to bring concepts and skills together to create a new meaning to persuade viewers to think differently or to take action. Bryant (2010) proposes five strategies to promote creative problem-solving in art education: "Open-Ended Assignments; Pre-Production: Mind-Mapping, Brainstorming, Storyboarding; Inclusion of Symbolism or Metaphor; Peer Conversations; and Critique" (pp. 44-46). Csikszentmihalyi and Sawyer (2014b) present a method for problem discovery. They indicate seven prerequisites to be met when problem finding: (1) through one or more knowledge domains; (2) immersion in a domain; (3) attention on a problematic area; (4) internalization of information; (5) interaction with information from other domains; (6) ability to recognize a new configuration; and (7) ability to evaluate and elaborate the insight. In short, the problem finding and solving processes require having knowledge and immersion in a domain and paying attention to problematic areas, internalizing and interacting with relevant information to related domains, recognizing a new solution, and finally evaluating the solution.

Peer-assisted Learning and Group Collaboration.

Much research shows the importance of peer-assisted learning and group collaboration during the creative process (Bryant, 2010; Hooker, Nakamura, & Csikszentmihalyi, 2014; Shin, 2010; Sowden, Clements, Redlich, & Lewis, 2015; Zimmerman, 2009). "Often creative forms of work and creative ideas are forged within a small group of colleagues" (Hooker et al., p.220). As Zimmerman (2009) states, "creativity is a complex process that can be viewed as an interactive system in which relationships among persons, processes, products, and social and cultural contexts are of paramount importance" (p. 386). Sawyer (2007) also points out that improvisation is the key to creating innovative products. According to Bryant, students like to ask each other for help, and collaboration empowers students in the class. Moreover, peer-assisted learning provides a milieu for divergent thinking, which is key to the creative thinking process (Sowden et al., 2015; Shin, 2010). Sawyer suggests that group collaboration needs to start from detail. It is risky and inefficient, but educators should allow time to let creative products emerge.

Intrinsic Motivation and Play

Researchers suggest that intrinsic motivation has a strong relationship with creativity (Csikszentmihalyi, 2014; Csikszentmihalyi & Sawyer, 2014; Csikszentmihalyi & Wolfe, 2014; Jaquith, 2011). In other words, self-directed learning is the key to creativity (Zimmerman, 2010). Zimmerman notes that creativity should be focused on "child-centered and society-centered art education placed in a contemporary studio-centered practice" (p. 4, see also Kelly, 2016). Research

on intrinsic motivation addresses the creator's enjoyment of the work itself (Amabile, 1997). According to Csikszentmihalyi and Wolfe, "People report the most positive experiences and the greatest intrinsic motivation when they are operating in a situation of high opportunities for action (Challenges) and a high capacity to act (Skills)" (p. 173). Freedman (2007) argues that when students are engaged through their interests, learning is more effective.

"Play, exploration, curiosity, and innovation are linked behaviors" (Goetzzwirn & Vandezande, 2015, p. 241) because play is about problem finding and solving, divergent thinking, and flexibility (Gude, 2010; Jaquith, 2011; Zimmerman, 2009; Salazar, 2015). From Nordlund's (2013) perspective, we are playing when we make art. We construct and translate the world, create new things, and take risks. Zimmerman (2010) notes that "creativity can be approached through a pedagogy that honors students' often challenging attitudes and beliefs, confronts social norms, and at the same time embraces fun and play as important ingredients of self-expression" (p. 4). Finally, Gude (2010) suggests that art teachers should provide students with opportunities to engage in "creative play" (p. 36) and encourage students to make observations of their inner experiences.

Creativity in Educational Environments

Recent research indicates that creativity skills are observable, learnable, and can be cultivated (Amabile, 1997; Goetzzwirn & Vandezande, 2015). For Kelly (2016), educators should take a teacher-as-designer role by creating learning environments that facilitate students learning to be engaged in a global world. However, creativity can be troubling; it is important to help students understand that making art may mean making trouble for previous ideas and images (Black & Browning, 2011; Freedman, 2007). Art teachers should, according to Zimmerman (2009), be "knowledgeable about subject matter, communicating effectively, using directive teaching methods, making classes interesting and challenging, and helping students become aware of contexts in which art is created and why they and others have needs to create art" (p. 393; see also Jaquith, 2011, pp. 18-19). For Gude (2010), psychological safety and freedom foster creativity, and these are rooted in the trust of freedom of expression.

Educational environments should provide well designed learning experiences and corresponding assessments that can be conducive to creative development. Csikszentmihalyi and Wolfe (2014) provide some suggestions for teachers to consider when fostering student creativity which includes considering students' interests to foster intrinsic motivation and flow, encourage problem-finding and internalize the learning. These implications are based on the level of domain, where they ask: 1. How attractive, accessible, and integrated is the information presented to students? 2. Are mentorships or apprenticeships provided? Schools and teachers should also ask: 1. Is there funding that supports creative ideas? 2. How open are teachers to new ideas? 3. Do teachers stimulate students' curiosity and interest? 4. Can teachers distinguish good new ideas from bad ones? and 5. Are there ways of implementing student creativity in the school? (pp. 178-179). Csikszentmihalyi and Sawyer (2014) also suggest not filling the students with "goal-directed, conscious, rational problem solving" (p. 70), but instead allowing time for unanticipated combinations of ideas to be generated (see also Jaquith, 2011; Sawyer, 2007).

Research Method: Participatory Case Study

I used a participatory case study as the research methodology. Stokrocki (1997) explains participatory observation as multi-person, multi-method, multi-conceptual, and multi-dimensional. My methods included observations with field notes, semi-structured interviews, and an initial survey. In this research, I was the observer as well as the co-instructor and assistant in the class. As Bogdan and Biklen (2007) note, the "foci in organizational studies typically are the

following: a particular place in the organization, a specific group of people, and some activity of the school" (p. 60).

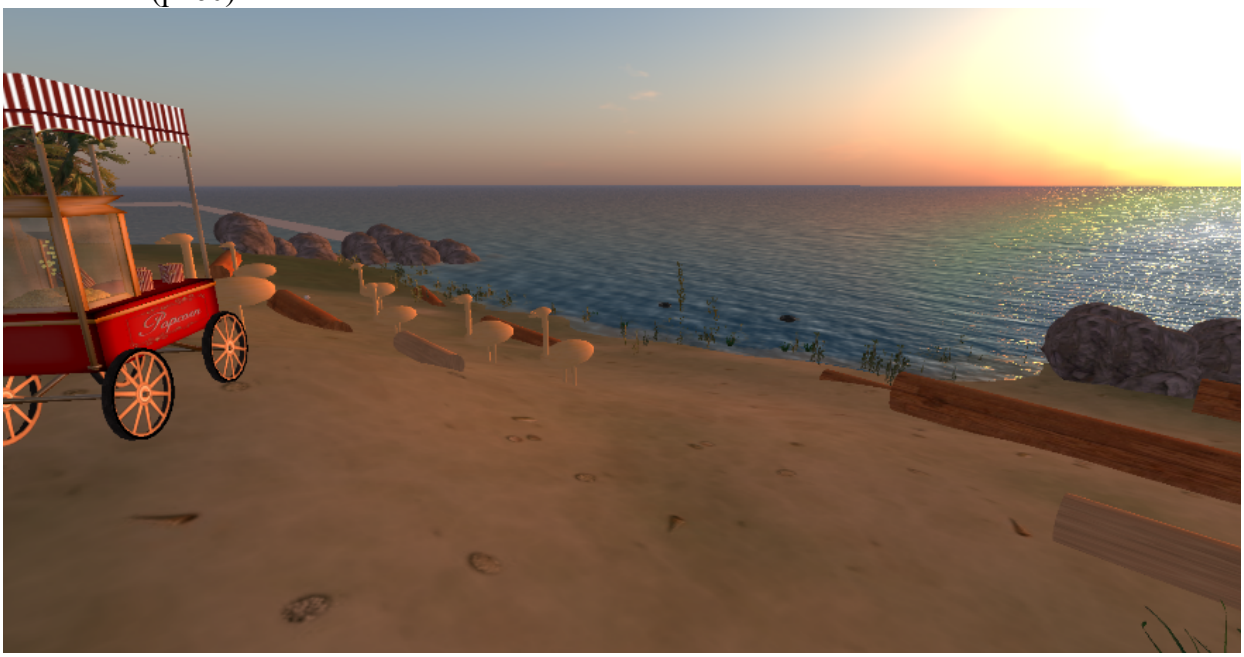

Figure 1. Virtual ecosystem created by high school student.

This research focused on a specific high school student group who used an Open Simulator (OS) virtual world to create a 3D animated virtual ecosystem. OS is open software that hosts a virtual world system, and the content is created by users (see Figure 1). In OS, users are able to create a more realistic world, and as high school students, the participants in this study stated that OS is like a higher resolution of Minecraft and they truly enjoyed this kind of realism.

When I first presented the research idea to the art teacher, I did not envision how the art teacher would unfold this unit. When the research started, I learned that the students and art teacher had an agreement that they were going to create this ecosystem as a "representational painting" project. They took a field walk observing their community and environment prior to the research's start. Therefore, the class formed an agreement on the definition of ecosystem before I became involved.

I created two separate virtual world regions for this research, one was the ecosystem area, and another one was a sandbox area. Students could create, experiment, and play with the software in the sandbox area. The idea of a sandbox area is similar to the sketchbooks used in art classes, where students can draft, experiment, and play with their ideas without worrying about how the experimenting process might sabotage the final project.

Data Collection and Analysis

This research was approved by the behavioural research ethics review, as well as the district school board review. Students' rights were well explained and discussed prior to and during the research. Parental consent and student assent were gained prior to the research project. Students were informed that they did not have to participate in this research. One student had an agreement with the art teacher for not being in this project before the research started and did not participate in this project throughout.

I assumed that a technology and gaming background might influence the students' learning and creativity in the virtual world, so the purpose of the anonymous survey was to understand the participants' technology and gaming background. Since there were not enough computers for all 18 students to use at the same time, paper surveys were used. The students filled out the surveys with pen, and I keyed the results into SPSS and coded the data.

With 18 participating students, it was impossible to interview everyone during one class period. Therefore, I provided anonymous open-ended interview questions on paper to each student for collecting their thoughts and reflections on this project. After the students read the questions, they were given the choice of having a face-to-face interview, a group interview with me, or answering the interview questions with pen and paper. Two students chose to have a face-to-face interview, three students chose to have a group interview with me, two students chose not to be part of the interview, and most of the students chose to answer the interview questions on paper. When analyzing the interviews, I used the classic qualitative method of coding (Robson, 2002). I followed the steps of interview transcription, coding, coding analysis, and text analysis.

I took photos of the class at work, snapshots of their virtual environment, and field notes while onsite with student permission given in their assent and parental consent forms. I also wrote reflection notes right after leaving the research site each day. All the notes were open coded and axial coded with the survey and interview data. The concurrent triangulation strategy "confirms, cross validates, and corroborates findings" within this study (Creswell, 2003, p. 217).

I used grounded theory as the foundation of this research. As Robson (2002) states, "a grounded theory study seeks to generate a theory which relates to the particular situation forming the focus of the study. This theory is 'grounded' in data obtained during the study, particularly in the actions, interactions and process of the people involved" (p. 190). This research's findings emerged from the data analysis.

Participants

The participating students, representing a variety of ethnic backgrounds, were in grades 11 and 12, and all were in the same art class. Most of the participants had 3D gaming experience. Only one student had experience creating a game in CryEngine with 3D Max software. Although there were 18 students, the total number of classroom computers was 8. Two additional computers were brought from home by students, bringing the total number of computers available for this class to 10. Therefore, most of the time the students needed to work together. And, because of this, there could be no more than 10 avatars working in the virtual world at any one time.

Findings and Discussions

The findings are divided into seven categories that align with the literature review: creativity in using technology, creative self-expression, responsibility and contribution to the world, problem finding and problem-solving, peer-assisted learning and group collaboration, intrinsic motivation and play, and creativity in educational environments.

Creativity in Using Technology

When replying to the survey question: What do you think an ecosystem is? I encouraged students to answer the question from what they knew, even though the students had an agreement on the definition of ecosystem. Although students were aware that the survey was not a quiz, more than half of the students wrote an answer they found in Wikipedia. This suggests that most students relied on technology to find answers before trying to think for themselves. The convenience of finding easy answers through technology may discourage students from thinking creatively.

This project used virtual world technology as the medium for collaborative student artwork. Most of the students enjoyed the process and wanted to participate in or use similar technologies for future art projects. When asked during the final class discussion if they learned something new in this project, the students stated that they had learned virtual world planning, construction, and scripting. The students said that they gained knowledge through the experience of working with the technology (Freedman, 2010; Shin, 2010; Zimmerman, 2009; Marshall, 2005). However, many of the students had not developed any content knowledge about ecosystems prior to the final class discussion. It was during the final discussion that students learned more about wild native animals and plants, as well as foreign species, in downtown Vancouver. That is to say, in this research, technology remained as a tool for student work. True learning of content, such as knowledge about ecosystems, still relied on teacher guidance and class discussion.

Creative Self-expression

This project echoed scholars' statements on creative self-expression (Eisner, 2002; Zimmerman, 2009, 2010). Since this was a class-based collaborative project, students were assigned to different groups for different tasks. Not everyone in the class created 3D objects in the virtual ecosystem; however, everyone created his or her own avatars (Ward & Sonneborn, 2009). Since the avatar creation and modification did not influence the final result of the collaborative work, there was minimal adult intervention in this part of the project. Students were able to freely develop their avatars, immerse themselves in the creative process, and express their own creative reactions to the world around them (Zimmerman, 2010). The research finding in this category can be divided into three sub-categories.

Figure 2. Some avatars created by the students.

Experimenting on their avatars: A male student created a very strange looking avatar, and this became a trend among the male students as many of them changed their avatars to look very strange (see Figure 2).

Changing their avatars: Through my observations, I noticed some students pausing in the middle of work on their assigned project to change their avatar. This "distraction" usually did not take long, and afterwards they returned to working on the assigned project.
Not attached to their avatars: I noticed many of the female students devoting careful attention to making their avatars "attractive" and many male students trying hard to make their avatars look non-human. I asked if they were attached to their avatars, the students answered: "No," this was just a game for them. Given this finding, it became clear that the opportunity for creative self-expression was important in this project. Avatar creation and modification was a task with which the students could take risks, have fun, and experiment without worrying about consequences. It was also an outlet for them to do something they could truly enjoy without the risk of ruining the final product.

Responsibility and Contribution to the World

Working in the virtual world provided students with a feeling of achievement. This echoes literature that asserts that to be creative is to be useful (Freedman, 2010; Milbrandt & Milbrandt, 2011; Nordlund, 2013). Even though most of the students did not create objects from scratch, but re-used pre-existing objects instead, they considered this re-use to be as important as creating new objects. They tried to transform an existing world (domain) into a new one (Csikszentmihalyi, 1996). This project gave social responsibilities (creating a virtual ecosystem that was agreed upon by the whole class) to the students, and most students tried their best to fulfill these responsibilities (Csikszentmihalyi & Nakamura, 2014). In addition to their feeling of contributing to the world, the students also expressed a feeling of achievement through the process.

Problem-solving and Finding

3D object creation can be done in multiple ways in Open Sim (OS), and the OS user interface is similar to other gaming software; therefore, students were comfortable using, experimenting, and playing with it. We started each class by discussing the local ecosystem, showing what had been created in the OS ecosystem, and what should be done by the end of the class. I also showed students what could be done in OS to help students envision what they could do in OS for their project. However, no step-by-step instructions were given. I provided colour-printed hardcopy handouts in the classroom, as well as video tutorials online, but no student ever picked up the handout nor opened the video tutorials on their computers.

Due to the possibility of OS, as well as the pedagogical design, problem-solving was essential to this project. No student had used OS prior this project; therefore, they all needed to learn how to use this software. Most of the students preferred to go through the problem-solving process by themselves. Many students reported that they liked this project because OS was not too difficult to navigate and because they did not easily get bored with it. During my observations, I noticed the students trying different methods to solve problems themselves. These research findings align with Bryant's (2010) five strategies to promote creative problem-solving in art education (see above literature review).

In this project, the building group was the group consistently trying to find different problems to solve. In the sandbox area, where their experiments would not influence the final product, they tried different methods to explore aspects of the virtual world. These started with simple object creation and moved on to collaborative object creation. Some students spent more time exploring the possibilities of texturing; some preferred to explore animation in the virtual world. I also learned some new OS creation methods from the students. Many of these tasks were not required for the project and were not noted in the lessons. However, students were curious about the possibilities of virtual worlds. Students also explored the possibilities of virtual worlds

in their avatar-creation process. Throughout this project, the students developed knowledge, immersed themselves in experimentation, and focused attention on problematic areas (Hsieh, 2015). They also internalized and interacted with information relevant to related domains to recognize new solutions and evaluate the solutions. These processes parallel the problem finding process proposed by Csikszentmihalyi and Sawyer (2014b).

Peer-assisted Learning and Group Collaboration

My research found that collaboration may increase student creativity; however, it may also distract from student concentration. Some students preferred to work in groups, and to help and learn from each other. During the project, five students created three avatars, which they used to work together on building one car in the sandbox area (see Figure 3). There was no prior discussion or plan drafted on paper for what this car was going to look like. These students dove directly into the creation process. They made changes based on what was created, negotiated the color and shape as they were building. Experimenting and making were both processes. This reflects Hooker, Nakamura, and Csikszentmihalyi's (2014) point that creative work is forged within a small group of colleagues.

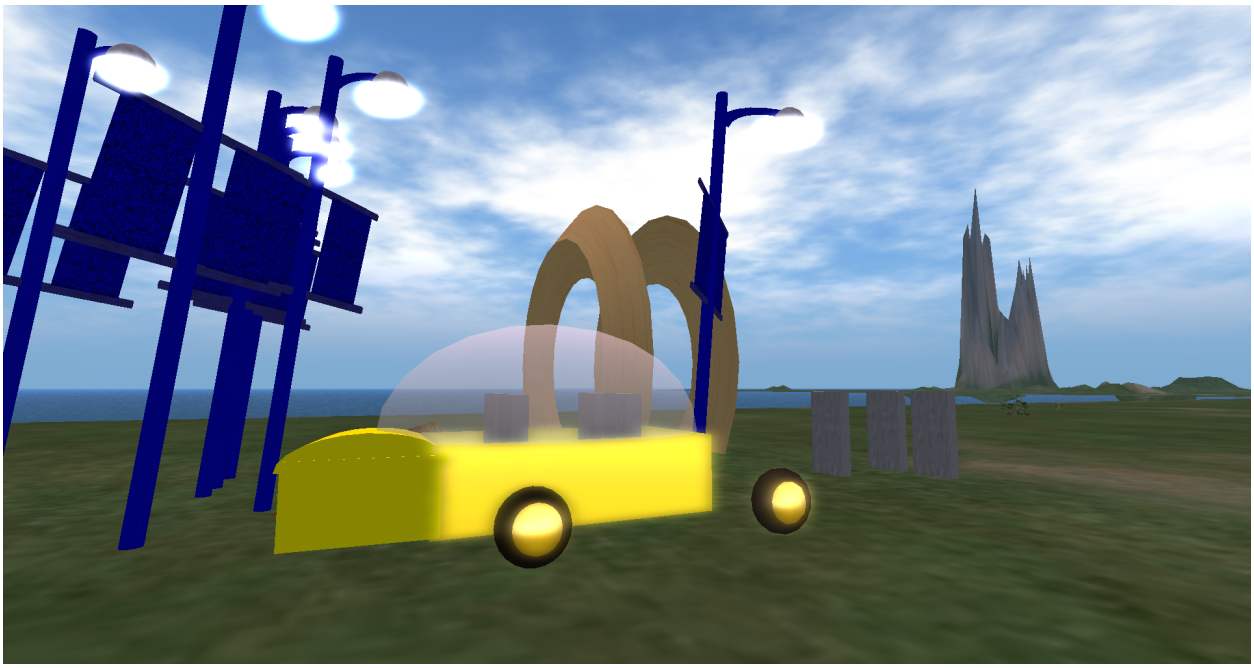

Figure 3. A car created by multiple avatars.

Two male students on the sound team tried hard to teach a female student on the team how to use OS to place a sound they recorded. The female student was not able to control the creation tools, and the male students patiently helped her. The time they spent teaching this female student was far more than the time a teacher, with a room full of students, would be able to spend. As Bryant (2010) states, students like to ask each other for help, and the collaboration empowered the students in the classes. Peer-assisted learning provided the students with space and time to learn from each other.

However, this research also showed that some students are not familiar with their peers, lacking psychological safety (Gude, 2010), and preferred to follow their individual plans and work alone. In some cases, students tried hard to focus on their task when other students distracted them.

There is limited literature on the disadvantages of group work in an art class; however, this research showed that distraction from group members may be a drawback to group collaboration.

Another issue that emerged with group collaboration was that it was almost impossible to motivate the students on the game design team to create a game for the environment because the members were students with very different personalities and characteristics. Almost at the end of this project, two female students finally suggested an idea that could be a game for the environment; they started to develop it without discussing it with those who were not interested in developing the game design. Even though the female students were not able to complete their part of the assignment, they finally found enjoyment in the project.

Intrinsic Motivation and Play

As stated above, this research did not provide students with step-by-step instructions. By showing students the possibility of the software in this project, student learning was self-directed (Zimmerman, 2010). The students enjoyed the creation process and were proud of what they created. The students thought the creation process provided the right amount of challenge for them to continue instead of becoming discouraged, which allowed them to achieve a state of flow (Csikszentmihalyi & Wolfe, 2014). The building group students were happy playing in the sandbox area. They created many objects that could not be applied to the final project, but they enjoyed the process. This paralleled the literature that play is about problem finding and solving, divergent thinking, and flexibility (Gude, 2010; Jaquith, 2011; Zimmerman, 2009; Salazar, 2015). For the students who played with their avatars and were trying to see what they could do, they were engaged in "creative play" (Gude, 2010) and interpretation, and were encouraged to make observations about their inner experiences.

Many students were assigned to a group that was not their first choice. These students were not motivated to do the required work. However, in the middle of working on the assigned project, some of these students shifted their focus to a project they were interested in. It was like they were taking a break and having a chance to enjoy their work time. These self-motived creations were creative and imaginative. This finding confirmed Zimmerman's (2010) notion that through intrinsic motivation, self-directed learning can be achieved.

Creativity in Educational Environments

Because of the nature of a school, creativity is not always easy to foster through a class project. Too many students, too few computers, as well as students who were not familiar with or who trusted each other all limited students' collative creativity. Moreover, because this was a class project, the teacher articulated that he envisioned this project as a "representational painting" made in a 3D virtual world (see Figure 4). Also, because this was a class project, the teacher needed to assign students to do different tasks, and not every student was able to be in the group of their first choice. Moreover, because students needed to negotiate their ideas with the group they were in or with the class, they were unable to make the ecosystem in the way they would have preferred. As Gude (2010) suggests, in a class project, it is not always easy to foster the creativity that allows for psychological safety and freedom, and freedom of expression. The students who collaborated on this project said it would be nice to create their own world and see what each would want to or be able to do.

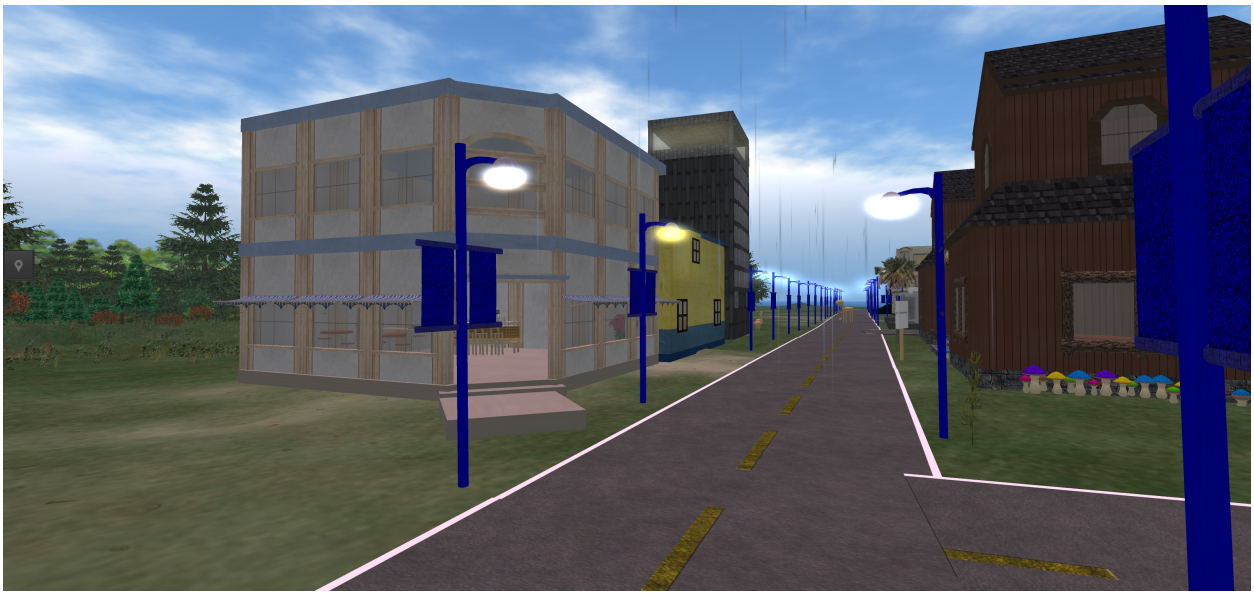

Figure 4. A scene of the final project created by high school students.

Suggestions and Applications: How to Foster Creativity in Art Education

Based on this research, I have a few suggestions that echo the literature. Can technology foster creativity? While students might thrive with different kind of surprises that technology could offer, they might also rely on technology to find answers. Deciding whether to allow students to use mobile technology in an art class is not easy. If an agreement can be reached between teacher and students, it may be best to allow students to use technology for finding resources only after the brainstorming process. In this way, students will not be able to depend on the technology for ideas when they need to be exercising their creativity.

Today, art education is more than self-expression. While not every art unit needs to be focused on self-expression, the research findings show the importance of creative self-expression to the students. This important desire may be addressed by allowing students to have a side project, maybe in a journal or sketchbook, where they can continuously explore their creative self-expression.

In this research, students expressed that one of their motivations came from making a contribution to the virtual world. It did not matter to them how they contributed, but they were proud that they could do something that impacted the larger world. Therefore, it is important for students to feel that their personal contribution is part of the whole project. When given the opportunity to contribute, students may be willing to spend more time giving their best effort to a project.

Many art educators still believe that providing step-by-step instruction is a responsibility of the art teacher. However, as this research shows, the net-generation may prefer finding their own problems and solving them by themselves. It is important for teachers to show students the possibility of the medium; however, students might want to explore in depth certain aspects of a project that are different from what the teacher had in mind.

Helping students brainstorm ideas and explore their technical skills may also be one solution to fostering student creativity. Group collaboration can be very beneficial, but it can also be troublesome. It is hard to find a single good solution for fostering creativity.

In art class, especially during a class project, it is important to provide students with an environment or time to play, since play is about problem finding and solving, divergent thinking, and flexibility. Play helps students find intrinsic motivation in a project.

Finally, as the literature shows, creativity in schools has been widely discussed (Black & Browning, 2011; Csikszentmihalyi & Wolfe, 2014; Freedman, 2007; Goetzzwirn & Vandezande, 2015). But creativity in group work in a school setting has not yet been widely explored. From the research findings, I am not able to provide solid recommendations; however, this is an important topic that requires future research.

Conclusion

According to Csikszentmihalyi and Wolfe (2014), "the future will require individuals who are able to formulate new problems, come up with new solutions, and adapt readily to the new ideas of others. Much of this training for a flexible, creative approach to information should be the responsibility of schools" (p. 181). To succeed in this responsibility, we will need to motivate students to have "curiosity, interest, and enjoyment of the activity" (Nakamura & Csikszentmihalyi, 2014, p. 202) in our classrooms. Using the virtual world for art education provides an engaging environment in which students can explore their creativity (Ward & Sonneborn, 2009). However, more research is needed before we can provide solid solutions for using the virtual world to foster creativity.

References

Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review, 40*(1), 39-58.

Bastos, F. M. (2010). New media art education. *Art Education, 63*(1), 4-5.

Bastos, F., & Zimmerman, E. (2015). *Connecting creativity research and practice in art education: Foundations, pedagogies, and contemporary issues*. Reston, VA: National Art Education Association.

Black, J. & Browning, K. (2011) Creativity in digital art education teaching practices. *Art Education*, *64*(5), 19-34.

Bogdan, R. C., & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theory and methods*. NY: Pearson Education.

Bryant, C. (2010). A 21st-century art room: The remix of creativity and technology. *Art Education*, *63*(2), 43-48.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: Sage.

Csikszentmihalyi, M. & Nakamura, J. (2014). Creativity through the life span from an evolutionary systems perspective. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 239-256.

Csikszentmihalyi, M. & Robinson, R. E. (2014). Culture, time, and the development of talent. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 27-46.

Csikszentmihalyi, M. & Sawyer, K. (2014a). Shifting the focus from individual to organizational creativity. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 67-72.

Csikszentmihalyi, M. & Sawyer, K. (2014b). Creative insight: The social dimension of a solitary moment. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 73-98.

Csikszentmihalyi, M. & Wolfe, R. (2014). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 161-184.

Csikszentmihalyi, M. & Getzels, J. W. (2014). The personality of young artists: An empirical and theoretical exploration. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 11-26.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York, NY: Harper Collins Publishers.

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience*. New York, NY: Harper Perennial.

Csikszentmihalyi, M. (2014). *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer.

Csikszentmihalyi, M. (2014a). Society, culture, and person: A systems view of creativity. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 47-62.

Csikszentmihalyi, M. (2014b). Creativity and genius: A systems perspective. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 99-126.

Davis, D. J. (2015). Looking back and looking forward: Creativity research and art education. In F. Bastos, & E, Zimmerman (Eds.), *Connecting creativity research and practice in art education: Foundations, pedagogies, and contemporary issues*. Reston, VA: National Art Education Association.

Demir, C. (2005). Enhancing creativity in art education through brainstorming. *International Journal of Education through Art, 1*(2), 153-160.

Eisner, E. W. (2002). *The arts and the creation of mind.* New Haven, Connecticut: Yale University Press.

Freedman, K. (2007). Artmaking/troublemaking: Creativity, policy, and leadership in art education. *Studies in Art Education*, *48*(2), 204-217.

Freedman, K. (2010). Rethinking creativity: A definition to support contemporary practice. *Art Education*, *63*(2), 8-15.

Goetzzwirn, S. & Vandezande, R. (2015) Differences between art and design education—or differences in conceptions of creativity? *Journal of Creative Behavior*, 1-15.

Gude, O. (2010). Playing, creativity, possibility. *Art Education*, *63*(2), 31-37.

Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444–454.

Hooker, C., Nakamura, J. & Csikszentmihalyi, M. (2014). The group as mentor social capital and the systems model of creativity. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 207-226.

Hsieh, K. (2015). Creativity and problem solving: A student-driven art party. In F. Bastos, & E. Zimmerman (Eds.), *Connecting Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues*. Reston, VA: National Art Education Association.

Jaquith, D. B. (2011). When is creativity? Intrinsic motivation and autonomy in children's artmaking. *Art Education*, *64*(1), 14-19.

Kelly, R. (2016). *Creative development: Transforming education through design thinking, innovation, and invention*. Edmonton, Alberta: Brush Education.

Lu, L. (2013). 3D Virtual worlds as art media and exhibition arenas: Students' responses and challenges in contemporary art education. *Studies in Art Education*, *54*(3), 232-245.

Manifold, M. C. (2015). The evolution of creativity in voluntary artmaking communities. In F. Bastos, & E. Zimmerman (Eds.), *Connecting Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues*. Reston, VA: National Art Education Association.

Marshall, J. (2005). Connecting art, learning, and creativity: A case for curriculum integration. *Studies in Art Education, 46*(3), 227-241.

Milbrandt, M & Milbrandt, L. (2011). Creativity: What are we talking about? *Art Education*, *64*(1), 8-13.

Mockros, C. A. & Csikszentmihalyi, M. (2014). The social construction of creative lives. In M. Csikszentmihalyi. (Ed). *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer. 127-160.

Nakamura, J. & Csikszentmihalyi, M. (2014). The motivational sources of creativity as viewed from the paradigm of positive psychology. In M. Csikszentmihalyi (Ed.), *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. New York, NY: Springer.

Nordlund, C. (2013) Waldorf education: Breathing creativity. *Art Education*, *66*(2), 13-19.
Partnership for 21st century learning. (2018). Retrieved from http://www.p21.org/

Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-research*. Malden, MA: Blackwell.

Salazar, S. M. (2015). Fiat lux: Creativity through play. In F. Bastos, & E. Zimmerman (Eds.), *Connecting Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues*. Reston, VA: National Art Education Association.

Shin, R. (2010). Taking digital creativity to the art classroom: Mystery Box Swap. *Art Education*, *63*(2), 38-42.

Sawyer, R. K. (2011). *Explaining creativity: The science of human innovation*. New York, NY: Oxford University Press.

Sawyer, K. (2007). *Group genius. The Creative Power of Collaboration*. New York, NY: Basic Books.

Sowden, P. T., Clements, L., Redlich, C. & Lewis, C. (2015). Improvisation facilitates divergent thinking and creativity: Realizing a benefit of primary school arts education. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(2), 128-135.

Stokrocki, M. (1997). Qualitative forms of research methods. In S. LaPierre & E. Zimmerman (Eds.). *Research Methods and Methodologies for Art Education* (pp. 33-55). Reston, VA: National Art Education Association.

Tillander, M. (2011) Creativity, technology, art, and pedagogical practices. *Art Education*, *64*(1), 40-46.

Ward, T. B., & Sonneborn, M. S. (2009). Creative expression in virtual worlds: Imitation, imagination, and individualized collaboration. *Psychology of Aesthetics, Creativity, and the Arts*, *3*(4), 211-221.

Zimmerman, E. (1999). What ever happened to creativity? A new focus on the relationship between creativity and art talent development. In The prospects of art education in the 21st century: An international symposium in art education (pp. 277-299). Taichung, Taiwan: Taiwan Museum of Art and Taiwan Art Education Association.

Zimmerman, E. (2005). Should creativity be a visual arts orphan? In J. Baer & J. Kaufman (Eds.), Faces of the muse: How people think, work, and act creatively in diverse domains (pp. 59-79). Thousand Oaks, CA: Lawrence Erlbaum.

Zimmerman, E. (2006). It takes effort and time to achieve new ways of thinking: Creativity and art education. The International Journal of Arts Education, 3(2), 57-73.

Zimmerman, E. (2009). Reconceptualizing the role of creativity in art education theory and practice. *Studies in Art Education*. *50*(4), 382-399. NAEA.

Zimmerman, E. (2010) Reconsidering the role of creativity in art education. *Art Education, 63*(2), 4-5.

Zimmerman, E. (2010). Creativity and art education: A personal journey in four acts. *Art Education, 63*(5), 84-92.