Amateur Confidence in Creativity with the Community Game Development Toolkit

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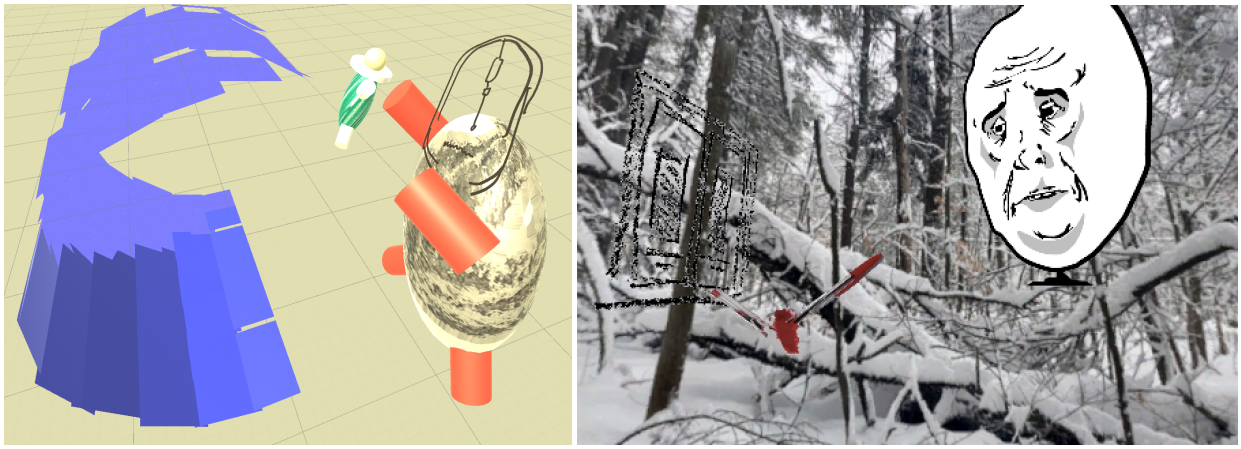

Figure 1: "Unko," Teo Nalani (left); "Broken Pen," Chris Lai (right).

ABSTRACT

The Community Game Development Toolkit ("Toolkit") is a series of collage tools for the Unity Engine developed with the goal of enabling diverse communities to engage in game development without having to climb the steep technical learning curve. This paper seeks to investigate the toolkit's usability and capacity to empower individuals by examining users' self-perception as creative, hypothesizing that the Toolkit's collage tools result in greater self-perception as creative and confidence in one's creations, with the experiment also acting as a "beta test" for user input.

CCS CONCEPTS

• **Human-centered computing** → **Virtual reality**; • **Computing methodologies** → *Perception.*

KEYWORDS

Creative computing, game development, human-computer interaction, accessibility

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1 INTRODUCTION

Video games are an important part of the modern entertainment and storytelling industries, and it is only natural that many people who grew up with and play video games are curious about participating in their production. Beyond those produced by major studios, indie games like Undertale, Stardew Valley, Five Nights at Freddy's, and more have become some of the most popular and influential games of the last decade. Numerous software tools such as the Unity Game engine, GameMaker and Twine have become available to make game development more accessible to small game design studios and even to individuals interested in creating games and interactive story experiences. Nonetheless, there remains a steep technical learning curve to developing games, particularly in creating interactivity through code and creating game art using 3D modeling and animation.

The Community Game Development Toolkit ("Toolkit"), developed by Daniel Lichtman, is one of many tools focused on making game design more accessible and less technically challenging. Based in the Unity Game engine, the Toolkit supports the creation of visually rich, interactive 3D scenes using a collage approach, in which creators use photos, drawings, do-it-yourself 3D scans and other easy-to-produce art assets. In particular, the Toolkit is focused on

making an artistic process of creating interactive stories and games accessible to marginalized communities whose members may not have the technical experience, software, or equipment necessary to create games using more commercial workflows. These communities have historically been left out of the commercial game development canon.

This study aims to examine how the Toolkit might increase or decrease users' confidence in their own creativity, particularly in relation to the Toolkit's focus on a collage-base approach to scene composition. It also seeks to tease out what might be unique about the Toolkit compared to other similar tools.

2 BACKGROUND

The Toolkit has been used in artistic exhibitions and projects including Teresa Braun et al's "MetaEternity," [11] which used interactive visual collage to explore the a possible continuation of consciousness in digital space after physical death, and Ash Eliza Smith, Samantha Bendix and Daniel Lichtman's "Collective Futuring in Nebraska's Panhandle," in which community members in rural Nebraska affected by substance use disorder use collage to imagine speculative futures of healing and mutual support. The Toolkit will be the subject of a special issue of Hyperrhiz Journal of New Media Cultures, to be published in 2024, in which contributing projects use the Toolkit to explore topics such as queer teenage bedrooms and surreal, imagined gardens. The Toolkit has been the subject of workshops at conferences such as the Museums Without Walls Conference, Museu Sem Paredes, 2022 and the Society for Language, Science, and Art at Purdue University, 2022 and Arizona State University, 2024. The Toolkit has been used in teaching game design and interactivity at institutions including the City University of New York, the University of Nebraska, Lincoln and Winona State University.

This paper is informed by two previous studies about the Toolkit. In 2022, Amelia Roth's "The Community Game Development Toolkit" summarized the Toolkit's features, and in 2023, Habin Park's "Exploring Virtual Reality Game Development as an Interactive Art Medium: A Case Study with the Community Game Development Toolkit" assessed general usability and accessibility of the Toolkit. This study seeks to build upon Roth and Park with an experiment-based approach, more specific analysis, and a larger sample size for greater representation.

3 RELATED WORK

Several game development tools and game development communities aimed at students, artists, children and other non-professionals served as inspiration while reflecting on how to construct this study.

MIT's Scratch is a visual programming language that teaches coding concepts to children through a "coding in English" approach. For example, a user may click and drag instructions like "turn right" or "play music" into a for loop, rather than manually typing the code to accomplish these actions. Scratch has several million users and a thriving online community where users can post their own games and "remix" (recreate with personalized changes) others' projects. Scratch differs from the Toolkit in that it is targeted at children, emphasizes (rather than de-emphasizes) coding concepts,

Figure 2: "Aero Zeppelin," Leila McKiernan.

and makes extensive use of premade visual assets such as character animations and illustrated scene backgrounds. Members of the Scratch community typically create platformers and remakes of popular games like Minecraft and Flappy Bird. In the Scratch community there is less focus on artistic introspection and more focus on gameplay and recreating favorite franchises that may have inspired the user to explore game development.

Other tools that employ a related "coding in English" approach include Justin Berry's Verb Collective [12] and Hutong Games' PlayMaker [3]. Like the Toolkit, Verb Collective is an add-on to the Unity game engine aimed at making game design accessible to students, artists and researchers. Verb Collective, however, is focused on a modular approach to creating interactivity using pre-coded actions, or "verbs" where as the Toolkit is focused on collage-based, visual scene composition. PlayMaker, an add-on to the Unity game engine, provides a visual scripting interface that also focuses on code-based (albiet visual) modular programming and the creation of interactivity.

Finally, projects distributed on the the itch.io game publishing platform often share an orientation towards accessible and experimental game design and inclusivity of marginalized communities. Most projects released on the platforms are produced by individuals or small independent studios; many are amateur passion projects and not developed for professional or commercial release. Like projects developed with the Toolkit, many narrative games on itch.io draw on the creator's lived experience in some capacity. "Coming Out Simulator" by Nicky Case and "dys4ia" by Anna Anthropy are semi-autobiographical; the former details the experience of coming out as a gay man and the latter of gender dysphoria and hormone replacement therapy. [2] [1] "Butterfly Soup" by Brianna Lei is a bildungsroman centering four sapphic Asian teenagers; the rest of Lei's games also primarily feature queer adolescents. [8] "Soul Void" by Kadabura discusses depression and dissociation, and "A Mortician's Tale" by Laundry Bear Games delves into the nuances of death and grief. [7] [4] itch.io is also frequently used to release zines, or small indie magazines with a short story or message, which also relate to the Toolkit's focus on visual storytelling within marginalized communities.

4 METHODS

This study consists of a creative task, a survey to be taken before the creative task, and a survey to be taken after the creative task. The "Before" survey questions are listed below. Questions (1) through (5) were answered on a scale from one to five, with one meaning "less so" and five meaning "more so." The remaining questions were free-response. Survey participants were instructed to "please answer these questions with your past experiences and present emotions in mind."

(1) I would describe myself as a creative person.
(2) I enjoy using creative mediums to express myself.
(3) Exercising my creativity is important to my everyday life and lifestyle.
(4) I often reflect on how my past experiences affect my perception of the world.
(5) I often reflect on how my identities, marginalizations, and privileges affect my perceptions of the world.
(6) Have you worked with other game development or interactive media tools? If so, please describe your experiences below. This can include anything from Scratch to a PowerPoint visual novel to a Choose Your Own Adventure story.
(7) Have you created anything reflecting on your personal experiences and perceptions of the world? If so, please describe those below. Examples of this might be a personal essay or art piece in high school or a current side project.
(8) How are you feeling about working with the Toolkit? You can write single word emotions (nervous, excited, etc.) or something more in-depth.

The "After" survey questions are listed below. Again, Questions (1) through (5) are on a scale from one to five, with one meaning "less so" and five meaning "more so," and the remaining questions are free response. Survey participants were instructed to "please answer these questions with the experience of the experimental task in mind."

(1) I would describe myself as a creative person.
(2) I enjoy using creative mediums to express myself.
(3) Exercising my creativity is important to my everyday life and lifestyle.
(4) I often reflect on how my past experiences affect my perception of the world.
(5) I often reflect on how my identities, marginalizations, and privileges affect my perceptions of the world.
(6) In what ways did the Toolkit meet or not meet your expectations for a creative tool?
(7) How did using the Toolkit compare to other experiences combining creativity and personal reflection (eg, a personal essay, an art piece, etc.)? Your answer may pertain to technical aspects (eg, "It was easier/harder to use") as well as emotional aspects (eg, "It provoked more/less thought about…").
(8) How did using the Toolkit compare to other game development or interactive media tools? Your answer may pertain to technical aspects (eg, "It was easier/harder to use") as well as emotional aspects (eg, "It provoked more/less thought about…").
(9) How did the collage format compare to other ways you have expressed your creativity (eg, "It made it easier/harder to express myself because…")?

Participants were found through one author's (Lance C.)'s network of colleagues and peers, and so participation was on a volunteer basis. For the creative task, participants were first instructed to use the Toolkit website's tutorial as a loose guide and experiment until they felt comfortable with the Unity controls, then given a prompt: "Illustrate one of your earliest memories. This can be anything: a literal portrayal of a scene, person or object; something more abstract depicting the feelings you associate with the memory; or somewhere in between those two."

Minimum three days passed between the taking of the "before" survey and the completion of the experimental task, to ensure participants would not remember their responses when taking the "after" survey. All trials were conducted live, so that an author (Lance C.) could act as technical support, and in-person where possible, with two trials conducted over phone call. All trials were conducted one-on-one, to avoid subjects influencing one another's learning process and final creation.

The author conducting the trials stressed to participants that their creation did not need to be perfect, they simply needed to feel it responded to the prompt and represented the memory to the best of their ability. The author conducting the trials abstained from making comments or visibly expressing (through facial expressions and other nonverbal cues) any opinion on creative choices and Toolkit functionality, and from on the aforementioned.

In addition to the rating questions in the "before" and "after" surveys, quantitative data on each trial included the duration of the trial and creative task portions of the experiment and verbal comments made by subjects throughout the creative process.

5 RESULTS AND ANALYSIS

Z- and t-tests were performed on the "before" and "after" rating question averages, treating the "before" as the "population" and the "after" as the "sample." The difference for question 1 was not found to be significant by any conventional measure ($t = -1.03$, $p_t = 0.32$; $z = -0.31$, $p_z = 0.756$). It is also worth noting that not all the conditions for each test were met (discussed further in "Discussions" and "Conclusions and Future Work"). Given the question with the largest before-after difference did not produce statistically significant results, the rest of the questions will not be discussed. Instead, conclusions were drawn from the written responses.

In response to question 8 of the "before" survey (how participants felt about using the Toolkit for the first time), 17 survey participants and 9 experiment participants mentioned feeling positively in some way, most commonly excited or curious. Those who did not feel positively mentioned feeling nervous and anxious due to inexperience. (One outlier participant simply felt "neutral.") A few participants, counted in the positive respondents, said they felt both excited and nervous.

In the "after" survey, four experiment participants said they found the Toolkit easy and user-friendly, and an equal number said they found it difficult and user-unfriendly. Positive comments about usability included "it was a simple process to pull in external images into my assets folder"; a core function of the toolkit is

automatically formatting images imported into the project. Other comments included "It was much more intuitive then I thought it was going to be!" and "It was easy to learn which I think is most important for a creative tool for someone who just wants to express something quickly without having a learning curve that takes time". Negative comments about usability included "I think some of the tools could've been easier on the eyes or more user-friendly," and "Other features were a bit unwieldy, such as the ability to resize assets." Most of these negative comments reflect on the complex user interface of the Unity game engine itself rather than features specific to the Toolkit. As most participants were previously unfamiliar with Unity, it is unsurprising that they did not separate their response to the Toolkit from their response to Unity itself.

Participants were asked to compare the usability of the Toolkit to other game design mediums and tools for self expression. Four participants had no previous experience in game design and had no basis for comparison. One participant noted that "It was harder to use than Scratch... but it also had more possibilities than programs like Scratch." Participants also compared the Toolkit to other expressive mediums less associated with game design. Participants noted that "[It was] definitely harder for me than writing a personal essay, but with some getting used to I think the ability to very specifically manipulate objects in space would be conducive to communicating experiences in a different way from writing," and "It allowed more freedom of expression than those photo album creation sites." Overall, participants noted that while the Toolkit (and the Unity environment itself) is more challenging to use than more traditional mediums of self-expression such as writing or collecting photos, the Toolkit's collage-based approach offers more possibilities for experimenting with storytelling.

A look at participants' reflections on the process of completing their creative task can shed light on the type of storytelling and expressivity that participants felt was encouraged and supported by the Toolkit. Several participants noted that they found the collage format offered particular freedom in exploring a memory from the distant past. Aspects of collage that related to memory included the freedom to combine multiple images and audio clips, as well as the possibility of positioning and resizing images. Participants' remarks included, "The ability to move my assets around a plane and change size and dimension and rotation was great. I think that helped me try and put emphasis on certain aspects of my piece," and "it was easier to express my thoughts than an essay or a poem because of the ability to so easily combine images and audio."

Participants also remarked that the Toolkit supported an exploration of visual abstraction, which they found supportive of the task of creatively exploring a memory: "It was a creative excercise [sic] I enjoyed and I think the previous instructions allowing us to experiment with vague shapes encouraged me to take a more abstract route expressing myself than I usually would."

No participants created their own visual assets during the experiment, which is noteworthy because original art creation is a key feature and focus of the toolkit. Participants used example assets provided by the toolkit, images found on the internet and ready-made assets available to Unity users through the Unity Asset Store. Five participants took advantage of the 3D environment in some way, while the other six creations were a flat plane. Several

	Avg. before	Avg. after	Avg. diff.
1) Desc. as cr.	3.7	4.1	0.4
2) Enjoy cr.	4.4	4.3	0
3) Importance cr.	3.7	3.6	-0.1
4) Refl. past exp.	4.3	4.2	-0.1
5) Refl. mar./pri.	4.3	4.2	0

Table 1: "After" survey question ratings

participants commented on the challenge of "going from mind to page," or more directly expressing themselves using the Toolkit. We presume the participants meant the ability to draw or illustrate directly in the 3D scene, rather than making art on paper, scanning and importing, as described in the Toolkit tutorial.

6 DISCUSSIONS

As aforementioned, not all of the conditions for the t-test and z-test were met. For the t-test, the random condition was not met as participants were found on a volunteer basis from one author's social and professional network, and so were skewed towards a younger population that may have already been artistically inclined. (Participants were between 16 and 21 years of age, with two outliers ages 48 and 49.) The normal or large sample condition was also not met, as the distribution of scores for the rating questions were right-skewed, and there were fewer than thirty participants. For the z-test, the random condition was again not met. Overall, a greater sample size from a greater diversity of sources would have been beneficial in increasing the population represented by participants.

Figure 3: "the kindergarten 2012," Elena Cheng.

One of the most notable outcomes in the participants' creations was the lack of creation of original assets, which participants attributed to it being too difficult or convoluted because it involves multiple steps: creating a real-life drawing, taking a picture of it, uploading the picture to one's computer, making it transparent in Photoshop (which the Toolkit guide specifies, although presumably another tool which is free could be used), and then dragging it into the Unity scene. Scratch, which a number of participants cited as being easier, has a sprite creation feature that opens a separate canvas for users to draw in; then, whatever is drawn on that canvas

can be dragged around as the user wishes. A built-in sprite creation feature like Scratch's might have greatly increased participants' willingness and enthusiasm to create their own assets, and that in turn would increase the "mind-to-page"-ness of the Toolkit and allow for a smoother overall creative process.

Additionally the ability to draw in 3D, which is possible in several VR applications such as Google's TiltBrush, could be useful, especially for those who are more abstractly inclined. [5] (One participant noted that that feature would have worked wonders for the Jackson Pollock-esque piece they wanted to create.) However, as most potential users of the Toolkit most likely do not have their own VR headset, the ability to draw directly in the Unity editor in 2D might see more use while still allowing some of the same abstract effects. Something like this might also be worth investigating to see if bridging the gap between more traditional art mediums and 3D scene-making encourages more participants to use all three dimensions, as those who only used two dimensions seemed not to know quite what to do with the depth aspect.

7 CONCLUSIONS AND FUTURE WORK

As a community-oriented project, the Toolkit is still in development; for example, last year, contributor Amelia Roth began developing a feature that would allow users to move objects in game mode, rather than in the editor window. It could be feasible to begin developing the sprite creation or draw-in-scene features described above, as the (albeit small) sample size of this study proved it might be desirable. A new creative prompt for the experiment might also encourage users to create their own assets and make use of 3D space in their scene composition.

Though no statistically significant results were found with the rating questions, it is worth noting that users answering the "after" survey blind to their answers in the "before" survey could be altered. Users could be asked directly if they felt a certain quality increased or decreased, or they could be shown their previous rating before asking for the "after" rating. Furthermore, as mentioned before, the source of the participants might have impacted statistical significance, since many of them were already creatively inclined. The 11-person sample, out of whom eight were undergraduate students, included two visual art majors and a creative writing major. The other students, while not majoring in the arts, majored in reflective and critically-minded academic areas (comparative literature, public health, and public policy among others) and had some non-academic involvement in the arts (orchestra, personal projects, writing arts reviews, etc.). Greater statistical significance might be found in a sample with more variance of creative inclination, and perhaps greater variance of creative inclination could be found in a sample with greater variance of lifestyle and majors. Moreover, the fact that the sample is entirely either in college or pursuing higher education means it is certainly not representative of the populace at large in terms of education or socioeconomic status.

Qualitative responses provided much insight into how the Toolkit's collage approach to 3D scene composition contributed to participants' ability to creatively express themselves in the game design medium. The Toolkit designers look forward to continuing to develop this study, and to incorporating the features discussed above in future iterations of the Toolkit.

Figure 4: "Avocado Incident," Basil Picciotto

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