# Freshmen Orientation Program Using Minecraft: Designed by Students for Students during the Covid-19 Pandemic

S. Supraja
*Nanyang Technological University*
Singapore
supraja.s@ntu.edu.sg

Sophia Tan
*Nanyang Technological University*
Singapore
sophiatan@ntu.edu.sg

Fun Siong Lim
*Nanyang Technological University*
Singapore
lim_fun_siong@ntu.edu.sg

Beng Koon Ng
*Nanyang Technological University*
Singapore
ebkng@ntu.edu.sg

Shen Yong Ho
*Nanyang Technological University*
Singapore
hosy@ntu.edu.sg

Andy W. H. Khong
*Nanyang Technological University*
Singapore
andykhong@ntu.edu.sg

***Abstract*—This Innovative Practice Full Paper presents experiences in designing a student-led virtual freshmen orientation program that uses a Minecraft environment. We describe the planning process, roles of the organizing committee members, and how the game was constructed for participants to learn and interact with one another. The student organizers not only created a virtual environment that scales the college map where more than a hundred freshmen (participants) could have an immersive experience of the campus, but also ensured the branding and marketing, logistics, and safety/well-being aspects of the event. In this paper, we present students' experience of this program from both the designers' as well as the participants' perspectives. We conducted surveys with the organizing committee members and interviewed the participants to gain insights on their perception of this event. Our analysis showed that student organizers had the autonomy to brainstorm, suggest creative ideas, develop novel games, and procure materials. They also felt that they developed authentic programming and leadership skills. On the other hand, participants felt engaged as the event was well-organized, had clear delivery of information, introduced them to new technology, made them more familiar with the campus, provided a conducive environment to hone their soft skills such as communication and teamwork even before they officially enrolled as undergraduate students in an engineering program, and helped them establish social networks to support them throughout their undergraduate education journey.**

***Index Terms*—Gamification, technology applications, freshmen orientation, student perception, student experience**

## I. Introduction

Undergraduate freshmen orientation programs are essential to students' socio-cultural participation, sense of belonging, retention, and ultimately success at a university [1], [2]. Freshmen orientation is one of the "High Impact Practices" in higher education [3] in which student engagement is shown to correlate with levels of achievement, retention, and success over the college years compared to their peers who have not engaged in these practices or activities. Freshmen orientation is an important first step that would support student transition into the university by providing them with essential resources and orientating them within a new community.

The Covid-19 pandemic had restricted students' participation in large events, threatening to inhibit this "High Impact Practice." This offered compelling reasons to find innovative ways to provide incoming students with an orientation experience that would be as engaging as the face-to-face program they would have otherwise experienced. The challenge was not only to provide students with conventional resources such as campus navigation but also to help them establish their future social-support networks in a virtual event [4].

In this paper, we present an innovative approach to freshmen orientation that is led and designed by senior students from an engineering makerspace using gamification within the Minecraft environment. Here, student organizers created a virtual college map in which freshmen enjoy an immersive experience and are presented with the opportunity to collaborate with other team members by playing virtual games and solving challenges remotely. Despite being a virtual orientation event, this experience incorporated aspects of gamification that would inspire first-year engineering students to interact, bond, and collaborate with one another. Through this experience, they would be initiated into the College of Engineering, and be acculturated into their community, practices, expectations, and opportunities. We highlight student experience of this program from both organizer and participant perspectives.

## II. Review of Related Works

### A. Digital Games for Formal Education

Studies on the impact of games and gamification in formal education have established a strong connection to student

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engagement [5], [6]. One study found that students in the gamified learning group were more motivated to complete tasks outside of class compared to those in the non-gamified learning group—they termed this "behavioral engagement" [7]. Gamification also leads to higher levels of cognitive engagement, such as the creation of higher quality outputs and achievement of higher test scores [7], [8], as well as higher levels of emotional engagement, such as feelings of fun, pleasure, and enthusiasm [9].

Most of the existing works have promoted the use of digital educational games in formal education for the purposes of academic achievement, learning, and creativity enhancement [10], [11] rather than social integration and acculturation within the university [12]. However, we posit that if gamification can enhance student engagement, it may also lead to significant benefits in the social integration of freshmen as well as an increased enthusiasm for their new community.

### *B. Use of Gamification for Orientation*

As highlighted in the previous section, there is much untapped potential for gamification in an immersive virtual world to enhance freshmen orientation or transition experience. On the use of gamification for orientation, activities are mostly documented by librarians and are faculty or staff-led rather than student-led initiatives [13], [14]. One work described the creation and implementation of escape rooms as a game to welcome students to the library but did not report empirical results [15]. Another study reported that students preferred game-based orientations to traditional orientations [16].

Other orientation programs that have included gamification were implemented in-person and global position system-dependent [17], [18]. These orientation activities were held on campus and required students to navigate the campus via a mobile game application. In contrast, our work includes a student-designed virtual and immersive world, customized game-based activities within the platform, and avenues for interaction among freshmen in the College of Engineering.

### *C. Virtual Worlds for Pedagogical Practices*

For the past two decades, educators in various disciplines have paid attention to the potential of immersive worlds for their affordances of interaction and collaboration with other players, participation in a social culture [19], and experiential learning [20]. Examples include using "Second Life" for learning since its launch in 2003 and more recently, "Minecraft," which has been reported to benefit student learning [21].

Central to the experience of virtual worlds is the representation of the participant as an avatar within a three-dimensional world and the real-time interactive experience with other participants. Studies reported that virtual worlds and avatars afford higher levels of instructor immediacy and social presence, which refer to perceptions and experience of the closeness and saliency of other online participants [22]. These perceptions of closeness are positively correlated with student motivation.

Therefore, we believe it is possible to bridge the gap between in-person and online orientation experience through an immersive experience in a virtual world. Further, our virtual orientation aims to inspire freshmen by immersing them within a virtual artifact that is created by the engineering student community to spark their interest in the engineering school.

### *D. Impact of Game Design on Students' Creativity*

It is useful to highlight that most research on gamification has been on faculty or instructor created games and their impact on learning and engagement from the gamer's perspective. Here we review existing literature that gains insights into the impact of student-led game design on learning and development from the designers' perspectives.

Learning by designing games has theoretically been supported by the constructionist perspective that advocates learning via the creation of artifacts which may include a collaborative and social process with the goal of sharing these artifacts with others [23]. An example is that of children learning a programming language and mathematical ideas through designing programs and robots in Mindstorm®—a system created by Lego.

Among the scant literature in higher education, one study found that students designing games had positive learning gains in the subject matter as well as creativity and communication [24]. The process of learning through designing games has also been referred to as "game design-thinking" in a study, which found that the co-creative process has a positive impact on students' empathy, creativity, and teamwork [25]. Game design by students have also documented positive gains in systems thinking [26] since they involve creating a system of rules, winning conditions, and rewards [27]. The discipline of game design is recent and with much potential for student learning. The lack of evidence in learning through designing games, however, attests to the novelty of this idea in our paper.

### *E. Student-led Events in Makerspaces*

Existing literature on student-led events often commend the ground up efforts of makerspaces within and outside of the university. Makerspaces have been reported to enhance students' team innovative behavior, creative self-efficacy, and creativity in undergraduate engineering colleges [28]. These informal learning spaces are ideal for engineering students to acquire an array of 21st Century skills that may be traditionally hard to incorporate within formal engineering education curricula [29]. The autonomous process of design and creation within this space promotes and sustains students' intrinsic motivation leading to higher levels of innovation [30]. Therefore, makerspaces have the potential to be the ideal place for students to design and create an immersive experience for other students.

To summarize, freshmen orientation is essential to first year engineering student experience, but the pandemic had made it challenging for students to gather in large groups. This necessitates innovative approaches to achieve outcomes

TABLE I
ORGANIZING COMMITTEE MEMBERS AND THEIR ROLES

| Committee | Member Count | Role |
|---|---|---|
| Main committee | 7 | Oversee the sub-committees and deal with stakeholders |
| Technical team | 18 | Design games and create a virtual environment that scales the college map |
| Program planners | 8 | Focus on the flow of activities |
| Logistics | 4 | Procure the resources required |
| Group leaders | 26 | Guide the participants and communicate with other sub-committee members |
| Business and marketing (B&M) | 3 | Publicize the event |
| Safety and wellbeing | 5 | Ensure participants are aware of safety measures in the University |

ensuring the smooth transition of freshmen into the university. We address this through senior engineering organizing committee members (OCMs) in the university makerspace, who create an immersive experience within which freshmen could still experience the spirit of the college. A review of the literature reveals this is an innovative approach that has yet been documented—most of the recorded events were designed and created by faculty or staff, or they rely on physical experience to promote social integration of freshmen. In addition, existing literature provides abundant evidence to support the positive impact of gamification on players' behavioral and emotional engagement. However, insights into the game designer perspective and the associated learning are much scarcer in the literature due to the recent development of this discipline.

We present an innovative practice and seek to address the following research questions:

1) How useful was the design and implementation experience for the OCMs?
2) What were the skills acquired by the OCMs?
3) What were the challenges faced by the OCMs?
4) How did the OCMs collaborate to overcome these challenges?
5) How do the OCMs think that the event can be improved?
6) What did the freshmen perceive as benefits of such a program?

## III. DESIGN AND IMPLEMENTATION OF THE MINECRAFT VIRTUAL ENVIRONMENT

### A. Organizing Committee Formation

Our innovative approach involves more than sixty senior students from an engineering makerspace split into various sub-committees leading the design and implementation of a three-day long virtual online orientation using gamification in a Minecraft environment. Table I shows the number of members and roles performed within each sub-committee. These sub-committees were formed based on open recruitment and selection interview by senior students. Selection of OCMs was based on their willingness to commit and relevant skillsets of existing students applying to the portfolios.

The main committee consists of the president and vice-presidents who would oversee the overall operations. They are also responsible to chart the strategic direction of freshmen engagement. The two crucial pillars are the technical and program planner sub-committees. The former plays a key role in developing a virtual environment that scales the college map where more than a hundred freshmen (participants) enjoy an immersive experience of the campus. The latter group is responsible for ensuring the smooth transitions between different activities within the entire orientation program.

The other important sub-committee is the Group Leaders (GLs), who serve as the main bridge of communication between the participants and the other sub-committee. The remaining supporting portfolios include one that ensures the safety/well-being aspects of the event, branding and marketing (B&M) that is responsible for publicizing the event, and logistics that ensures the availability of resources required.

### B. Platform Features

The technology behind the Minecraft virtual environment and game designs include artificial intelligence and graphic design tools, 3D modeling and printing, Fusion 360 (a cloud-based 3D modeling platform), Arduino, Unity 3D game engine for creating 2D platformer games, and C# programming. These technologies have been used across the three segments: (1) escape room challenges, (2) adventure play games, and (3) campus navigation.

With reference to Fig. 1, it can be seen that the orientation consisted of escape room challenges for participants to solve as a team. Prior to the game, the freshmen are initially assigned to a clan before being subdivided into smaller groups to maximize interactions and collaborations during game-play. Students can view their team members via video call to facilitate communication and strategic planning. Participants must collaborate with other team members to first design a team logo (akin to an avatar) and thereafter solving puzzles and challenges innovatively in the game. Scores earned from each team are then collated within each clan to reinforce social integration and a sense of belongingness through gamification.

Fig. 2 shows the adventure play/customized platformer game activities similar to conventional video games in which participants/players explore, collect multiple hints hidden in the virtual world, and gain points/gold coins. To navigate to these adventure spots, the designers have used various locations on the recreated campus map as hotspots for participants to familiarize themselves during game-play as they overcome challenges assigned to each group.

During the campus navigation segment as shown in Fig. 3, the hosts (i.e., group leaders) will lead a group of freshmen to explore around the virtual campus and highlight key facilities via live-streaming on the event's Instagram account. Such a


Fig. 1. Escape room screen captures of the Minecraft virtual environment.


Fig. 2. Adventure game screen captures of the Minecraft virtual environment.

virtual campus tour is important to familiarize freshmen with the location and services provided by the laboratories, student support office, and printing facilities. The participants can raise questions through the Instagram live chat room function and seniors will provide real-time responses.

### C. Event Management

Adopting a design-thinking framework, the game designs described in the previous section evolved after multiple iterations of ideation, brainstorming, and sharing sessions by the technical sub-committee over several months. Novice OCMs gained an understanding of Minecraft's game mechanics from their peers who had served as OCMs in the previous year's orientation program. These experienced seniors contributed ideas based on those experiences—the current program incorporated rehashes of some ideas but with modifications and enhancements arising from feedback obtained in previous years.

To ensure the smooth flow of the three-day long event, multiple trials/test runs were performed for the games along with beta testing, senior trial camp, and dry runs. The organizers also utilized a telegram bot which helped them to automate some tedious tasks which, in turn, reduce human errors. This telegram bot was built by some of the technical team subcommittee members on Google Apps Script integrated with Google sheets as the database and administrator user interface system. This experience has reinforced the OCMs' JavaScript programming abilities.

## IV. Methodology

We conducted surveys with the OCMs after the end of the event, out of which thirty-three OCMs responded. The survey


Fig. 3. Campus navigation screen captures of the Minecraft virtual environment.

comprised questions on a five-point Likert-scale ranging from strongly agree (1) to strongly disagree (5). Satisfaction of the OCMs has been evaluated via factors such as relevance of this event to their degree program, opportunities to design, allowability to fail, and innovation displayed by their team members that has impacted their own creativity [28]. Question items that address the first two research questions on the benefits of the event (highlighted in Section II-E) consist of:

- (**Relevance**) The skills that I have learned through this event will be useful/relevant for my future courses/degree programme.
- (**Conducive environment**) The event offers a conducive environment that enhances my creativity and innovation.
- (**Design opportunities**) I am given opportunities to design games and activities in [this orientation].
- (**Learning from failures**) I am given opportunities to learn from my failure/mistakes when preparing/during the event.
- (**Teamwork**) My teammate generates new and useful ideas, searches out new technologies, processes, and techniques and/or productive ideas, promotes and champions ideas to others (e.g., convincing people, providing justifications), and develops adequate plans and schedule for the implementation of new ideas.
- (**Self-beliefs about creativity**) It is easy for me to stick to my aims and accomplish my goals; I am confident of generating novel ideas for the event, good at finding new and original ways to solve problems, can remain calm when facing difficulties because I can rely on my coping abilities, and usually handle whatever comes my way.

The survey also consisted of open-ended questions to gain insights into OCM experience in relation to the third and fourth research questions. In addition, we sought their feedback on areas of improvement as aligned with our fifth research question. The OCMs provided their responses to the following:

- How do you form and work in teams in this event as compared to classroom or study groups?
- Share a time when you got stuck when working on an event/activity planning. What did you do? Is this the same approach with other engineering assignment?
- How could future events be improved to support me in being more confident with my creative abilities and innovative behavior?

In line with the last research question on the perspective of the participants, we also interviewed the participants to gain insights in terms of what they had learned about engineering, the campus, and soft skills. In addition, we asked the participants how they felt this orientation event helped them to integrate into the university as freshmen.

## V. Key Findings

### A. Survey Ratings by OCMs

We report the average survey ratings across the various question items for each sub-committee as shown in Table II. The average ratings obtained for the main committee, technical team, and program planners are mostly above a score of 4 out of 5, indicating that they have had a good learning experience through this event across all aspects. Our analysis showed that student organizers from these three committees were given ample opportunities and autonomy to brainstorm, suggest creative ideas, develop novel games, and procure materials. They also felt that they developed authentic programming and leadership skills. In particular, the main committee members, who were involved across all sub-committees throughout the event planning process, provided high ratings for relevance (4.750) in terms of acquiring both technical and soft skills toward their degree program and conduciveness (4.750) in terms of the learning environment when compared to the other sub-committees. However, the main committee members were less confident on their abilities to be creative, as reflected by a low rating of 3.850. This might be attributed to them being

TABLE II
SURVEY RESPONSES BY ORGANIZING COMMITTEE MEMBERS IN TERMS OF AVERAGE LIKERT-SCALE RATINGS

| Factor | Main committee | Technical team | Program planners | Logistics | Group leaders | B&M | Safety | Average |
|---|---|---|---|---|---|---|---|---|
| Relevance | **4.750** | 4.182 | 4.250 | 3.667 | 3.727 | 4.333 | 4.500 | 4.201 |
| Conducive environment | **4.750** | 4.273 | 3.750 | 3.333 | 3.636 | 3.333 | 4.250 | 3.904 |
| Design opportunities | 4.250 | **4.364** | 4.000 | 3.000 | 3.273 | 3.000 | 3.750 | 3.662 |
| Learning from failures | 4.500 | 4.182 | 4.000 | 3.667 | 3.909 | 3.667 | 3.750 | 3.954 |
| Teamwork | 4.250 | 4.091 | 4.000 | 4.167 | 3.886 | 3.625 | 4.313 | 4.047 |
| Self-beliefs (creativity) | 3.850 | **4.084** | 3.850 | 3.733 | 3.629 | 3.467 | 4.083 | 3.814 |

exposed to such a leadership role for the first time and were heavily dependent on their sub-committees.

With respect to the technical team who were key members responsible for designing the entire virtual platform, these students rated the design opportunities the highest at 4.364, implying that they gained technical knowledge through this event. With reference to game design thinking, one OCM reported learning "*game development with user's interests and needs in mind, providing an experience tailored for the freshies' experience and learning rather than my own*". Consistent with literature on game design thinking [25], this suggests the authentic nature of these projects has drawn students' attention to certain concepts that they might have missed in traditional class assignments. Their ratings for self-beliefs about creativity is also the highest at 4.084 as opposed to the other sub-committee members, indicating that they are well-equipped with background knowledge of the technology used in the game design and were confident of their abilities. This is a testimonial to the success of selecting members with appropriate skillsets during the initial recruitment process. This self-confidence is also reflected via a moderately high rating of 4.091 for teamwork questions, implying that these sub-committee members could contribute both individually and work as a team.

In contrast to the technical team, responses of the other sub-committees such as logistics, group leaders, marketing, and safety are mostly between the neutral (3) to agree (4). This lower score is due to the roles being perceived as supportive in terms of game design and management. Qualitative responses suggest that these OCMs were "*not involved in the [game design] area*" and "*did not actively participate in planning and organising as [they] only provided extra help when needed in graphic design*." However, some of these sub-committees provided opportunities for students to interact with one another and enhance their soft skills. For instance, a safety officer was tasked to help the group leaders, including "*hyping up the orientation groups, taking attendance, and [performing] administrative works*." Since the role of a safety officer was not as prominent compared to a physical event, the key responsibility was to ensure that the freshmen completed the mandatory safety modules according to the university guidelines. Therefore, for these supporting roles, their level of involvement (described by the number of hours spent for this event) is not sufficient in terms of achieving the intended outcomes of the event; this requires further improvement of team formation in future events.

On average, the OCMs across all committees rated themselves 3.814 for the questions on self-belief about creativity. The open-ended segment related to these questions revealed that the OCMs faced time pressure, felt that they were inefficient, and procrastinated as they lost sight of their long-term goals. However, responses to the teamwork-based questions for all members suggest that the OCMs felt wholesome when working as a team since they were able to complement each other and overcome their individual shortcomings by relying on their peers. This is reflected via a higher average rating of 4.047 across all sub-committees.

### *B. Interviews with Participants*

Participants felt engaged as the event was well-organized and had clear delivery of information. One of the participants, who felt that she was an introvert by nature, expressed that "*everyone has equal chance to participate [in a virtual event], while in physical event someone might be left out*." She further shared that physical games could potentially be "*limited by budget*" while there was freedom to have "*more things to play*" virtually. Surprisingly, this virtual orientation was welcomed by the participants and exceeded their expectations due to the efforts put in by the organizers to "*design fun games rather than sticking to common ice breaker games*" that these participants are aware of in their high school or pre-university education. Therefore, the participants felt more inclusive and integrated with one another, achieving the benefits of such an innovative practice of developing an orientation program via gamification.

This orientation program has also introduced the participants to new technology. A participant remarked how he felt proud of pursuing an engineering degree after experiencing the virtual platform designed by senior students—he mentioned that "*[engineering] is not just about hardware, you can also explore various options in the software field (as they developed the games for us to play)*." Another participant felt that the "*games they built in [the orientation] showed me what engineering can achieve so it did inspire me*." This implies that the event has successfully inculcated the spirit and culture of engineering among the freshmen.

In addition, depicting the university virtually with a navigation map familiarized the participants with the campus despite the physical constraints due to the COVID-19 pandemic. The orientation program also provided a conducive environment for the participants to hone their soft skills such as communication and teamwork even before they are matriculated as undergraduate students in an engineering program. Team-based activities


Fig. 4. Word cloud based on organizing committee members' responses regarding teamwork.

have also helped them establish social networks to support them throughout their undergraduate education journey. The interaction between the group leaders (seniors) and the participants was strong given that a participant felt "*the seniors shared a lot of useful information about both academics and campus living that [she] still [relies] on today*." This shows that the outcome of gamifying the orientation has resulted in both social integration and learning about resources.

## VI. Discussion on the Perspective of Organizing Committee Members

We further elaborate qualitative findings from the open-ended responses of the OCMs by presenting three significant themes that have emerged from the survey. The students largely commented on the soft skills acquired and the importance of teamwork, how they solved challenges faced before and during the event, and their retrospective reflections on how the event could be improved.

### A. Soft Skills Learned and Importance of Teamwork

Consistent with other literature on student-led projects, the OCMs indicated that they acquired multiple soft skills [31] such as co-operation, coordination with others, leadership, effective communication (by "*interacting with other committee members and freshmen*"), teamwork, time management, perseverance, managing expectations, event planning, risk assessment, people management, and project management.

Some felt that they also learned how to "*push through all the [challenges such as] setbacks like the cancellation of physical event, subcommittee members bailing out, budget cuts, friends bantering about taking up a low reward role*." Most importantly, almost all OCMs appreciated their team members for supporting each other throughout the journey, including constructive criticism that "*made finding and correcting mistakes easy and helpful*." An organizing committee member remarked that he learned from "*working with a team online, organizing and collaborating virtually*." Such skills are important in the corporate world.

Fig. 4 shows a word cloud based on the OCMs' responses associated with questions on teamwork as detailed in Section IV. Some of the positive phrases include "*Gantt chart/schedule/comprehensive timeline*," "*lot of ideas/games ideas/new ideas*," "*overall productivity*," and "*regular meeting*." These phrases indicate that each team member complemented each other based on their strengths to generate new ideas, search for solutions, and construct appropriate timelines.

### B. Managing Risks Associated with and Overcoming Challenges

Due to uncertainties caused by fluctuating number of Covid-19 cases, the OCMs highlighted that the abrupt change from a physical to a virtual event resulted in miscommunication among their OCMs. Due to the time-bound nature and Covid-19 restrictions, the event could not foster the fully intended creativity and innovation. However, they prioritized the more urgent issue of creating a virtual platform and worked toward that goal collectively.

There were also logistical challenges that were overcome by "*peer to peer interaction*" or "*communication throughout the group*." From the game design perspective, a major issue faced was the "*dilemma where [the program planner sub-committee] had to remove huge portions of the game to fit the narrative and time allocation for the game*." It was a difficult decision for these OCMs to make as they had spent significant amount of time to create each section. Although one of the program planners felt that his teammates "*recognized [his] efforts and wanted to help salvage the parts [he] created*" by trying to fit them in, he realized that "*forcing those portions in would be detrimental to the final outcome and would be best if [it was] removed entirely*." This highlights the ability of OCMs to reflect on their own actions and respect their peers' views

on alternative solutions while handling differences in opinions. It also highlighted their ability to think beyond themselves to meet the overall objective of the event. This platform therefore provides opportunities for personal development.

With respect to challenges faced during the event, the freshmen encountered login errors to the Minecraft environment. Under time pressure, the technical sub-committee debugged the problem calmly and efficiently. They worked with the program planners to "*find other ways to entertain the freshmen*" meanwhile. Through this process, the technical sub-committee ensured that the "*entire committee is on the same page, so that [they could] overcome any challenges together*."

Techniques adopted to handle the above challenges were largely unlike conventional classroom activities since there were no correct answers to the approaches taken. The OCMs had to explore various options before determining the most appropriate way to handle these challenges. This provided the OCMs with opportunities for strategic thinking, risk management, and decision making.

### C. Suggestions for Improvement

After this virtual orientation experience, the OCMs provided their feedback on what could be included to enhance the experience for future batches of students and what training they could undertake to develop a better event. In particular, the organizers would like to be provided with a platform for more interactions between the "*campers [participants] and GLs [group leaders]*" as well as between the "*GLs and committee*" to review the shortcomings of the event everyday.

A common feedback raised was on the involvement of professionals to train these OCMs prior to organizing the event. For instance, some OCMs felt that the "*event can focus more on aligning workshops aimed at teaching industry-preferred skills*," "*more on involving successful start-up mentors to give advice and share their experiences*," and "*having supports from industrial partners for technical supports and getting a quick glance of latest technologies and trends in the industries to inspire participants' innovative behavior and exposure to industries*."

In addition, mentorship from senior advisors such as faculty members, staff, or alumni has been requested by these OCMs. An OCM wished to "*attend more leadership related programs to support me to become more confident*," while another would like to have "*more mentorship and support especially in technical areas and team management as these are skills that many of us hope to learn from taking part in such large-scale school events*." One OCM also highlighted that "*if there is no proper mentorship, [they] may be adopting the wrong values/ methods when carrying out tasks*."

## VII. Insights and Recommendations

Our study suggests that despite challenges associated with many uncertainties and constraints, OCMs of the makerspace were able to create a virtual environment that met the objectives of the freshmen orientation. The participants appeared to have fun, built relationships, and have a better sense of the school and applications of engineering. Some even expressed pride to have become part of the engineering community.

The areas for improvement identified by the OCMs seem to suggest that they would like more support in organizing the events, to have learning outcomes that are more aligned with the purposes of makerspaces, and to gain immediate feedback from the participants.

Hence, we may wish to consider how we might provide guidance to the OCMs rather than adopt a totally hands-off approach. For instance, it might be good to facilitate some succession planning by having seniors play the role of advisors during the planning phase of the event or to connect the students with industry partners. The faculty might also wish to challenge the OCMs to explore ways on how everyone in the organizing committee can be engaged in the creative process so that these learning outcomes for makerspaces can be achieved. For example, the organizing team can be encouraged to create a safety-related game where participants have to identify the emergency escape routes and gather at a designated area within the immersive virtual world. This will allow involvement of the safety team in terms of the creative process. The B&M team can also explore ways to collect real-time feedback from the participants within the virtual world itself. Such a data-driven strategic-thinking process will allow the team to strategize for the next run. In essence, academic mentors will need to model an innovative mindset to motivate OCMs to challenge conventional ways and adopt creative ways to approach their roles.

## VIII. Conclusions

We presented an innovative approach to freshmen orientation during the pandemic when strict guidelines are to be adhered for in-person events. The problem was the difficulty in initiating freshmen into the culture and social networks of engineering remotely. Senior engineering students led and designed an immersive world in Minecraft for freshmen to experience the orientation virtually. This context provided opportunity to examine the impact of student-led game design from the designers' perspectives and feedback from student participants. Overall, student designers had a positive experience and perception of the project on various aspects of their learning, including soft skills, teamwork, and self-belief about creativity. This event exceeded the expectations of the freshmen participants whose experience of the immersive virtual world testified to the potential of their selected discipline.

Universities seeking to incorporate such practices can consider a finer balance of faculty and student-run events. To maximize opportunities for innovation and creativity, there could have been more guidance from faculty and staff especially in areas outside of their discipline, such as those responsible for safety or marketing. Sub-committees that are not heavily involved in design work can also collaborate with those directly involved in design. Better inter-team collaboration may improve their design experience. Alternatively, they could have included a more interdisciplinary team for a more diverse exchange of skills and knowledge.

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