“(We) Can Talk It Out...”

Designing for Promoting Conflict-Resolution Skills in Youth on a Moderated Minecraft Server

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Online multiplayer games like Minecraft, gaining increasing popularity among present-day youth, include rich contexts for social interactions but are also rife with interpersonal conflict among players. Research shows that a variety of socio-technical mechanisms (e.g., server rules, chat filters, use of in-game controls to ban players, etc.) aim to limit and/or eliminate social conflict in games like Minecraft. However, avoiding social conflict need not necessarily always be a useful approach. Broadly defined in CSCW literature as a phenomenon that may arise even amidst mutual cooperation, social conflict can yield positive outcomes depending on how it is managed (e.g., [27]). In fact, the aforementioned approaches to avoid conflict may not be helpful as they do not help youth understand how to address similar interpersonal differences that may occur in other social settings. Furthermore, prior research has established the value of developing conflict-resolution skills during early adolescence within safe settings, such as school/after-school wellness and prevention interventions (e.g., [2, 98]), for later success in any given interpersonal relationship. While games like Minecraft offer authentic contexts for encountering social conflict, little work thus far has explored how to help youth develop conflict-resolution skills by design interventions within online interest-driven settings. Drawing from prior literature in CSCW, youth wellness and prevention programs, we translated offline evidence-based strategies into the design of an online, after-school program that was run within a moderated Minecraft server. The online program, titled Survival Lab, was designed to promote problem-solving and conflict-resolution skills in youth (ages 8-14 years). We conducted a field study for six months (30 youth participants, four college-age moderators, and one high-school volunteer aged 15 years) using in-game observations and digital trace ethnographic approaches. Our study data reveals that participating youth created community norms and developed insightful solutions to conflicts in Survival Lab. Our research offers three key takeaways. Firstly, online social games like Minecraft lend themselves as feasible settings for the translation of offline evidence-based design strategies in promoting the development of conflict-resolution and other social competencies among youth. Secondly, the design features that support structured and unstructured play while enabling freedom of choice for youth to engage as teams and/or individuals are viable for collective or community-level outcomes. Third and finally, moderators, as caring adults and near-peer mentors, play a vital role in facilitating the development of conflict-resolution skills and interest-driven learning among youth. We discuss the implications of our research for translating offline design to online play-based settings as sites and conclude with recommendations for future work.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**; *Empirical studies in HCI*; *HCI design and evaluation methods*; *Field studies*;

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1 INTRODUCTION

Online multiplayer games like Minecraft [67] have significantly transformed the notion of play-grounds for young people today. Survey studies indicate that youth across the world are increasingly turning to interest-driven (i.e. intrinsically motivating) online activities including social games like Minecraft [4, 46, 47, 60, 61, 63, 64]. Neuroscience research shows that the quality of activities, particularly during early and middle adolescence, are strongly correlated with brain development [37, 43–45, 50, 59, 87]. The development of one’s socio-emotional, cognitive, and physical abilities are aided through healthy social relationships with peers and other caring adults (e.g., parents, teachers, coaches)[45]. On the one hand, multiplayer games enable youth to expand their social and collaborative skills with peers and other adults in interest-driven (i.e. intrinsically motivating) settings [3, 46, 81, 99]. On the other hand, they are rife with personal and interpersonal conflict. For example, conflict in Minecraft may arise in contexts engineered by game-design (e.g., players being attacked by virtual zombies) and/or in-game behaviors (e.g., stealing or destroying someone else’s virtual resources, social drama, etc.). Research shows that current approaches in games like Minecraft limit or avoid conflict (i.e. a deterrence-based approach [99]) through the use of socio-technical controls which eventually limit learning. In stark contrast however, literature in CSCW emphasizes that conflict is an unavoidable and natural outcome in everyday life and that it can exist even when two or more individuals cooperate with each other [27]. Easterbrook et al. [27] explain this a nuanced definition and suggest that the quality of cooperation depends on the ways in which conflict is handled.

Scholars in CSCW have recognized that multiplayer virtual games can feasibly advance our understanding of socio-technical systems which undergird collaboration and other such group-based phenomena [6, 11, 21, 23]. Relatedly, researchers in CSCW have examined how multiplayer games can be designed to support social aspects of collaborations including “sociability” (bonding with others as an enjoyable process in itself) [23]; collective enjoyment and collaborative learning [68, 69]; social capital [7]; and equity in collaborations [52]. Recent studies on interest-driven youth communities in Minecraft [3, 81] ground our research pursuits in CSCW. These contributions reveal, albeit in separate contexts, the need for understanding how to design inclusive and equitable online contexts for youth. These studies also highlight the value of design-based investigations as a way of understanding how to better harness the socio-technical potential of Minecraft. CSCW offers decades of research on conflict [32, 51, 92] which we delve into shortly in our review of related work. So far, the potential of using games like Minecraft to promote an alternative mind-set towards conflict [27] has not been fully explored.

The enduring benefits of psychosocial training during early adolescence including personal and professional success in later life is evidenced by a rich body of work across studies in clinical, wellness and prevention, and youth developmental research [26, 96, 104, 113]. We shortly review evidence-based practices such as I Can Problem Solve (ICPS) [97, 104], known to promote a problem-solving mind-set in youth. Prior research has suggested that the role of technology, specifically within video game contexts, be further explored to overcome the limitations of traditional evidence-based interventions [15, 26, 100]. Research also shows that play-based settings offer rich possibilities to simulate real-world experiences and are widely acknowledged to foster learning and development

[34, 35, 38, 88, 105]. While limited studies report on translating evidence-based practices in single-player online games [12, 17], it is not yet clear how these practices may translate into multiplayer online games.

Based on the opportunities to build on prior work in CSCW and advance our understanding of conflict-resolution in online social games for youth, we chose a mixed-disciplinary approach in our research endeavor. Our design-led research [74] is situated within the context of a moderated Minecraft server in an interest-driven, after-school online program for youth. We seek to address the overarching question of how might we leverage the socio-technical affordances in Minecraft to support youth in shaping the growth and social climate of their own play community? More specifically in the same context, we ask:

- RQ1: How might design be leveraged to promote a prosocial climate amidst naturally arising conflict in a moderated Minecraft server?
- RQ2: How do youth participate in the designed activities? How are their behaviors within the moderated server reflected over time on the climate of the play-based community?

Our research draws from decades of successful evidence-based practices deployed in school-based programs to help youth develop problem-solving and conflict-resolution skills. The second and third authors of this paper designed an online after-school program, called Survival Lab, that facilitates conflict resolution and collaborative opportunities for young children (ages 8 -14) in Minecraft. Following, the first author led a six-month field study between September 2018 - January 2019 with 30 youth participants, four college-age moderators aged 18 or above, and one high school volunteer aged 14 years. The field study procedures included in-game participant observations [108] and an ethnographic approach using digital traces [36] (to be explained in the following section) in accordance with approval from an institutional review board. We offer three key insights based on our work in this paper: i) the feasibility of translating offline strategies into experiential online settings for developing problem-solving and conflict-resolution skills; ii) the usefulness of creating structured and unstructured opportunities where youth can encounter conflict in authentic, interest-driven settings; and iii) the critical role that near-peer mentors play in modeling pro-social behaviors. Our approach exemplifies how offline evidence-based design strategies may be translated into online multiplayer settings to promote social competencies among youth. The work presented in this paper also suggests the viability of online play-based settings for iterative design and evaluation of behavioral interventions.

In the following sections, we begin with a review of the literature in CSCW and prior work in adjacent disciplines more specific to our design process. We then describe our design goals and chosen methodological approaches. We present our findings with canonical examples from the data to address the above research questions. Finally, we discuss the implications of our findings and conclude with recommendations for future work.

2 PRIOR WORK

Due to the interdisciplinary nature of the research questions posed above, it is necessary to review related work in Computer Supported Collaborative Work (CSCW), Positive Psychology (Youth Development) and Prevention Programs (offline evidence-based design strategies).

2.1 CSCW Research on Online Social Conflict

Broadly speaking, researchers in CSCW have been focused on understanding various dimensions of conflict such as – contributing factors [54], impact of social conflict on collaborations [73]; conflict-management strategies [42] and so on. Easterbrook et al.’s [27] comprehensive review of literature on conflict resolution in CSCW provides a starting point for us to understand how

conflict resolution is relevant to the CSCW community. They delve into past studies in CSCW on group-work which highlight that further understanding of social conflict can inform how group collaborations can be better supported. We then examined the CSCW literature on virtual games to see how conflict has been addressed. Prior work offers strong evidence that supports how sociality [3, 68, 69, 81–83] is supported in online multiplayer games. More recent work focused on the socio-technical affordances in Minecraft are of direct relevance to our investigations around conflict. On the one hand, research confirms that Minecraft servers can be designed to simulate rich possibilities for social interactions. Ringland’s work [82, 84] focused on an exclusive server, Autcraft, reveals that the careful curation and administering of community norms enable a new form of social play for its youth members who otherwise tend to experience social stigma online. The approach of enforcing strict rules through various socio-technical means including moderation and technology filters work for select communities such as Autcraft. However, recent research [71, 99] forces us to confront the notion that conflicts may be an unavoidable phenomenon as it emerges when there are tensions between personal agency and/or as a result of the underlying social dependency on other players. More work is necessary to understand the how the affordances of social play, which inherently present natural scenarios for social conflict, can be harnessed to help youth develop conflict-resolution and other social competencies within online play-based settings.

2.2 Background on Minecraft

Minecraft supports endless creativity in that players can construct 3D virtual worlds and objects such as farm-houses, forests, and even virtual computers [76]. The game supports various configurations (e.g., Survival, Creative, Adventure, etc.) that each outline what players can and cannot do in both single-player and multiplayer modes [25]. Gaining popularity among youth, ages six and above [64], it supports activities that foster creativity, logical and computational thinking [70, 93, 109]. Researchers across disciplines have been investigating Minecraft as a context that can support STEM learning and design thinking [9, 24, 25, 55, 56]; social play [81, 99, 102]; collaborations [13, 72]; and advance our understanding of behaviors in online communities of interest and affinity networks [3, 75]. Communication in Minecraft occurs through in-game chat, gameplay actions, and more recently, through voice chat using tools like TeamSpeak [107] and Discord [20] (e.g., [49]), and even video-based applications such as Skype [75]. Researchers note that more focus on design is needed to ensure that the features of Minecraft can be optimally harnessed to support youth’s social needs [3, 81].

2.3 Trace Ethnography

Prior work in CSCW has demonstrated the efficacy of ethnographic and participant-observation methods in online social games [69, 81]. Building on these approaches, we sought to understand other ways in which we might take advantage of multi-modal communication in a moderated Minecraft server. Online settings like Minecraft are rich socio-technical ecosystems in that users communicate through chat, voice, video, and in-game tools as described above. We adopt the trace ethnographic approach [36, 39, 58], which when combined with other methodological approaches can help researchers corroborate their analyses. These digital traces automatically generated in the form of chat logs, audio and/or video recordings (example) exist, often in the background. While they may individually reveal very little, when researchers assemble these data with other observational data, the traces come alive to complete a richer, more detailed narrative [36]. Furthermore, as Haines [39] argues, traces’ approach offers a way to ground researchers’ interpretations in the system-generated data. In triangulating field observations with system-generated data logs, the internal validity of research findings can be established [5, 77].

2.4 Offline Evidence-based Practices for Conflict Resolution

Problem-solving in the information age involves being able to collaborate, often across disciplines to address complex issues [30] and studies suggest that problem-solving skills will be a key prerequisite for success in the future [31, 33, 51, 65, 90]. Research on interpersonal conflict suggests that there are four general styles that adults use to mediate interpersonal conflict among youth [2, 96, 97, 104]. The first two, power and suggestion, involve eliciting little to no responses from youth (i.e. use of power or authority to command a certain action and suggesting solutions from adults’ perspectives) and are evidenced to be the least effective in helping youth learn to problem-solve. The third style refers to explaining, where the adult continues to dominate the problem-solving process, and though necessary to explain consequences to youth remain less effective. The fourth and ideal approach, problem-solving, involves a Socratic method of open-ended dialogue between the adult and youth. By asking open-ended questions, Shure [97] and others [104] argue that youth are forced to think for themselves and reflect on the situation or problem. Most Minecraft servers are understood to follow the first three approaches [99]. The I Can Problem Solve (ICPS), used in many evidence-based offline interventions, can potentially be translated into online Minecraft contexts. We found a handful of related studies [12, 17] that adopted offline strategies in online games. For example, Beanstalk [12] is a game specifically designed for science education (targeting children ages 6-10) to promote social competence. Zoo U [17], an interactive online game for younger children (ages 7-11), is described to translate evidence-based strategies that promote social competence. While these studies suggest possibilities for designing games to support social competence in youth, no studies known so far have addressed problem-solving in a multiplayer online setting.

3 DESIGN APPROACH & METHODOLOGY

The second and third authors created an online after-school program called Survival Lab, designed for youth (ages 8-14), in Minecraft. They developed the online program drawing from offline evidence-based strategies in the literature [2, 28, 94, 97, 115]. Survival Lab was piloted for six months within a moderated Minecraft server that was hosted by Connected Camps (CC), a non-profit organization. The first author used trace ethnographic approaches ([36, 39, 58]) to conduct the field study between September 2018 and January 2019. In the following we describe the design process, field study set-up, participant and facilitation teams, data collection and analysis procedures.

3.1 Program Design

3.1.1 Community Agreements ritual. Traditional in-person programs in evidence-based literature [57, 62, 86, 95, 104] emphasize that youth seek emphasize that youth seek i) a sense of belonging to a given community or group; ii) mutual respect from peers and other adults; and iii) opportunities to actively engage as members of a given community. Autonomy or personal agency (e.g., [40]) can help community members develop a stronger sense of belonging that further promotes social relationships within communities ([66, 80, 89, 91, 102, 106]). Based on these findings, Survival Lab included the design of online Community Agreements (CA) rituals intended to help youth nurture a sense of community or belonging. This ritual was designed to assign the youth community a collective ownership and agency in determining their group norms. This concept has been in existence in offline settings, such as schools, after-school programs and even religious and public-service-based communities [14, 16, 112].

3.1.2 Opening & Closing Discussions. Group discussions are evidenced to encourage peer learning and reinforce learned concepts [29]. The ICPS [96] approach involves open-ended dialoguing to elicit diverse views and encourage youth to reflect on possible solutions to interpersonal problems.

Building on these strategies, the latter two authors designed the opening/closing discussion rituals to create circumstances for youth to engage in reflective group discussions. These rituals form the basis for “teachable moments” [99, 101] where moderators help youth reflect (e.g., on topics such as cooperation, teamwork, and communication) and/or facilitate discussions on how youth would like to improve their experiences in Survival Lab.

3.1.3 Open-ended Team-based Challenges or Quests. Social skills training programs incorporate the concept of “superordinate goals” [8] that require learners to cooperatively solve problems together. CSCW research suggests that maximizing interdependence and social interactions can support collaborations [18, 19, 22, 41, 48, 53, 66]. Based on insights from the literature, Survival Lab was designed to include “World Quests” as a set of time-bound challenges and crisis events that were introduced in every gameplay as part of a larger narrative (e.g., youth maybe survivors in an abandoned desert town or adventurers in outer space, etc.). Quests in Survival Lab were designed as team-challenges to increase opportunities for youth to play together if they chose to, thereby facilitating a range of interpersonal skills.

3.1.4 Near-peer Mentorship. Traditionally, moderators in games like Minecraft oversee server administration and/or act as peacekeepers of the community [81]. However, recent research suggests that moderators are positioned to also help youth experientially develop problem-solving and conflict-resolution skills in multiplayer games ([99]). Offline evidence-based programs emphasize the role played by coaches, teachers, and/or facilitators in scaffolding youth development [28, 114, 115]. To this effect, our design adopted a near-peer mentorship model. Four moderators (college students) and one community ambassador (high school student), all experts in Minecraft, formed the facilitation team in Survival Lab. Moderators were not trained in specific ICPS [98] dialoguing techniques, but were trained on how to facilitate the discussion rituals in general. However, as facilitators of other CC programs in addition to Survival Lab, they are positioned to better understand youth’s interests and connect them to a broader range of opportunities within the organization.

3.2 Field Study: Survival Lab Pilot

3.2.1 Study Setting and Program Structure. The online after-school program (i.e. Survival Lab) was designed to run within Minecraft on a secure server hosted by Connected Camps (CC). The organization runs a variety of interest-driven after-school and summer programs within online spaces for youth. All online programs run by CC are mainly facilitated by moderators who form a part of CC’s experienced and certified staff. Youth participate and interact within various interest-driven programs (e.g., Arts Club, Coding Club, Creative Lab, Survival Lab, etc.) using infrastructure and secure tools hosted by CC. Survival Lab also integrated TeamSpeak ([107]), a voice-client that participants could use if they chose to, for social interactions among players and moderators. Survival Lab was piloted as a free program that was offered semiweekly, 90 minutes per session, for six months between September 2018 -January 2019 (for 20 weeks, a total of 40 sessions). While the Minecraft server was open for 90 minutes during every session, participants could access the TeamSpeak channel at any time although they typically appeared online in the TeamSpeak “Lobby” channel for 20-30 minutes each before and after every session. Figure 1 illustrates a schematic to show what a program session in Survival Lab typically looks like.

3.2.2 Youth Participants. A total of 30 youth, ages 8-14 years, participated in Survival Lab. Survival Lab was designed as a free, drop in model which meant that youth could choose to attend a host of programs including Survival Lab within the broader CC program. There were usually at least 10-15 participants in a given session. 19 out of 30 youth participants (i.e. 63% of the overall participant

Fig. 1. Survival Lab’s Structural Features: Typical Session

pool) were regular attendees in Survival Lab. Four of the remaining 11 participants were more regular but attended the sessions only for a month. While participants were aware that Survival lab was designed as a novel pilot program for a limited duration, they were not aware of our research questions or the program’s underlying pedagogical goals. The study was approved in accordance with the rules and requirements stated by the ethics committee within the Institutional Review Board at a University. Parents of all youth participants granted permission for observations and access to server logs as part of the CC program registration process. We did not have permissions to interact directly with participants to be able to conduct participant observations, interviews, etc. Out of the 30 participating youth, 24 were from various states in the U.S, one each were from Argentina, Australia, and Canada and three participants had not disclosed their location. Survival lab pre-pilots were conducted for seven weeks in the Summer (2018). Sixteen participants had participated in these pre-pilots although on different days. Among them, three participants (P2, P7, and P9) were present together during the pre-pilots for three weeks. However, we did not have permission then to collect data on players’ interactions in the pre-pilots. Additionally, 25 out of 30 participants had previously registered for other labs such as Coding, Game, Creative, Media, and Film Labs. In this paper, we refer to youth in Survival Lab as the participants. It may be noted that the facilitation team often referred to the same participating youth in Survival Lab as campers.

3.2.3 Facilitation Team. All the interest-driven youth programs (e.g., Coding Club, Arts Club, Minecraft Club, etc.), hosted by CC, are run by in-house facilitation teams and coordinated by a program manager. Each facilitation team comprises moderators and community volunteers, who volunteer their time and expertise to grow the online programs for youth. The moderators or camp counselors, usually college students, are experts in various topics such as Minecraft and are mainly responsible for operating a given program. The community volunteers are motivated to grow their expertise on a topic or to be an advocate for the youth programs they previously participated in. Together, the moderators and such community ambassadors form the facilitation team as they volunteer their time and expertise to grow various youth-based programs. The Survival Lab program included four moderators (Mod1, Mod2, Mod3, Mod4; ages 18 or above) and one community volunteer, also a high school student (CV1; aged 15).

3.2.4 Data Collection Procedures. The research team participated in Minecraft in spectator mode, which allowed them to fly around and passively observe the virtual world without interacting with it, or participants, in any way [78, 111]. The first author was visible to youth participants on TeamSpeak and had access to the moderators' chat channel in Minecraft (concealed from participants' view). The first author logged into TeamSpeak 30 minutes prior to every session and logged out 30 minutes after each session. Each main session in Survival Lab lasted for 90 minutes resulting in approximately 2.5 hours of audio data per session. In addition, we created two automated bots that could be moved around the various TeamSpeak channels to record 2.5 hours of data per session. Moderators also provided access to their TeamSpeak and Minecraft gameplay recordings. This was done to unobtrusively collect data corresponding to instances when moderators were in a private channel with participants. Similarly, in Minecraft, we collected 90 minutes of gameplay data (lead researcher, four moderators). This included video recordings of the gameplay. Additionally, the first author collected screenshots and chat-logs from every session. We collected 100 hours of in-game observations between September 2018 and January 2019, as well as log data including video replays from the researcher's and each of the four moderator's perspectives, audio recordings of various TeamSpeak channels (amounting to nearly 5000 hours of log data), screenshots, Minecraft text chat logs, moderator logs from TeamSpeak and Slack and planning documents. This large study data-set helps facilitate a more holistic understanding as we can triangulate observational and traces' logs from various perspectives (i.e. researchers as well as that of facilitation team). The first author captured hand-written field notes from every session and created debrief notes to help track salient themes and manage the vast amounts of data [110].

3.2.5 Data Analysis procedures. The first author wrote regular analytical and reflective memos, checking the video replays to follow-up on conversations analyzed from TeamSpeak. The first author analyzed the observational data and traces' data in multiple iterations using both thematic analysis [10, 77] and purposive sampling [85]. Field notes along with the multidimensional traces data for every session were analyzed individually by the first author in the days between every session, yielding a richer set of analytical and reflective memos. As the program progressed, the first and third authors discussed the analyses regularly (after every two sessions) and revisited specific aspects of the data, as needed, guided by the research questions.

4 RESULTS

We present three main themes based on our analysis of the traces' data.

4.1 Feasibility of Translating Offline Problem-solving Strategies

Survival Lab was designed to maximize social conflict during the gameplay in Minecraft. Whenever there was any conflict among participants, youth were not interrupted until the gameplay (i.e. ten minutes prior to closing rituals) had been completed. There was only one exception when a conflict between P8 and P9 emerged within ten minutes of a new quest, which we describe in one of the examples below. In general, the moderators waited to discuss such tensions and problems during the closing discussion rituals, and occasionally followed up in subsequent opening discussion rituals. No conflicts were observed or found in the traces data during the rituals in Survival Lab. We attribute this pattern to two reasons. First, the moderators always ensured that participants convened in the virtual community center in Minecraft and in one main channel in TeamSpeak by broadcasting announcements in the game and all TeamSpeak channels and they facilitated the discussions. Second, participating youth moderated their discussions based on their community agreements (e.g., "Allow others to speak and listen to their ideas"; P2 was observed telling their peers not to talk over each other a few times) reminding others not to talk over each

other). During the discussion rituals, moderators used open-ended prompts to invite and encourage participants to share their reflections and reactions around whatever had transpired during the game. The goal was to elicit as many responses as possible from youth by using open-ended questions/prompts that are known to promote a problem-solving mindset [2, 98]. Our findings are presented as three sub-themes below and offer canonical examples from the field study. We highlight the observed questioning techniques in our examples and contrast with those used in the evidence-based programs like ICPS.

4.1.1 Post-hoc Troubleshooting. The moderators followed up on any problems that had transpired during the gameplay by asking questions aimed at collecting everyone’s perspectives. The literature on ICPS suggests that one way of inviting youth to actively engage in the problem-solving process is to elicit their views on the problem. An example of a typical ICPS question in this context would be, *“Could you tell me what happened here?”*.

Following is an isolated example of conflict from Survival traces when Mod1 intervened immediately, instead of the usual practice of waiting for the closing discussions. In week 7, after the opening rituals and approximately ten minutes into the gameplay quest, a conflict had emerged between P8 and P9. Our observations show that P9 caused P8 to lose their virtual lives in Minecraft by engaging in a Player versus Player (PvP¹) battle. Everyone on the server knew this through a message that automatically appeared in Minecraft chat which read “P9 was slain by P8”. A few other players (e.g., P2, P4, P7) noted this in Minecraft chat or spoke in the TeamSpeak channel, wondering what had just happened. We note that Mod1 invited P8 and P9 into a temporary private channel in TeamSpeak. The first author was careful to not enter the private channel nor teleport themselves (i.e. go to the same virtual location as Mod1 or the two players) as the event was clearly a sensitive situation. Besides, Mod1 had not invited the researcher or any other moderator into the separate channel unlike other regular instances. However, the researcher had access to the traces (i.e. the moderators’ audio recordings) which later revealed that P8 had just offered to help P9 fix their broken shovel (P8 said “Don’t worry, I’ll make you one” to P9) before being struck by P9 for no apparent reason. The excerpt below illustrates how Mod1 facilitated the incident. While this example differs from the other exemplars, to follow later on, in that the interpersonal conflict was resolved mainly through a moderator-led approach, we can still see that the moderator engages with the players to make sure they have an opportunity to present their views.

[private TeamSpeak channel: P8, P9, and Mod1]

Mod1: alright so, we’re gonna chat/talk about what happened here. P8, can you tell me what happened?

P8: I was standing and then P9 just decided to start punching me for some reason. I don’t know why

Mod1: P9, what do you have to say to that? [no response] because if you don’t say anything and just let P8 talk, you’re gonna get the punishment. if you don’t tell us what happened either. Coz’ I need to know from both of you what happened. Coz’ you know about the CA. no PVP! but if you’re not gonna talk to me and just keep running away like this, it’s not gonna look good for you [no response] and you said you can hear me, P9

[P9’s response is incoherent with background noise] I hear you...

Mod1: But P8 didn’t punch you.

P9: No I mean like... as in I kinda just started punching P8. I don’t know why

Mod1: ok, so then you did kill P8 then. P9, that is punishment for community service then. are you ok with that?

¹https://minecraft.gamepedia.com/Tutorials/Player_versus_player

P9: as long as it's not mining because i have no pick-axe or a sword.

Mod1: Well..since you're doing clay you can give 10 stacks of clay as community service punishment. ok?

P9: Ok, I think I already have that much just to be honest

At this point, Mod1 agrees to accept what P9 already had but suggests that P9 apologize to P8.

Mod1: ok. P9, could you? [apologize to P8]

P9 : [types in Minecraft chat the command to give the clay to Mod1 and also types] I am sorry

P8: It's ok.

Mod1: Ok, are we all good here?

P8: Yep

Mod1: alright. So just be careful not to kill anyone? because we see it. it says right there in the chat and then we have the CA for it. alright well. that's good then.

When this incident was settled, everyone returned to their team channels and continued with the gameplay. We note that Mod1 clarified to a curious few participants (e.g., P2 and P7) that things were resolved between P8 and P9. Here, we can only speculate that Mod1 did so to let everyone carry on with their gameplay and not further highlight a closed matter between two players. The traces data shows that a larger conflict had emerged within the youth the same day in Week 7 which was brought up by Mod1 and others in the discussion rituals of Weeks 7 and 8. This example is presented shortly in Section 4.2.2.

During a different session also in Week 7, P1 had been struck by P14 (PvP). The latter claimed that they had seen P1 raise their sword first. Based on Mod1's suggestion to talk to each other, the ensuing conversation revealed that P1 explained to P14 that they had raised their sword to kill a virtual monster and retrieve a music disc. We confirmed across the traces' data that the issue between them had been settled after P14 had offered an apology to P1.

4.1.2 Taking emotions and diverse perspectives into Consideration. Moderators used the discussion rituals to prompt participants to reflect on problems that had emerged during the gameplay or by providing fictional scenarios. Inferred from the ICPS literature, this strategy helps youth connect their own emotions and that of others. Examples of typical ICPS questions in this approach include: "*How do you think that player might feel when you ? How do you feel when ... ?*" Our analysis reveals that the questioning approaches adopted by Survival Lab moderators are aligned with the ICPS technique. Only the most relevant responses from participants are presented where applicable as we showcase the open-ended discussion prompts in the following three examples from the data.

The first example is an excerpt from the discussion on how participants might deal with teammates who do not cooperate with each other (Also see example from Weeks 15 and 16 in 4.2.3). Related to the instances when the majority of participants chose to adventure in the game rather than help out their three teammates (P1, P11, and P15), the moderators persisted to help youth come up with some strategies on their own. In the excerpt below, we see how Mod1 and Mod2 do not make any explicit conclusions but assert that to upkeep fair behaviors, everyone should continue to reflect on their teamwork. Note how moderators do not assign blame to non-cooperating participants below.

Mod1: "If someone didn't cooperate with you, and refused to work with you, how would you deal with that?"

...

Mod2: "What if its on another server or in real life, and there was no mod?"

...

Mod2: “What kinds of things would you say to start that conversation?”

...

Mod2: “Ok, anyone else have any suggestions?” [after a minute or so]. for instance this world quest , not blaming anybody here, only some helped with the quest. is it ok to let someone [do all the work]...?

[P2 responds affirmative] Mod 1: i don’t think that’s fair to the ones that are working hard [No specific response]

Mod2: well that’s good food for thought. we want to remember, while we are having fun, and when we’re working in teams, we have obligations to help each other.

The second example is when Mod1 and Mod4 presented a hypothetical scenario in the opening discussions, prompting participants to think about how they might feel if someone created a rumor about them or how they might react to rumors about others. While there were no incidents in Survival Lab related to rumors, we note that moderators introduced topic about first impressions at around the same time that a few new-comers had joined the group. We see in the example below that Mod4 offers a personal anecdote to encourage youth to participate in the closing discussion.

Mod1: what happens if you believe rumors, good or bad? what happens to you, and maybe you listened and trusted it.

P6: whenever you hear a rumor and think its true ,it expands constantly and people say its true but they cant because everyone thinks its true

...

Mod4: earlier today we asked you if you could think of a moment when you assumed something about someone...or you were a part of a rumor... raise your hand or type chat with a plus sign ... [following a few minutes of silence] I’ll share one of mine it’s probably one of my bigger regrets as well. [describes how they avoided another schoolmate] I wish I talk to that kid more often more often or it took the chance to get to know them

This strategy prompted P11 and P9 to share their personal experiences which we deliberately discarded as it includes sensitive information.

Moderators in Survival Lab also built on each others’ dialoguing techniques to help participants further explore problem-solving. However, they also rephrased or simplified questions when participants expressed difficulty in understanding the questions. Below is an illustrative example.

Mod1: what do you do when someone is too competitive?

[P6 explains that they would “try to have a nice rivalry ..but play fair”]

....

Mod2: i had a follow up question, when you’re engaging in a friendly competition, what kind of things are ok to say and not ok to say. coz you can say things that can sound mean. obviously there;s a diff between you guys can never beat us and you guys suck. what is too much? what kinds of things are OK to say?

[P9 says that they don’t understand the question and Mod1 paraphrases it]

P9: treat them like a friend, it should be a friendly competition.

4.1.3 Brainstorming alternative approaches. When moderators detected conflicts or tensions among participants, they brought back questions in the discussion rituals for participants to brainstorm. This sub-theme includes situations when the problems were more open-ended (i.e. there is no single right answer) in Survival Lab. An example of a typical ICPS brainstorming question from the literature is: “*Can you both/all think of ... ?*”. While our study data reveals that there were far fewer conflicts than we had expected in Survival lab, the following is an example that is worth

mentioning. In this case, Mod1 and Mod2 offered a few open-ended prompts that prompted youth to engage in a rich brainstorming discussion and eventually creating a new community agreement.

[oasis episode: Mod1 invites everyone to brainstorm the incident]

Mod1: Yesterday, we got into the oasis. it seemed like there was a split between campers ...There were a lot of discussion around it. How do you feel about it?

[Mod1 acknowledges everyone's reasoning]

...

Mod2: How about P1's recommendation? [reminding all about another suggested solution]

...

Mod1: How about reasons for not...?

...

Mod1: How does everyone feel? [about the final consensus]

4.2 Social Conflict and Choices: Organizing as Teams or individuals for Structured vs. Unstructured Play

As inferred from the literature, multiplayer games like Minecraft present a plethora of opportunities for social conflict. Quests or team-based challenges were designed to harness this potential and provide opportunities for youth to encounter conflict during the gameplay. The facilitated designed activities book-ended each gameplay session to foster a positive community experience. Conflict was treated as an inescapable part of everyday life in Survival Lab that can be addressed positively in many ways including group norms and group discussions. Based on Easterbrook et al.'s [27] nuanced definition of conflict, we coded for conflict both when there were any signs of cooperation among youth and when there was a lack of such signs (e.g., clear disagreement, use of abusive language, arguing, and so on). To our surprise, the traces' data revealed far fewer social conflicts than we had anticipated. Below we describe the outcomes of social conflicts in Survival Lab with illustrative examples from the traces' data.

4.2.1 Time-sensitive Challenges Requiring Team-Work. We observed various instances where teams or participants offered each other help to complete quests or acquire a certain level or resource in the game. We offer two examples to show how participants continued to play together despite contexts that were ripe for conflict. First, in one of the sessions during Week 6, a new quest was assigned to create pressure among youth participants to compete for scarce resources. They had to work in teams to increase the odds of finding scarce items (e.g., a music disc and a jukebox) and survive various threats to their virtual lives. The facilitation team had announced participants would be rewarded with virtual money and a surprise once the quest had been completed. The surprise was that the participants could throw a virtual welcome party to celebrate the official launch of their new world. We expected that players would confront each other to form teams as some players were more experienced in Minecraft than others. We also expected that teams would vie for certain areas in the virtual world that were more likely to yield resources needed for the quest. However, the youth participants remained in their usual assigned teams (one of the teams (T2) had recently lost an experienced player P7 to another team (T1), and yet appeared to be making good progress). During the first half of the gameplay, P2 and P7 from T1 asked P14 for help with a specific item (a music disc). The traces' data shows that P14, busy with their quest in team T2, offered no clues or help. After a short while, P2 and P7 were observed to give P14 an extra music disc as they were able to find two discs. The traces data also shows that Mod1 refused P14's offering as it had to be a different disc. Even then, the data shows that P14 went on with the quest and eventually found the music disc. Based on our data, we cannot explain the motivation for T1 to help T2, but we posit based on the chat and audio traces, that players viewed the activity

as a means to celebrate in Minecraft after everyone completed the quest. For example, when the moderators announced the quest, all participants expressed their excitement for the “party” at the end of that session.

Our second example relates to an interesting two-part case when the moderators decided to spontaneously introduce a conflict related to the game narrative to increase the chances of youth encountering opportunities for problem-solving. In the first part in Week 7, CA1 and Mod4 shared their plans in a private Minecraft chat accessible only to the facilitation team and the researcher. Mod4 had planned to distract the unsuspecting participants by disguising themselves as a visitor, Mayonnaise, to the virtual town. CA1 was going to help them generate many more virtual monsters (e.g., Sandwich, Ketchup, and so on) to attack the participants from various strategic locations in the virtual world. Their idea was to confront participants with an unexpected situation that was intended to induce conflict and confusion among participants. Participants would be forced to defend themselves and work together to protect everything they had built in the virtual world. As the plan unfolded, P14 was observed to be the first player to spot (and suspect) the hostile visitors. The traces’ data shows that P14 alerted both teams (T1 and T2) to prepare for a collective fight against Sandwich and their crew. As best as participants were observed to have fought the powerful mobs together, they could not overcome the attack. The log traces show that inter-team communication had suffered because participants had used separate TeamSpeak channels and had had no time during the attack to communicate through Minecraft chat. In the closing discussion on the same day, Mod2 is observed to help participants determine what they could do in the future to prevent such issues.

Mod2: “We had a big fight, talking back and forth and had to mobilize. what are some best ways to do this?”

P1: “Talk one at a time”

Mod2: “That can be tough in a fight like this”

P14: “Use the main channel to plan” [referring to the TeamSpeak voice channels]

P2: “Have a plan”

Mod2: “What would we plan? ...who’s offence, defense?” [participants agreed on chat]

Mod2: “Yeah!”

P1: “Two main areas - Plan on who will be where - spawn and oasis”

Following this incident, we found that participants had increased their use of communication channels; planning and closely monitoring what was being said during the quests which the third example illustrates

We analyzed the traces to see how participants worked as teams over time. In the second part, on the following day of Week 7, Mod4 continued their plan and captured Mod1 (the town Sheriff) as a hostage. This time, participants were observed to work together more, communicating more efficiently. They were unable to rescue their Sheriff as they ran out of time, but Mod1’s reflection confirms our analysis. Below is a post from Mod1 in CC’s internal communication channel after the session which acknowledges that participants had worked together.

[Post by Mod1 on 20 Oct, 2018 in the Slack team channel used by CC moderators]

Mod1: survival lab glow and grow:

glow: I was captured and taken hostage! Everyone worked together to thwart the evil doings of the “new” camper Mayonnaise who was actually Sandwich’s second in command! The conspired to attack the town and oasis but a sandwich sale had them retreat! I guess...? but I’m still captured so i hope they save me next week.

grow: I should let campers know that they are able to change the volume for other campers and/or TeamSpeak itself in case someone is a bit too loud from being too excited and we can't tell everyone 1 by 1 to quiet down when a world event is happening.

The traces' data shows that participants continued to play in teams and reflect on their team-work related experiences throughout the study. The last example under this theme relates to the final quest in the program where participants were earthlings on a spaceship in the virtual world. Tasked with one of the most challenging quests in Survival Lab that included several interdependent tasks or "superordinate goals" [8], we found that all participants chose to work together and completed the series of quests on time. For instance, participants had to gather sand, make glass out of it; build a glass tower and install a beacon on its top while simultaneously fighting alien mob invasions, protecting the beacon, and gathering TNT to destroy Saturn. During the reflective discussion that day, participants unanimously shared that they preferred teamwork over working alone. They also reflected on how their team skills had changed over time. We provide a full excerpt, though lengthy, to highlight responses from participants in their own words.

Mod2: "You were supposed to do a quest as a team. Has your teamwork got better or worse over time?"

P20: "It got better" [on asked to explain more]. "We have five people in our team.

P18 helped with the base" P7: "better, no reason."

P4: "I think teamwork has gotten better.

P6 gave me nether bricks so I can decorate my house. P6 helped me"

Mod2: "Share something you learned"

P2: "How to work together, like...get more people to help me, not telling them over."

P9: "That sometimes you shouldn't attack things that attack you"

P20: "How sky block works in Minecraft"

P12: "I learned to live without PvP"

P4: "To be more careful. Usually in Minecraft, there's no void" [referring to the void in the virtual world]

P3: "I learned I hate mobs"

P9: "Same, P3. Same"

P20: "I learned to be careful and how good sharing is"

P7: "Teamwork is key"

4.2.2 Minecraft-specific Conflicts in Structured versus Unstructured activities. Certain conflicts were easier to engineer as they could be designed using the in-game affordances in Minecraft. These include for example, Player versus Player or PvP attacks, farming virtual animals that are a source of food and potentially personal pets in the game narrative. We report on two instances where social conflict appeared due to these game-specific features. Interestingly, in both examples, we note that youth drew from real life examples to develop new norms or agreements for the community.

The first instance relates to PvP and emerged during Weeks 4 and 5. P12 had just joined the lab in Week 4 and suggested a Community Agreement ("No hitting randomly"). Participants had been discussing since Week 2 what they might do if someone stole from them. For example, P1, P13, and P19 had been discussing alternate strategies for dealing with anyone who might steal items from their team. PvP was not enabled or allowed by default in Survival Lab. Noting these discussions, the moderators prompted the community to discuss their views on PvP. All but one among 19 participants who were present agreed to "ban" PvP. When P14 expressed that they were all supposed to be in an abandoned town ("fights in the wild west, so we can keep it like that"), P9 immediately countered "It doesn't have to be like that" and everyone else agreed. P14 agreed support this new Community agreement and stated that anyone violating the agreement would

be sent to a virtual jail (P9 agreed with this). Even as Mod1 was thinking out loud if they were going to make a virtual jail, Mod2 spoke thus “I think P1 has a different suggestion besides jail” (based on what P1 was typing on chat). P1 had an insightful suggestion that the “punishment” ought to be something that would help the community (“Let’s say as a punishment you had to find something that wasn’t super hard to find and you had to return it and it could be something that is helpful to the town. its like some people went to jail and had to do community service.”). We see that P1’s idea is inspired by something they might have come across in real life when people offer service when they violate some rule. The group created a revised agreement (“No PvP. Punishment: Community Service!”). To our surprise, we found in the traces data that P9 had engaged in a PvP attack two weeks later(See 4.2.1 for an elaborate description). Later on in the program, moderators created a specific area within the virtual world (PvP arena) since participants expressed an interest in engaging in PvP battles for fun. The moderators did this to encourage unstructured play and reminded participants to only attack those players who were present within the arena.

The second instance in Week 7 and 8 was an unplanned conflict scenario. The community had created a virtual oasis in the desert town, built farms and (“spawned”) farm animals like cows, ducks, rabbits, etc. The participants found themselves unable to agree on how to use those animals for survival. While killing the animals would earn them points in the game and serve as food or resources (e.g., beef, leather) although reading them would help generate other kinds of resources (e.g., milk). During one of the sessions when participants were allowed time for free-play, P14 along with a few other participants (P2, P7, later joined by P9) killed all the cows in the oasis. Since the cows had been programmed to regenerate, this behavior lasted the entire gameplay. P1 along with a majority of the other campers strongly opposed the idea of killing the virtual animals. In one of the follow-up discussion rituals, the moderators asked all participants to discuss their thoughts and views on the incident. After a fairly long back and forth discussion led by participants and facilitated by Mod1 and Mod2, the two sides agreed to settle half-way. P14 suggested that killing farm animals should be made legal during the day but protected at night (P14: “It’s like how stores are open only for a while”). As a new agreement was established to reflect this new policy, P1 thoughtfully reminded their peers to limit their use as resources in a desert can be scarcer. We note that this policy evolved into a more broader agreement in Week 14 (Unclear from the data which exact participant suggested this: “Be mindful of the environment so we don’t run out of resources”). Again, we note youth drew from their real-world observations (e.g., P14’s reference to a shop that remains closed at night) to solve in-game problems.

The PvP related debate emerged during a structured ritual, while a related incident later on (P9 attacking P8, described in 4.2.1) happened before a structured quest was announced. In contrast, the oasis episode emerged as participants were engaged in free play (i.e. an unstructured activity when participants could go adventuring in the virtual world). These results prompted us to re-examine the data for any other similar patterns which we present in a sub-theme below.

4.2.3 Individual Agency versus Team Goals. We found a few instances, especially during unstructured gameplay, that had great potential for social conflict where participants had to confront their goals against those of their team or the larger community. None of these led to any tensions or conflict whatsoever, but we report three examples from the traces’ data to illustrate how youth in Survival Lab dealt with such situations.

During Weeks 15 and 16, participants were led to a new area in the virtual world that was mostly covered in snow and tasked with constructing new houses and community structures. As always, they were given the freedom on how they would respond to the quests. We noted that most members in T2 agreed to explore the new land together. But in T1, only P1 wanted to complete the quest that would earn their team additional resources. P1 was observed to ask their teammates for

help, while most of them were busy adventuring the world. P1, joined by P15, persisted to complete as much of the quest as possible but the two players hesitated to take action on certain tasks as they wanted their team-mates to also have a say in the outcome. The moderators acknowledged their contributions and gave their team useful resources. In a subsequent session, P11 faced a similar dilemma when their teammates abandoned the quest and throw “snowballs” at everyone instead. The moderators allowed youth to make such choices and observe the outcomes. Neither case resulted in any conflict among youth. The moderators prompted everyone to think about fairness in team-work. In doing so, moderators encouraged youth to think about how they might address such problems on other servers or cases when moderators were not present.

Mod1: “If someone didn’t cooperate with you, and refused to work with you, how would you deal with that?”

P2: “Tell a mod”

Mod2: “What if its on another server or in real life, and there was no mod?”

P2: “Maybe calm down and try to work with them”

Mod2: “What kinds of things would you say to start that conversation?”

P2: “Maybe why aren’t you cooperating?”

Mod2: “Ok, anyone else have any suggestions?”

In Week 12, the traces’ data shows that P2 and P9 had got into an argument towards the end of the session, revealed later to be due to a misunderstanding. However, as suggested by Mod1, P2 and P9 reconciled and agreed to stop fighting and forgave each other. The discussed ritual also shows that other participants offered ways to solve such problems as the brief excerpt below reveals.

Mod1: [repeating their question]. “What can we do to stop misunderstandings in big teams?”

P5: “You have to make sure your not talking over each other”

P30: “Maybe we can open a courthouse and you can talk it over with your friends in a safe environment”

P9: “I agree with P30” [P2 agrees]

Mod1: “Ok...so being able to talk it out. You can do that over here, instead of blaming each other”

P30: “Yeah” Mod1: “What else can we do to keep up that teamwork with a bigger group?”

P7: “Basically talk it out”

We analyzed other sessions where participants were allowed to switch teams or reorganize themselves. However, the traces’ data show that participants discussed such changes with each other and created agreements (e.g., communicate and cooperate with your teammates) on how they would interact with each other. During the last month in the program, we noted that P2 had wanted to change their team after already making two switches. The moderators suggested that P2 wait for a few weeks but nevertheless informed P2 to go ahead as long as other participants had raised no objection. Although other participants team-mates gave their consent, we found that P2 had settled back in their original team.

4.3 Near-peer Mentorship Critical for Youth Development

4.3.1 Modeling Pro-social Behaviors. One surprising finding relates to the moderators’ use of alternative problem-solving techniques [98, 104], especially during the discussion rituals, despite the lack of any formal training. An explanation for this is that the four moderators are part of an ongoing enculturation within the CC organization where other moderators were trained to use the ICPS dialoguing technique. Our analysis shows that Survival Lab moderators actively communicated among themselves before and after every Survival Lab session, as presented in the

previous theme. In addition, these moderators communicate asynchronously (e.g., Slack ²) and synchronously (e.g., weekly meetings) with their larger moderator network in the organization. For example, moderators across various programs in the CC organization shared their own program-related glows and grows with each other. Below are two excerpts from the Survival Lab moderators (Mod1 and Mod2) during Week 3 and Week 15 respectively. These quotes illustrate how moderators reflected on their practices in sharing with their peers.

Mod2’s post on a common channel in Slack dated 22, September, 2018]

Mod2: Survival Lab

Glow: Another really great event today! These events that involve plot/acting are really really fun (for both the kids and the moderators) and I hope to keep these going.

Grow: Campers sometimes get worked up and panic during attacks, and I’m letting the group self-regulate to start with. There are already campers who enforce community agreements within their team. If it gets out of hand I’ll step in but I don’t expect that will be necessary.

[Mod1’s post on a common channel in Slack dated 21, December, 2018]

Mod1: survival lab glow and grow:

glow: We failed the mission! Oops, but it’s okay they’ll have another thing to hopefully work with and also hopefully achieve. Other than that their survival skills are still intact!

grow: I think we need to further show how much the repercussions are for failing stuff, as a lot of campers still stay oblivious towards some crises

The traces’ data shows that moderators always acknowledged participants’ diverse views during the discussions. They modeled respect and empathy for everyone in the community in their written and spoken communication.

4.3.2 Recognizing Individual Differences Among Youth. Our data shows that moderators encouraged youth participants, equally, to share their views and ideas throughout Survival Lab. They gently thanked eager volunteers who had led many rituals in the past and suggested if someone else wanted to take a turn. This practice encouraged players who started as shy, reluctant participants in the beginning (e.g., P2, P8, P9, P11) to speak up more often as the Lab progressed over the six months. For example, P2 volunteered to give all the new-comers a tour of the virtual world beginning from Week 14. In Week 17, Mod2 appreciated P2’s enthusiasm and suggested they might want to let someone else be the new tour-guide. P2 not only agreed so P9 who opted could play a tour-guide for the new-players P3 and P26, but also joined the tour and helped P9 when prompted. At the same time, moderators were sensitive to participants’ personal styles (e.g., P15 engaged actively in collaborative quests but preferred to chat in Minecraft rather than talking through TeamSpeak which the majority did). The traces data show that P2 even asked P15 multiple times why they did not talk much. Mod2 encouraged them to continue to work together (e.g., P2 can continue to use TeamSpeak while P15 can type in chat). We observed that the friendly and helpful demeanor of the facilitation team helped participants develop a positive friendly rapport within the community. As an example, in Week 13, P2, P7, and P8 playfully engaged in a “snow-ball” fight with Mod2. Mod2 did not admonish the participants for their act, but surfaced questions around cooperating with teammates in the discussion rituals.

4.3.3 Valuing Ideas and Suggestions from Youth. As illustrated in the examples so far, moderators refrained from correcting participants or enforcing rules or adults’ views on youth. Their expertise in Minecraft provided a strong connect with youth as the traces data show how participants (e.g., P1, P2, P4 P8, P9, P11, P14, P18, P20) talked about Minecraft with the moderators. For instance, they wanted to know how to craft a diamond sword, or acquire a rare mineral, etc. within the game. The

²<https://slack.com/>

moderators and CA1 helped participants when the latter would reach out to them, appreciated if someone volunteered to do something, and empathized when a participant lost their items or died in a violent mob attack. For example, during Week 18, P4 offered P11 their shovel when they heard that P11 had lost all their items in a mob attack, which the moderators took note and appreciated P4. The excerpt below reflects the theme of friendship among youth in Survival Lab, consistent with previous examples above around friendship.

P11: "Oh No! I lost all my stuff. The flashbacks... why! I remembered, I left all my stuff including my 54 diamonds."

P4: "I am sorry"

P19: "Must have been hard to get all those diamonds"

P4: "I can give you my shovel"

P11: "Thanks"

Similarly, when brainstorming ideas for how to treat community resources and team-based resources, Mod2 appreciated inputs from P10 and P1.

Moderators actively sought input and suggestions from youth on how they could improve Survival Lab. For example, in Week 6, moderators checked-in with participants to know if survival Lab was useful for youth (excerpt below). Based on participants' ideas, they launched a market place in Week 10, enabling participants to buy and sell resources in the virtual world. Similarly, in Week 12, they also created a duelling arena where participants could engage in PvP with mutual consent. The traces' data reveals that moderators continued to seek inputs from participants throughout the Lab. P14 proudly shared in TeamSpeak and Minecraft chat that they had helped the moderators build parts of a new virtual world that was released in Week 14.

Mod2: the opening Q for today is... "both groups have been spending time in their resp. areas. but we want to take a look at silver ranch. i hope its useful for everyone. what changes do you suggest to improve it? does anybody have suggestions?"

[P2 and P7 wanted shops]

Mod2: sure, what kind of stuff are you thinking? [P2 explains]

Mod2: Ok. anything other than shops that might be useful?

[P9 asks for food and P2 suggests "a PvP arena place"]

Mod2: ooh that's interesting. would it be like a PvP dueling arena? ...

Overall, moderators demonstrated to the youth community in Survival Lab that participants' ideas and suggestions really mattered in Survival Lab.

4.4 Summary of Findings

In summary, our analysis of the observational and traces' data supports three main insights. First, that Minecraft can be leveraged through design to help youth encounter conflict and shared facilitated activities enable youth to address conflict in constructive ways. Second, that youth revealed their ability to solve problems and in insightful ways (e.g., community service idea for PvP non-compliance, a policy that is more middle-ground inspired by the real-world) when alternative dialoguing techniques [97] were used. Third and finally, that moderators played an integral role as caring adults in enabling youth to reflect on their interests and problem-solving skills with peers.

5 DISCUSSION

Our work sought to understand how we might build on literature in CSCW and offline evidence-based practices to promote conflict-resolution and problem-solving skills in youth within an online play-based setting. Our chosen context was a moderated Minecraft server, designed to maximize opportunities for youth (ages 8-14) to encounter social conflict. The design of Survival Lab drawn

from prior work in CSCW, youth wellness and Prevention Science programs aimed to leverage three main socio-technical affordances on the online moderated server. These include i) a set of interest-driven activities (e.g., team-based quests, unstructured and free form of gameplay) for youth; ii) consistent rituals to enable youth to come together in deciding their group norms and reflect on their experiences in Survival Lab; and iii) a facilitation team that adopted and encouraged an alternative mind-set towards conflict. Prior work in CSCW (e.g., [27]) and evidence-based programs (e.g., [2, 97, 104]) endorse the view that social conflict is an inevitable phenomenon, particularly in social settings. The latter two authors of this paper designed Survival Lab to promote the idea of conflict resolution as an ongoing learning opportunity (RQ1). Our findings, illustrated through canonical excerpts in the traces’ data reveals how youth participated, to varying degrees, in the designed activities and rituals. The most surprising finding was that despite introducing situations that were ripe for conflict in Minecraft, youth did not engage in any disruptive behaviors and/or deviations from the youth-led community agreements. Youth participants in Survival Lab showed an unexpected integrity in that even when someone “broke” the agreement, they cooperated with the facilitation team to mitigate any tensions. Overall, the traces’ findings reported in this paper reveal that through the six-month pilot study, participants’ friendly behaviors toward each other and mutual respect were reflected both in the community agreements they collectively created and in the climate or the culture of Survival Lab (RQ2). We now discuss the implications of our findings for research in CSCW.

5.1 Offline to Online is Feasible and Enhanced in Play-based Settings

Our work builds on initial promise in prior work that has translated offline evidence-based practices in games to promote competence in youth [12, 17]. However, to the best of our knowledge, our work is the first to examine translating offline practices such as ICPS [2, 97, 104]) into online multiplayer games. The work in this paper informs and extends prior work in CSCW that has revealed the high potential for social in games like Minecraft [3, 81]. Prior work demonstrates that offline strategies can be translated for use in single-player video games in promoting social competencies [12, 17] among youth. Our work establishes the feasibility for translating evidence-based strategies within online multi-player settings. Furthermore, our study suggests promise for leveraging design to foster a positive server climate in the face of authentic social conflict. Survival Lab serves as a model for the design of a positive and open youth community that is not disrupted by social conflict or confounded by the choices offered to youth. These results are inline with prior literature [15, 26, 103] that online games can be viable alternatives for traditional offline interventions.

5.2 Need for Recognizing Strengths in Youth

Our findings from the Survival Lab traces reveal that youth were full of ideas. When prompted, they readily created community agreements throughout the program. While it took time and repeated reinforcement from moderators to help youth view their “failures” during quests as opportunities to improve their team-work, youth raised to the occasion when faced with tensions among their peers. We provided the examples of PvP and Oasis episodes that show how youth thought of solutions based on their observations in real life (e.g., P30’s suggestion to open a courthouse and “talk it over with friends in a safe environment”). Normally, PvP results in a ban where players may get frustrated and/or argue with others in the community. However, by positioning the youth community to have to discuss a solution, we saw how they agreed to fulfil service that would benefit the entire community as a “punishment” for breaking an agreement. We also saw in the examples how youth wanted to help each other and be friends. More work is needed to gather youth perspectives and investigate how they generated thoughtful responses. These findings are consistent with theories in positive psychology [57, 62] that young adults are competent and

capable (of pro-social behaviors). Young adults need opportunities where they can practice, fail, and learn from their mistakes.

5.3 Moderators as Friendly Mentors Rather Than Gate-keepers

Moderators in Minecraft were an integral part of the design in Survival Lab. They modeled positive behaviors, leading by example and positioning themselves as near-peer mentors to youth. This mind-set shift requires deliberate thinking and reflection on moderators' part. Our work suggests the promise that adults, too, can cooperate and learn to trust youth to independently problem-solve. Moderators refrained from making judgements or telling youth what they needed to do. Our examples show that they encouraged youth to be open-minded and consider others' perspectives. These are essential for effective problem-solving. Our study shows how moderators worked as one unit, often adapting their activities to give youth more choice (e.g., optional quests, ability to change teams, etc.). However, more work is needed to evaluate our preliminary suggestions through controlled studies, which we leave for future improvements. Our research suggests that through such incremental improvements and future iterative evaluations, online interventions can complement their offline counterparts and overcome the limitations around scale and impact. Furthermore, our research setting offers ways for moderators and other caring adults to use multi-modes of feedback (chat, text, actions through the gameplay, etc.) in real-time to better support and scaffold the development of social competencies in youth.

5.4 Study Limitations

Survival Lab was designed as a free drop-in model as explained before to support the highest-possible sense of personal agency in youth. The exploratory nature of our design work and Survival Lab pilot was necessary, given that it was previously unclear whether or not offline design strategies would be translatable into online contexts. Consequently, we could not incorporate psychometric measures that would have enabled a formal design evaluation. As a trade-off however, we ground our empirical pilot findings on two premises - first that the qualitatively assessed observations corroborate with in the system-generated traces (i.e. internal validity [5, 39, 77]; and the second being that our findings align with established results in offline evidence-based programs (e.g., such as ICPS [2, 95, 98, 104] and RCCP [1, 2, 115]). The empirical pilot findings are nevertheless valuable as they help identify opportunities that can be addressed in future work.

5.5 Recommendations for Future Work

Our work offers the promise of translating offline evidence-based practices into online play-based contexts for supporting youth development. We expect that our findings will inform future work on the design and research of online play-based settings particularly for youth. Our methodological contribution and empirical pilot findings provide the basis upon which future controlled experiments can be set up to evaluate the translated online design features. Alternative methodologies in future work may build on the reported online design strategies within play-based communities of various sizes and potentially across diverse contexts. Online contexts have the potential to overcome the problems of scale, reach, etc. that are limiting factors in offline contexts, but also conceal challenges unique to online contexts. Further work is needed to explore the feasibility of translating offline evidence-based practices for promoting positive group behaviors into other kinds of online and blended-online community settings (e.g., Twitch live streaming [91]). Future work should consider how online design strategies might complement offline practices and build on each other to address how we might design for collective outcomes (i.e. at a community level). Our work showed how participants drew from real-world observations to problem-solve in Survival Lab. More work is needed to understand youth perspectives on how young adults might apply online skills in offline,

real-world settings. Our work also suggests the need to further examine the role of caring adults (parents, moderators, etc.) in promoting youth development in play-based settings. Related work in CSCW and HCI communities (e.g., [79, 81, 91, 99, 102] may inform such future endeavors.

6 CONCLUSION

Youth are increasingly engaging in online social activities that including playing games like social Minecraft. Research shows that current approaches in games like Minecraft avoid or eliminate social conflict to suppress deviant group behaviors. However, youth need opportunities to practice and grow their ability to solve social conflict within safe contexts so they can overcome interpersonal problems and better understand how to cooperate with others. Research in CSCW offers a wealth of knowledge on conflict resolution that is an inherent part of any collaboration and everyday social interactions. Adjacent disciplines in youth wellness, Positive Psychology, and Prevention Science programs offer a rich evidence-base for alternative design strategies known to work in offline/in-person settings. Building on CSCW research, our work explores an alternative view of social conflict (i.e. that can occur whether or not mutual cooperation exists) within an online multiplayer game for youth. We translated offline evidence-based strategies into an online after-school program that was run within a moderated Minecraft server. The program was designed to maximize social conflict and individual agency for youth (ages 8-14 years). To our surprise, our analysis of data from a six month field study (30 youth participants, 4 college-age moderators, and 1 high-school community volunteer) revealed that youth not only engaged with the program’s design features to problem-solve conflicts they experienced, but also drew on community norms that youth themselves had authored in Survival Lab. Our traces’ data revealed only three major conflicts over a six-month time period, all of which were resolved through discussion in an amicable manner. While further research is necessary to formally evaluate our design, our work in this paper offers the promise for designers, researchers, and practitioners to expand contexts in Minecraft aimed at promoting pro-social development in youth. Our research suggests that online play-based settings can be viable sites to rapidly and iteratively build, evaluate and scale behavioral interventions for youth, thereby addressing some of the challenges faced by traditional offline interventions.

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