

# Final Group Report

IN4MATX 153

Group 8

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## 1. Introduction

As a group we decided to analyze and explore Minecraft as a CSCW system through its collaborative and multiplayer elements, along with improvements that can be implemented for a better experience. Minecraft serves as a digital space where users can work together in real time to build, explore, and play. The problem being addressed is although Minecraft offers powerful tools for collaboration, there are present flaws that clash with CSCW principles, hindering the game's fullest effectiveness for group work. Our team set out to investigate these challenges and think critically about how Minecraft, as a CSCW system, could better support its users. The problem we wanted to address was coordination difficulties due to lack of real-time updates, which leads to often having to rely on external platforms to coordinate. Through our study, we applied key CSCW concepts which lead to proposed solutions that were directly integrated in game. The goal for our project was to increase in-game visibility, support real-time, and context-aware communication. The suggestions were aimed to strengthen teamwork, seamless communication, and enhance the overall collaborative experience within Minecraft's existing system. Some of the ideas we explored included better in-game navigation through split screens, clearer ways to track teammates such as a minimap, and more natural communication features to support face-paced teamwork. Awareness, communication support, and social translucence were considered when figuring out what worked well and what could be improved. Through this project, we aimed to offer solutions that would make working in a team on Minecraft less stressful and more enjoyable.

## 2. Theoretical Framework (CSCW Concepts)

Our analysis of team play in Minecraft draws on four complementary CSCW theories that illuminate why remote collaboration falters and how our plug-in remedies those gaps.

### Workspace Awareness

Gutwin & Greenberg define workspace awareness as the continually updated knowledge of who is doing what, where, and with which objects in a shared space. However, the standard first-person Minecraft hides these cues, so players must stop their movement and ask others "Where are you?" Our solution is a live split-screen POVs, with colour-coded minimap, and username labels externalise presence, location, authorship, and activity, enabling teams to anticipate one another and manage coupling with fewer verbal interruptions.

### Social Translucence

According to Erickson & Kellogg, making socially significant actions visible, interpretable, and accountable lets collaborators coordinate through lightweight social signals rather than heavyweight negotiation. In our plug-in, broadcasting each player's camera feed and status emoji turns invisible effort into a public display, encourages timely help-seeking, and deter free-riding.

### Articulation Work

Schmidt & Bannon describe articulation work as the extra labour of dividing, sequencing, and meshing interdependent tasks. Our visual version-control panel supports this by recording who changed what and when. This feature allows players to quick roll-backs, while custom status chips such as “Mining” or “AFK” let teammates negotiate roles without leaving the game.

### Coordination Mechanisms

Schmidt & Simone argue that effective collaboration relies on rules plus artifacts that stabilise interdependent action. In our idea: split-screen windows, the minimap, version history, and pinned alerts act as coordination artifacts, each paired with simple conventions (e.g., stay within a 200 m radius, commit builds nightly) that help players align timing, avoid conflicts, and recover from mistakes without resorting to external tools.

Overall, these theories form our analytic backbone: awareness and translucence supply real-time context; articulation work structures tasks; coordination mechanisms institutionalise the resulting workflow. They predict that richer visibility channels and lightweight in-world artifacts will cut coordination delays and increase team cohesion—predictions tested empirically in Sections 4 and 5.

## **3. System Design & Implementation**

Based on the CSCW concepts discussed in the previous section, we designed a plugin system for Minecraft to improve teamwork and collaborative gameplay. We focused on solving three common problems that players often face: not knowing what teammates are doing, struggling to communicate clearly, and finding it hard to recover from mistakes. We implemented four main features, each mapped to specific collaboration challenges observed during user gameplay and supported by the theoretical ideas from CSCW.

### Split-Screen View

Minecraft only shows you your own screen, which makes it hard to know what your teammates are up to. Our split-screen feature lets players display up to four live views of teammates at the same time, each labeled with a username. Users can choose how many screens to show or switch between different players. This feature improves workspace awareness by gaming players real-time visibility into their teammates’ activities, whether they’re building, exploring, or fighting. It also adds social translucence, since everyone’s actions become more transparent to the group, which helps build trust and keeps everyone more connected.

### Visual Version Control

When multiple players are working on a shared build, mistakes and confusion can happen. Our version control system shows side-by-side comparisons of changes between different versions, highlights who made each change, and lets users roll back specific sections. This supports

articulation work by helping teams organize their progress and recover from problems without starting over. It also works as a coordination mechanism, allowing players to keep track of edits, avoid conflicts, and better manage their contributions in a shared space.

#### Live Minimap

In large or complex Minecraft worlds, it's easy to get lost or separated from your team. Our live minimap shows the real-time location of each teammate, their direction, and icons that represent their current activity, like building or mining. This boosts workspace awareness by making it easy to stay informed about where everyone is. It also supports coordination mechanisms, allowing players to use minimap to move together, plan routes, and avoid doubling up on tasks without needing to constantly chat.

#### Enhanced Communication Tools

To reduce confusion and make communication more efficient, we added features like proximity-based voice chat, emoji reactions, customizable status labels (e.g., "AFK", "Busy"), and pinned alerts like "Mob attack at base". These tools support articulation work by giving players lightweight ways to share updates, give feedback, or warn teammates during fast-paced situations. They also enhance social translucence, since players can quickly understand each other's status and intentions even without talking directly.

Each of these four features was designed to address specific collaboration challenges commonly seen in multiplayer gameplay. By focusing on awareness, communication, and coordination, our system reflects key CSCW principles and aims to create a more seamless and connected team experience.

## **4. Research Methods and Data Collection**

In order to guide our research and design, we used a survey-based approach using a Google Form questionnaire. Our primary goal was to collect both qualitative and quantitative data from a variety of Minecraft players to gain insights on how CSCW concepts manifest in Minecraft. The Minecraft Questionnaire was distributed to a range of participants, including friends, academic peers, and coworkers, all with varying levels of familiarity with the game. This sample of participants allowed us to get a good range of perspectives across casual players and more experienced players.

The survey was structured with the following key themes associated with CSCW:

- Frequency and context of play: Survey participants were asked how often they played Minecraft, if they mostly played solo or collaboratively, and in what settings.
- In-game collaboration styles and task management: We investigated how players shared roles, distributed tasks, and coordinated objectives during collaborative play.

- Communication tools and challenges: Participants were asked to detail the platform(s) they use for communication while playing Minecraft (Discord, text-chat, phone calls, etc.) and were asked to identify any difficulties in maintaining effective communication while playing.
- Version control and world management: We explored how players manage their shared worlds, including version control practices, backups, and administration.
- Suggestions and feedback: Participants had the option to share their own personal suggestions and insights for improving CSCW in Minecraft.

## 5. Findings & Evidence

In our Minecraft Questionnaire, which was sent out to a multitude of different Minecraft players. With this questionnaire, we were able to find many interesting facts regarding how Minecraft players collaborate and what Minecraft lacks when it comes to group collaboration. This is important because understanding what players want is paramount to making the right decisions for new features. These findings from the questionnaire will be the basis for new features that are to be added in Minecraft.

### Participants

Some things to note about the participants are that the majority of them, based on the questionnaire, do not regularly play Minecraft on a daily basis. Only around 13% of the participants said they played minecraft a few times a week. This is compared to the largest group of 53% which only play Minecraft occasionally. However the most important aspect that we were looking for was if participants have ever collaborated with others in order to build or complete objectives. The data came back to show that 86.7% of the participants have collaborated with others players. Based on this information we can look at the rest of the data provided by the Questionnaire through a different lens and understand what kinds of players that our data comes from.

### Interesting Findings

- 100% of the participants enjoy playing with others on the platform.
- The majority of participants have worked on Minecraft projects with people in different time zones
- 93.3% of participants use Discord voice chat to communicate in Minecraft
- 53.3% of participants found backups useful
- Majority of participants do not divide roles in projects

Evidence/Reason for CSCW changes

Split-Screen View

- Some participants wished to see a split screen mode to spectate friends in order to make teamwork easier.
- 20% of the participants are unaware of what teammates are doing and 46% and semiunware.

#### Visual Version Control

- 60% of participants have lost progress or needed to revert changes in a minecraft world due to a mistake, griefing, or a coordination issue.
- 66.7% of participants do not manage world versions or rely on server admins
- 79.9% of participants would find version history and changelogs help with team collaboration.

#### Live Minimap

- When asking for features participants wish to see in Minecraft the live minimap was one such feature requested.
- 73.3% of participants think that a live minimap of teammates would be most helpful in a team project.

#### Enhanced Communication Tools

- 80% of participants would find a built-in voice chat to be useful for teamwork.
- Most common communication issues that occur in minecraft are participants missing or missing hearing instructions.

## 6. Recommendations, Limitations, & Future Work

#### Limitations:

- Split screen
  - Having split windows for gameplay could confuse players about which is theirs and which is their teammates. Furthermore, this feature is implemented with the assumption that the user has more than 1 screen. While this feature is available for use regardless of screen count, users with 1 screen will have their visuals reduced to fit split screen(s).
- Version control
  - There are similar games, such as Ark: Survival Evolved, that have this feature well-embedded in their system. The issue is that it requires a tremendous amount of storage, depending on how far back the user wants to save for rollback purposes. On top of that, rolling back also means loss of any progress beyond the chosen timestamp. Overall, this might not benefit all players
- Live minimap
  - This feature has been implemented plenty of times in the gaming industry across genres. The issue with the current suggestion is that the minimap is meant to be

small and out of the way, by having name tags appearing in it will cause the map to cluster up and render it useless

- Communication

Minecraft servers tend to have a lot of players since it is multiplayer and a good amount of them are public; voice chat might get really chaotic. Not only that, since this is an online platform, there will be individuals out there who would abuse the system to use offensive speech and have disruptive behaviors

## Recommendation and Future Work

- Split screen

This feature should be enforced to be available only for users with more than 1 screen. Understood that users who don't meet the base requirements will be missing out on the feature. This is done to ensure the user experience is at its best when playing the game and using the feature.

- Version control

This is a welcome feature for many users based on the surveys, but it could bring irreversible damage. Since Minecraft multiplayer is popular, there should be a mechanism where this feature can bring more good than harm. Firstly, the feature can only be controlled by the host of the lobby to prevent abuse. Secondly, there should be a voting system to override the decision in case of abuse. This would at least make most of the users happy if it were to be used.

- Live minimap

Having a player tag helps with distinguishing who is who. To stick to the goal while not compromising the idea, players can be color and symbol coded. This combination should allow for a vast range of unique symbols to represent players on the minimap without taking up too much space.

- Communication

Similar to the version control feature, a feature that can help combat abuse is a voting system where players can vote on banning the disruptive user from using voice chat for a certain time or completely kicking them off the server.

## References

Erickson, T., & Kellogg, W. A. (2000). Social translucence: An approach to designing systems that support social processes. *ACM Transactions on Computer-Human Interaction*, 7(1), 59–83. <https://doi.org/10.1145/344949.345004>

Gutwin, C., & Greenberg, S. (2002). A descriptive framework of workspace awareness for real-time groupware. *Computer Supported Cooperative Work*, 11(3–4), 411–446. <https://doi.org/10.1023/A:1021271517844>

Schmidt, K., & Bannon, L. J. (1992). Taking CSCW seriously: Supporting articulation work. *Computer Supported Cooperative Work*, 1(1–2), 7–40. <https://doi.org/10.1007/BF00752449>

Schmidt, K., & Simone, C. (1996). Coordination mechanisms: Towards a conceptual foundation of CSCW. *Computer Supported Cooperative Work*, 5(2–3), 155–200. <https://doi.org/10.1007/BF00133655>