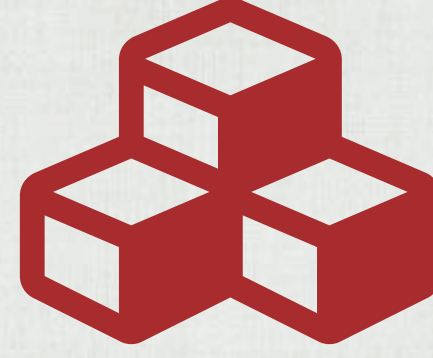


# PLAYFUL, COLLABORATIVE APPROACHES TO 3D MODELING AND 3D PRINTING



## METHOD

Come\_IN Computerclubs are constructionist, voluntary clubs using ICT for education in Germany (6x) and in Palestine (2x).

- Age 8-14.
- Intro to 3D printing & modeling with Minecraft (DE) / CubeTeam (PS).
- Then open projects with individual meaning for the children.
- Usually groups of 4-5.
- So far 28 1hr sessions in DE and 8 1.5hr sessions in PS.
- Participant observations, interviews, field notes, server logs, photos, videos.
- Printers: Z-Printer 650 & Printbot Simple.

**INTRO:** Cheaper / more prevalent 3D printers offer new opportunities for non-experts to produce their very own physical products. However, most 3D modeling software is still geared towards experts and offers limited collaboration. To change this, we are conducting qualitative studies with children in constructionist computer clubs in Germany and Palestine on co-constructive, playful 3D modeling using Minecraft and similar tools. Here are some first results.

## SOME FINDINGS

### Technical:

- Minecraft / CubeTeam surprisingly efficient for simple models.
- Ownership of objects often unclear.
- Limitations of 3D printers (e.g. Overhangs) not reflected in modeling tools.
- Orientation in 3D and mapping of camera position to task is problematic for kids.
- Way from model to print too complicated / not integrated.

### Social Practices:

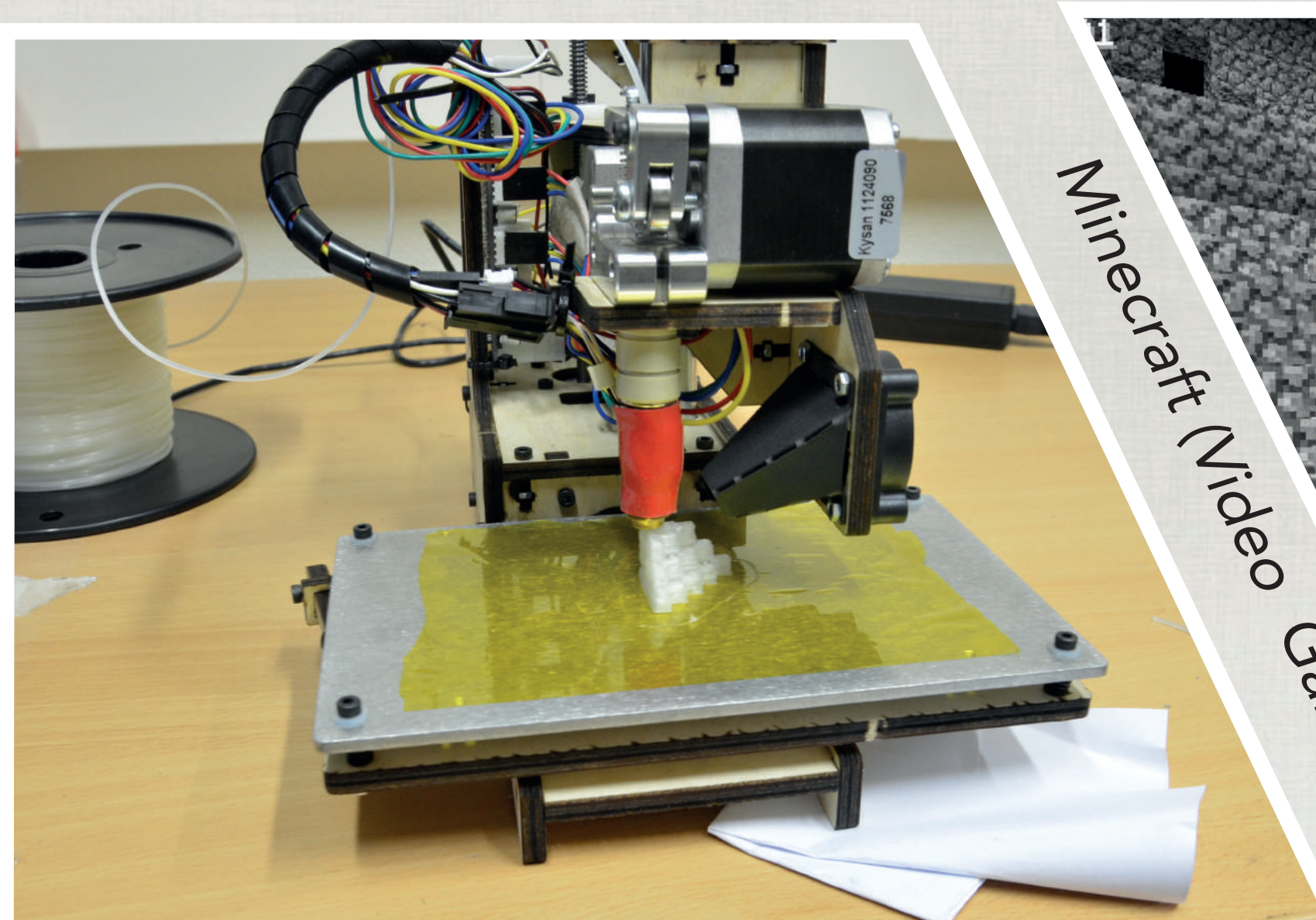
- Instruction: Advanced Children take the leader role.
- Orientation: Position allocation of players and structures.
- Support: Help and knowledge sharing.
- Arbitrating: Conflict resolution

## Outlook

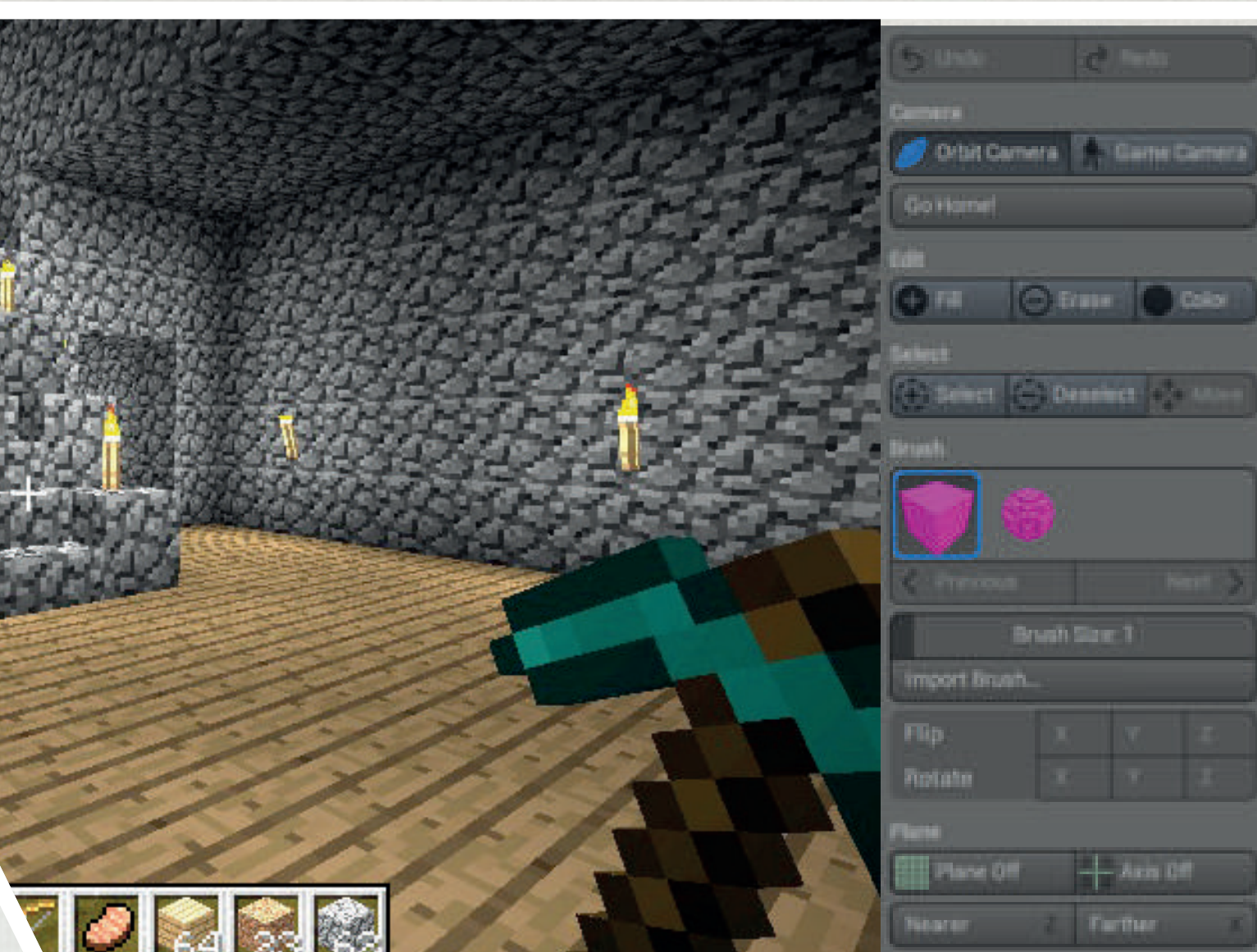
- Deeper, intercultural analysis and more in-depth implications for design.
- Inclusion of other digital fabrication technologies (e.g. lasercutting or CNC milling).
- Work some of our findings into CubeTeam and iteratively test with children.

## DISCUSSION

- Making and digital fabrication are powerful for education but the tools need an HCI perspective to grow.
- Consider findings for future educational 3D modeling tools.
- Draw inspiration from games (e.g. WASD/Gamepad for Camera).
- Collaboration is valuable, should be supported but needs consideration (e.g. ownership, arbitration).
- Collaboration features also need to address social practices and roles.
- Better integration of software and 3D printers!



Minecraft (Video Game)



CubeTeam.io (browser-based)

