

Exploring Display Techniques for Mobile Collaborative Learning in Developing Regions

Mohit Jain University of Toronto

Ed Cutrell Microsoft Research India

Jeremy Birnholtz Cornell University

Ravin Balakrishnan University of Toronto

Current State



Image Courtesy: Joyojeet Pal

dgp dynamic graphics project
UNIVERSITY OF TORONTO

Microsoft
Research

Current State



Image Courtesy: Bill Thies

Approaches to Technology in Education

[1] Outdoor computer kiosks, supporting the goal of self-learning



[2] E-Learning Materials with a pedagogical focus



[3] Imparting education using games on inexpensive cellphones



[4] Using multiple mice to impart healthcare learning



Requirements

- Inexpensive (Project#1,2,3,4)
- Plug-and-Play (Project#1,2,3,4)
- Scalable (Project#1,2,3,4)
- Enforce **Collaboration** (Project#4)
- **Mobility** (Project#3)
- Not restricting the **play behaviour** (Project#3)

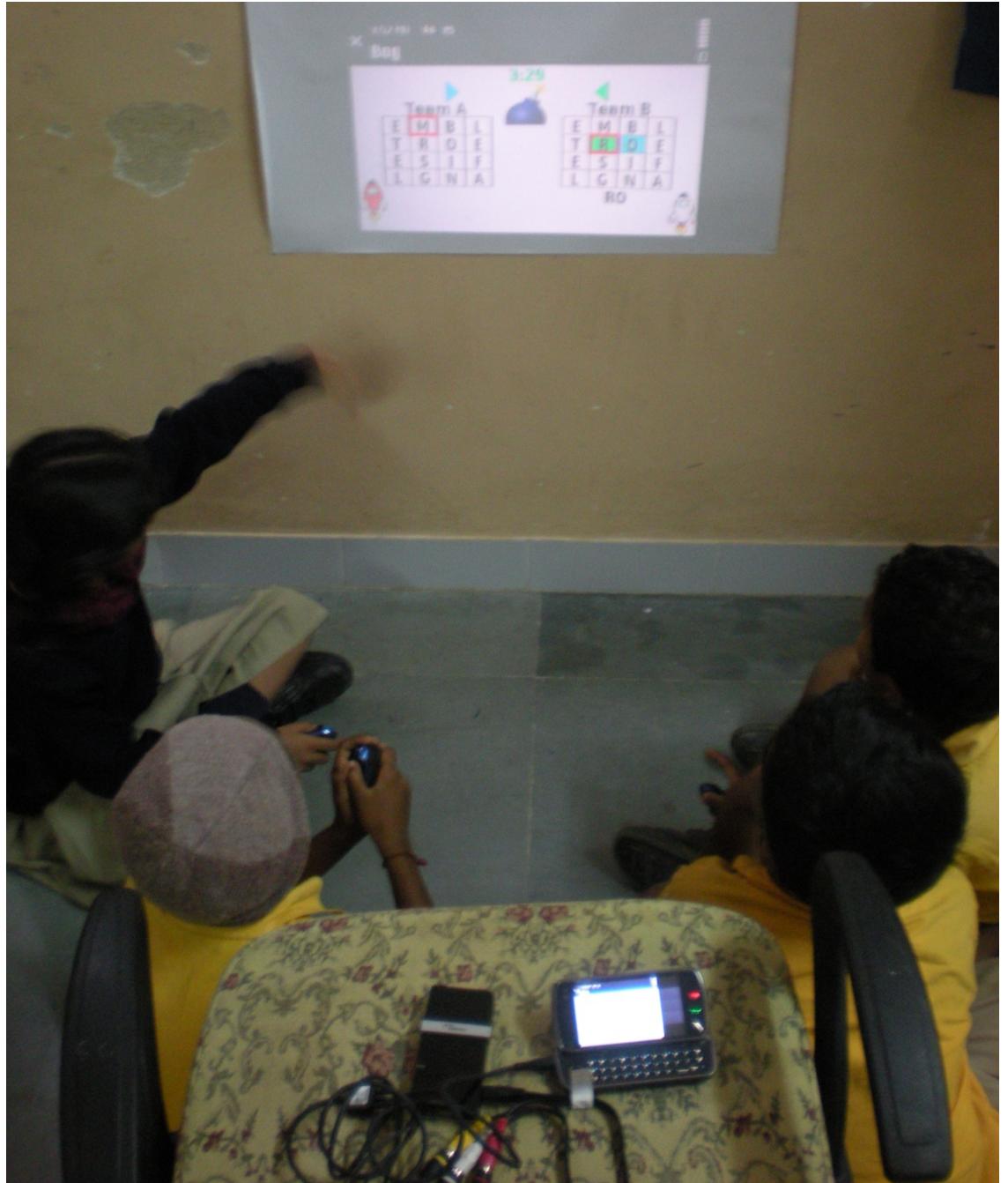
[1] Hole-in-the-Wall Education Ltd. (2001)

[3] MILLEE. Kam, M., et al. (2004)

[2] Azim Premji Foundation (2001)

[4] Multiple Mice. Pawar, U.S. (2007)

SDG Single Display Groupware



MDG

Multiple Display Groupware

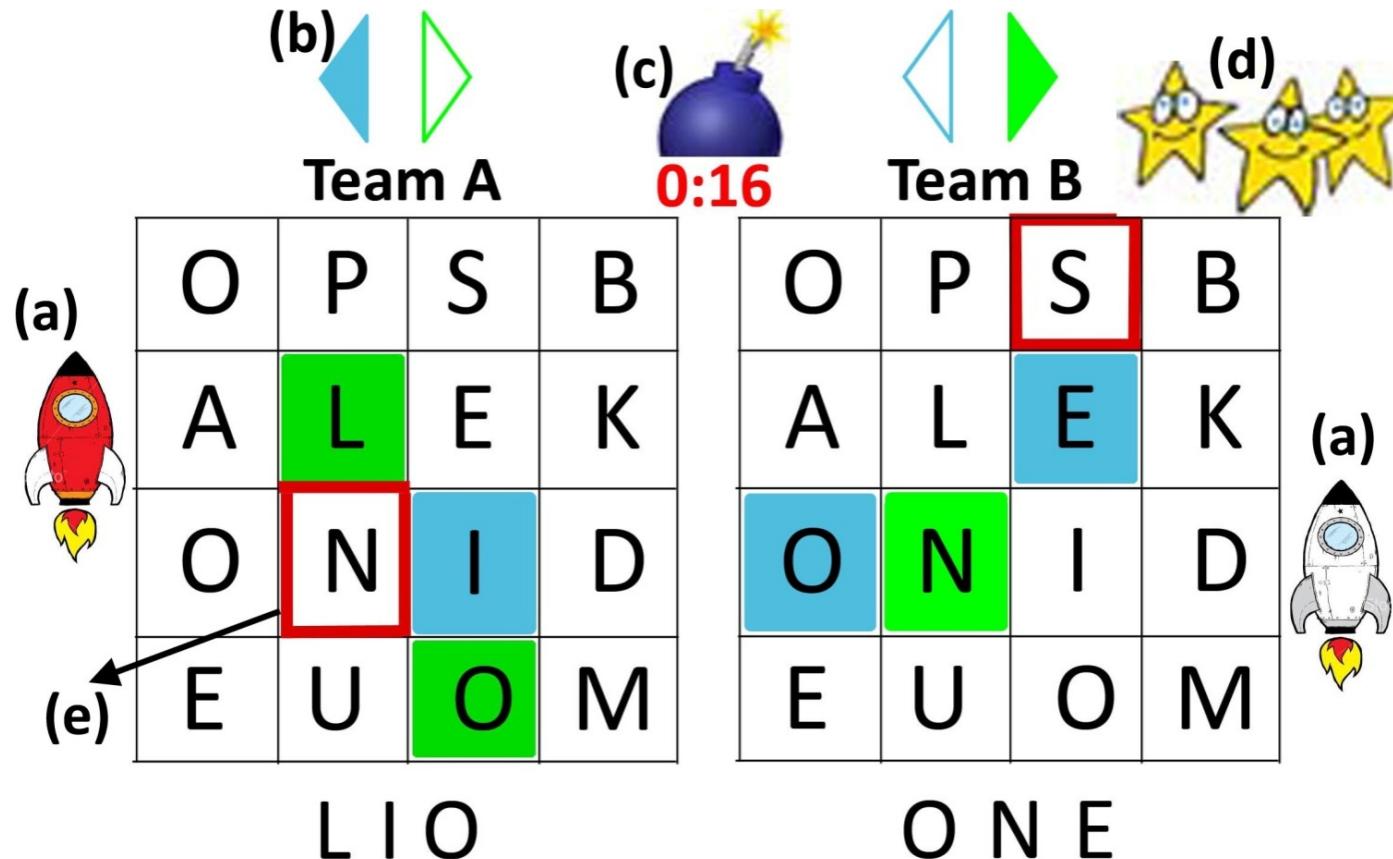


N Cellphones

Research Questions

- What kind of communication occurs, both as individual and as teams in the two display conditions, and does that have any impact on learning?
- How does the student play behaviour differ in the two display conditions?

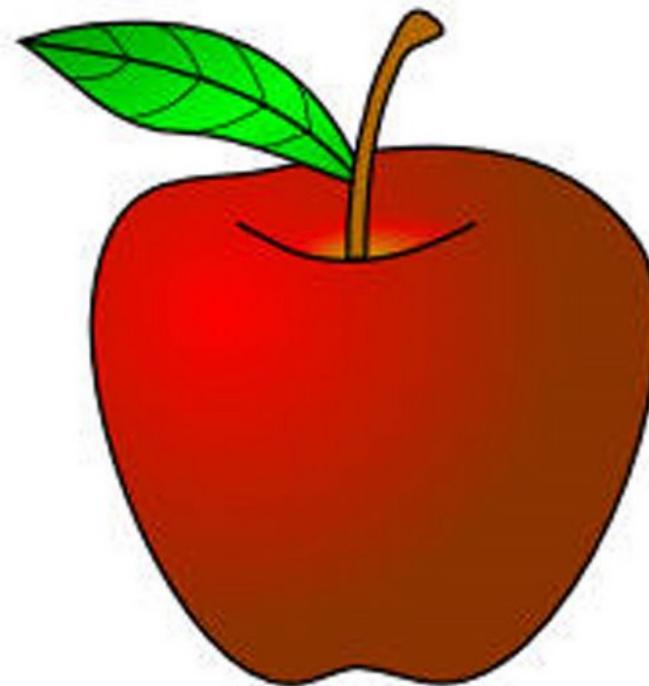
Design: Collaborative Boggle™



Design: Collaborative Boggle™

APPLE

O	P	P	B
A	L	E	K
O	N	I	D
E	U	O	M

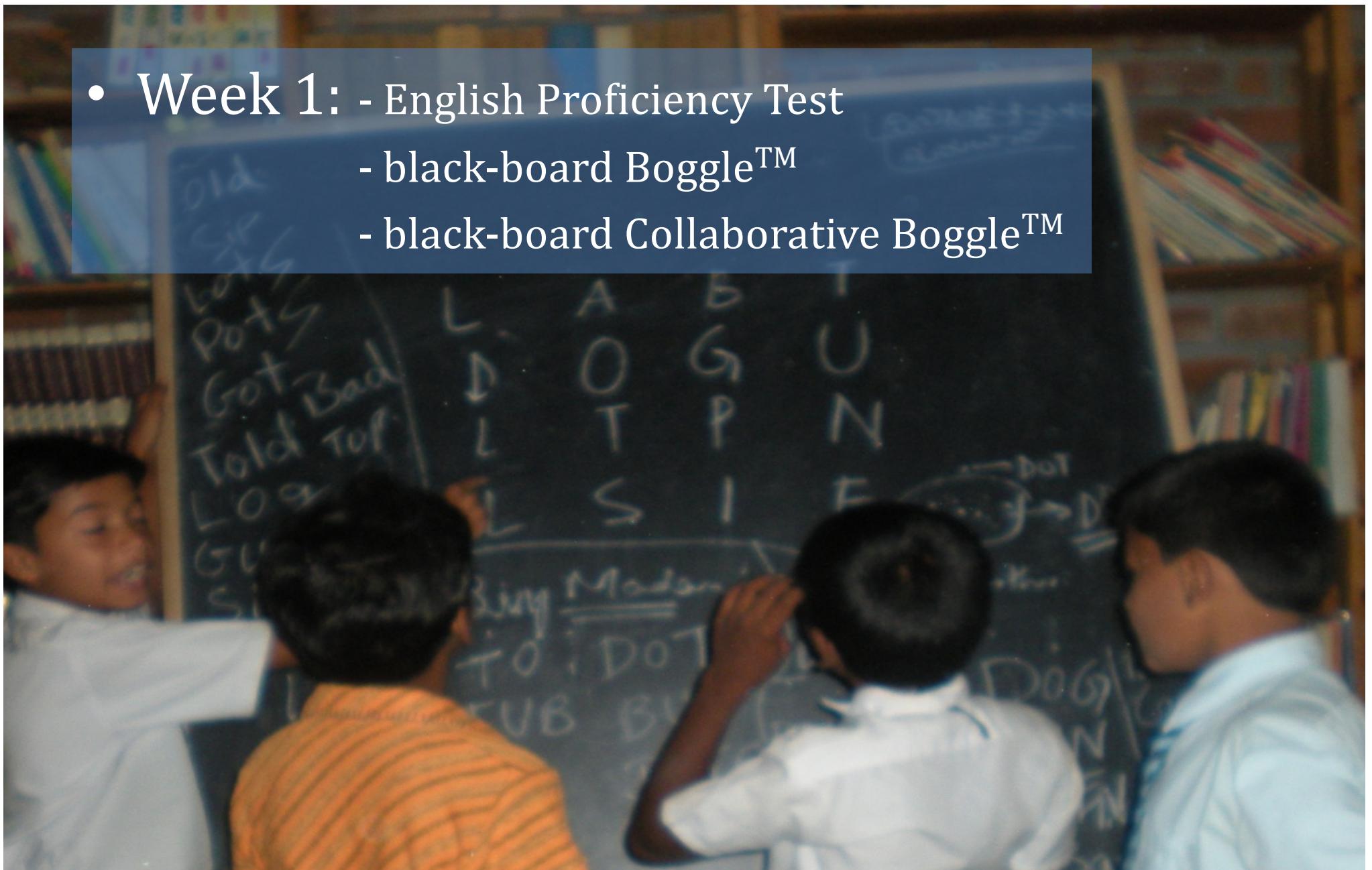


Participants

- School 1: CLT
 - 4 weeks {2 weeks formal study}
 - 8 participants (1 female)
- School 2: CHI
 - 5 weeks {3 weeks formal study}
 - 34 participants (16 females) – for initial 4 weeks
 - 16 participants (10 females) – for the last week
- Within Subjects Design with Matched-Groups

Methodology

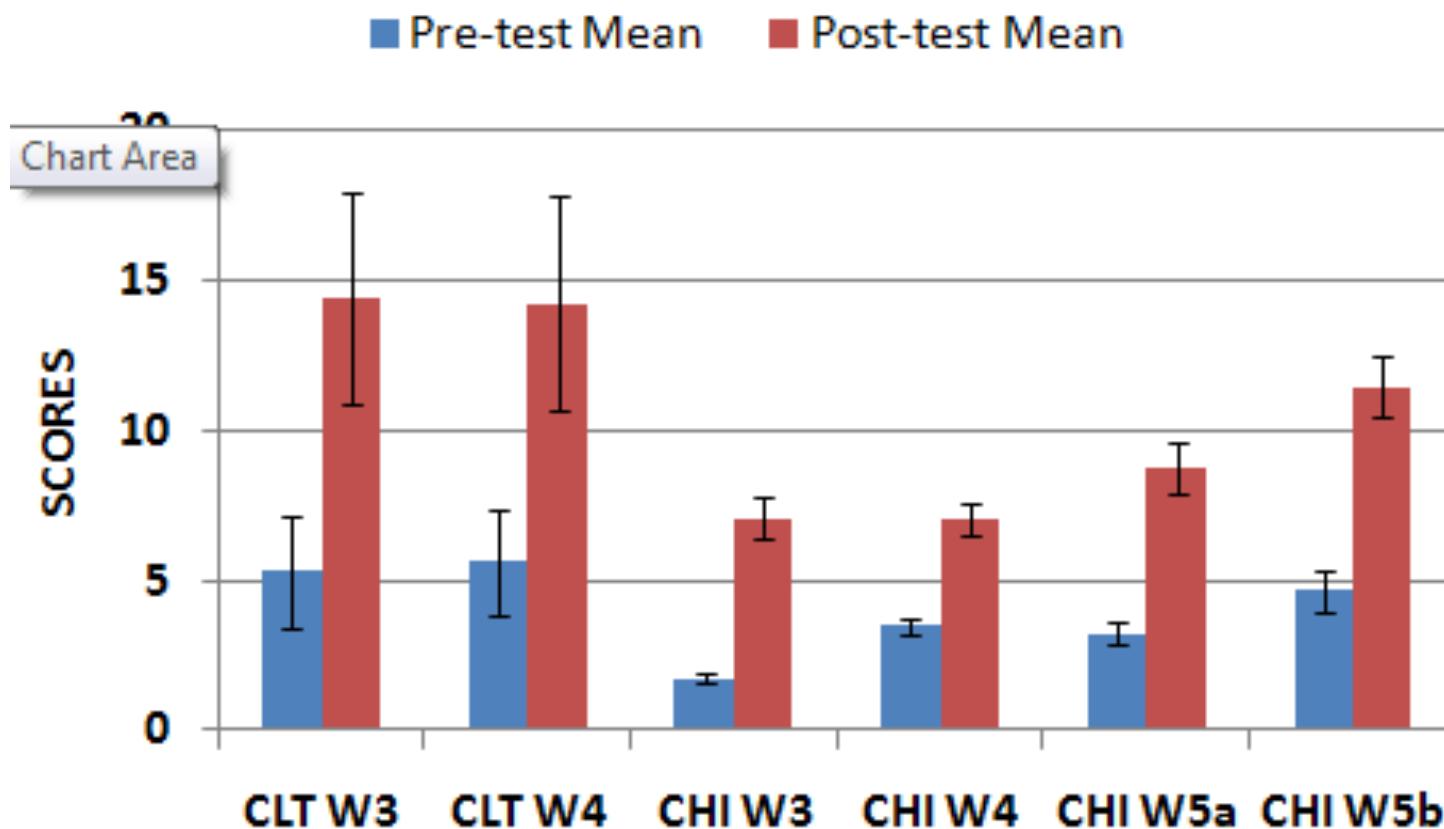
- Week 1:
 - English Proficiency Test
 - black-board Boggle™
 - black-board Collaborative Boggle™



Methodology

- Week 1: - English Proficiency Test
 - black-board Boggle™
 - black-board Collaborative Boggle™
- Week 2: - SDG and MDG game-play approaches
 - HCI issues {observed and fixed}
 - Pre-test for Week 3
- Week 3 onwards: - M, T, W, Th: Game-play
 - F: Image-word Association Pre-Post Test, Interviews

Results: Pre-Post Tests



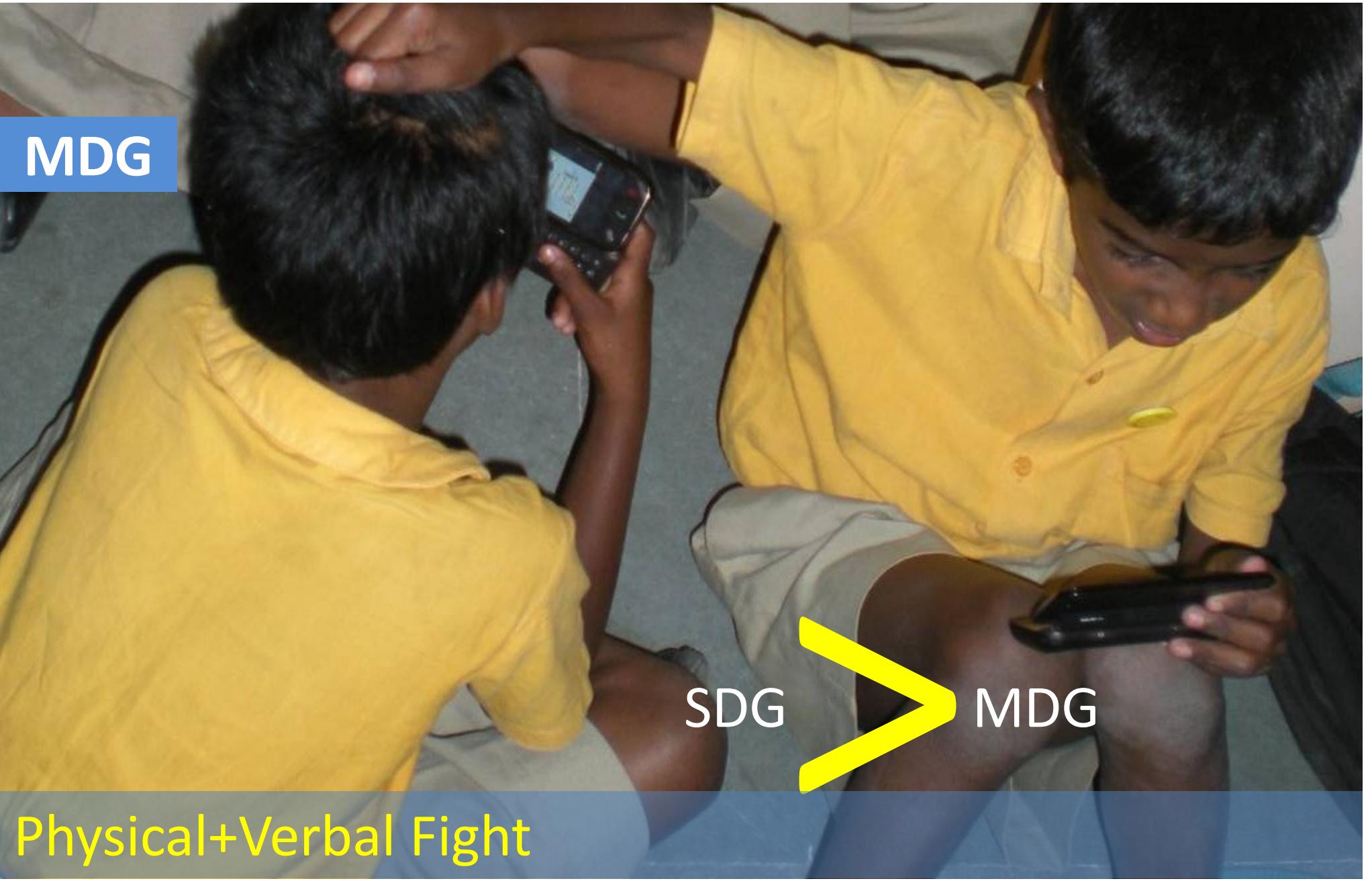


SDG



MDG

Game Score per day, Collaboration

A photograph showing two young boys in yellow shirts sitting on a bed, each holding a black mobile phone and looking intently at its screen. They appear to be playing a game together.

MDG

SDG > MDG

Physical+Verbal Fight



SDG

MDG

Taking control of other's device



MDG

SDG > MDG

Complaint, Learning-based



S
D
G

"like a gun", "like remote control"

"Big-bright screen", "distorted screen"

"Its easier as joystick needs to be moved, not pressed. There is something in centre, and we can move Left, Right, Up or Down"

"joystick not so accurate"

M
D
G

"like a laptop"

"Screen is good, more viewable and clear", "Small screen"

"perfect aiming in phone"

G
A
M
E

"I like to spell, spelling is good"

"stars and rocket going up is really good"

"I love to compete... winning is good"

"... nothing specific about the game, I just like playing with my friends"

Discussion

- Classroom vs. Field
- Communication
- Game-play

Future Work

- Including passive onlookers
- Competition vs. Collaboration vs. Competition+Collaboration game
- Truly-mobile, role-playing games for MDG



Thank YOU

dgp dynamic graphics project
UNIVERSITY OF TORONTO

Microsoft
Research