

Technology Touching Lives



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Learning Digitally in a Group: Exploring Single Shared Display Technology (SSD) for Children

Dr. Cheah Wai Shiang, *UNIMAS*

Dr Fitri Suraya Mohamad, *UNIMAS*

Research Assistants: Ting Meng Siang & Farhanah Abd Karim, UNIMAS

Centre of Excellence for Rural Informatics (CoERI)

Research Groups

- Social & Cultural
- Energy
- Information Technology
- Telecommunication
- Business and Economics
- Health
- Education

- **VISION:**

- Communities transformed into a knowledge-based society by **leveraging** on ICT innovations

- **MISSION:**

- To generate, disseminate, apply and preserve knowledge through **innovative** and **multidisciplinary** approaches to **empower** society to **sustainably** address their developmental needs in a wider social and economic contexts

Technology-Enhanced Learning Team



- Led by Dr Cheah and Dr Fitri, Unimas



MyKliKs: Social Network for Remote Rural Children



LifeTree: Mobile Game about teaching Children on How to Live Green



Rimba Ilmu: Shared single display technology

Agenda



- **Theories on Collaborative learning, Game-based learning, and Shared Single Groupware technology**
- **Features of SSD system**
- **System demo**
- **Practicum with participants**
- **Feedback and Ideas for improvements**



COMPUTER-SUPPORTED COLLABORATIVE LEARNING - THEORIES

Why collaborate?



- **Collaboration is crucial in the 21st century because:**
 - rising need for society to think and work together on critical issues/concerns
 - shift from individual to community-based efforts

What is Collaboration



Collaboration is the **process of shared creation**: two or more individuals with complementary skills interacting **to create a shared understanding** that none had previously possessed or could have come to on their own. Collaboration creates a **shared meaning** about a process, a product, or an event. In this sense, there is nothing routine about it. **Something is there that wasn't there before.** Collaboration can occur by mail, over the phone lines, and in person. But the **true medium of collaboration is other people.** Real innovation comes from the social matrix... [and] is a **relationship with a dynamic fundamentally different from ordinary communication.**

(Shrage, 1990: p40–41).

The many faces of Collaboration



- **Collaboration is labelled in many forms**
 - systems (Austin 2000, Noam 2001)
 - dialogue (Senge, 1990, Clark et al, 1996)
 - creative problem solving (John-Steiner, 1992)
 - Inter-organisational relationships involved in Information Technology (Black et al, 2002)

Collaboration – in Education



- **In the field of Education, Collaboration is seen as an opportunity to**
 - renew/rebrand/refresh the concept of school
 - address increasing number of students from diverse backgrounds
 - tool to engage students in meaningful learning experiences
 - utilise information through technology
 - create exciting new ways to make learning fun and valuable

Sharing an Understanding



- In a collaborative learning environment, students need to develop an **understanding that encompasses the knowledge which is being dispersed**.
- Each individual develops **experiences and knowledge personally**, and **knowledge structures are created to organise information** as it is being learned (Anderson, 1983, 1993).

Schema & Shared Mental Models



- **The knowledge structures** are known as schema or mental models.
- When individuals learn in groups, it is useful when each group has its **own common mental representation of the knowledge domain** to facilitate the sharing process.
- A form of common mental representation is referred to as “**shared mental model**” (Cannon-Bowers, Salas & Converse, 1993; Klimonski & Mohammed, 1994).

Shared Mental Models



- Perceptions or understand of, or **shared knowledge** about an issue, situation, or process, that is shared among a group of individuals (as a team) **through communication**.
- Successful teams are usually those who hold shared mental models.



Greenland iceberg - an awesome photo to show how deeply embedded our mental models can be (& our assumptions)

Collaborative Learning



The Good

- Recognise value brought by different team members
- Deeper learning happens when in discussions
- Less hesitant to speak when in small peer groups
- More fun
- Opportunity to know peers better
- Learn to work in teams

The Bad

- People need to go at different speeds
- Domination by some individuals
- Easy riders /passengers
- Discussion off topic/useless
- Some groups just don't get along

Game-Based Learning



- Games are designed to support learning of something, for one reason or another:
 - As an approach to learn knowledge/skills,
 - As a support tool to engage with a learning topic, and
 - Can either be used for school-based or home-based learning

Game-based Learning



Anderson et al. (2001) structured the use of games for learning around four organizing questions:

1. **The learning question.**

What should the learner learn?

2. **The instruction question.**

How should instruction be delivered in order to provide high levels of learning?

3. **The assessment question.**

How should accurate assessment instruments be designed or selected?

4. **The alignment question.**

How should learning, instruction, and assessment be balanced with one another?

TRANSLATING THEORY INTO PRACTICE

Computer facilities in school



- **In classroom,**
 - LCD projector
 - Screen
 - Sound system
 - PC/ laptop
 - Software (Microsoft Power Point/ Open office)
- **In lab,**
 - LCD projector
 - Screen
 - Sound system
 - PC/ laptop
 - Software (Microsoft Power Point/ Open office)
 - **Multimedia courseware**

Technical limitations



- **In the classroom**
 - Computer not enough
 - Lack of students concentration
- **In the lab**
 - Computer not enough
 - licensing issues
 - Lack of students concentration
 - Maintenance fees

Our idea....



- How to reduce the cost of the setup?
- How to engage the student?

In common,



- Screen
- LCD project
- Computer
- Software

What do you think(1)



**Can we fully utilize the
single display with existing
infrastructure?**

What do you think(2)



How does the students are able to interact within this single display setup?

What do you think(3)



**How many interaction type
of interactions students
can perform?**

Rimba Ilmu



- A platform to enable collaborative learning
- Based on shared single display technology
- Application allows students to collaborate over a single PC and screen display
- Supports face-to-face collaboration

Learning Engagement



Interactive Learning

Teacher control mode
Student control mode



Cost effective

Play in group
Play individually
16 in 1 interaction
strategies

Sustainable

Questions bank
Authoring tool

Rimba Ilmu features



Class Management Tool



Activity Management Tool



User Management Tool



Game-based Activities

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User Evaluation

Pilot study conducted in schools around
Kota Samarahan area

Method



- All the students go through a pre test. The questions used in the pre-test were taken from Bahasa Malaysia syllabus for Primary 1
- 20 questions -15 minutes.
- Each group is divided into two, by random selection. Only ONE group is given access to use Rimba Ilmu. The other group becomes the control group.
- A Post test is distributed to both groups. Results are collated to understand if Rimba Ilmu is able to improve student learning.

Instruments



- **Pre- and post- tests: Paper based**
- **Video: to record the interaction among the students from multiple points**
- **Screen capture: to record student actions during play**
- **Assessment data: captured during and after the game is played**
- **Questionnaires/ interview: usability study**
- **Field observation: Field notes are recorded**

Results



Qualitative analysis (1)



Issue	Boy group	Girl group	Mix group
Difficulty of the BM questions was appropriate for students [1]	Only the last few sections (last two activities) cannot be completed.	Only the last few sections (last two activities) cannot be completed.	Only the last few sections (last two activities) cannot be completed.
Good students instruct the struggling students to use the system and no one would be left behind. [1] "Pakai mouse itu"	The take over the control	Yes	Yes
Good students instruct the struggling students to select the answer, and no one would be left behind. [1] "Click sanalah."	No But will take over the control	Yes	Yes *only one good student in this group
Children would get too involved in the racing aspect of the game and not focus as much on getting the correct answer to the problem [1]	Yes	No	No
The children responded well to the mouse and had little trouble understanding the meanings of the mouse [1]	Yes	Yes	Yes
<i>Children are not confused by multiple cursors on screen:</i> Once a child discovered which colour cursor was his, there was never any confusion at all in spite of having so many cursors on screen[1].	Not confused.	Not confused.	Not confused.
The split screen setup did not draw children's attention away from their own section of the screen, similar to the results found by Moed and Otto. [1]	Yes	Yes	Yes
The students immediately absorbed these UI commands and utilized them in the free play time at the end.[2]	No, required training	No, required training	No, required training

Qualitative analysis (2)



Issue	Boy group	Girl group	Mix group
New conflicts and frustrations may arise between users when they attempt simultaneous incompatible actions.[3]	Yes. The students are frustrated to wait for others to complete	Yes	Yes
SDG applications must squeeze functionality into a very limited screen space, which may result in reduced functionality compared with similar single-user programs.[3]	True	True	True
Due to increased processing requirements, SDG applications might be slower than a single user version[3]	No, with current high speed computer	No, with current high speed computer	No, with current high speed computer
Completing tasks might take more time, because it is no longer possible for a strong willed user to direct the collaboration by controlling the input device. [3]	True, they need to wait the completion for all before moving to the next question	True, they need to wait the completion for all before moving to the next question	True, they need to wait the completion for all before moving to the next question
Users may actually collaborate less.[3]	No really, it depends on the interaction design.	No really, it depends on the interaction design.	No really, it depends on the interaction design.

Pilot study: The aftermath



- **More questions came about after the pilot testing was conducted:**
 - Did learning taking place through Rimba Ilmu?
 - Are data from the pre-test and post-test analysis indicate it can become a teaching tool?
- **Interaction analysis – needs to be conducted to comprehend the levels of collaboration and interaction that happen during game play**

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Your turn to try!

Conclusion



- **Shared single display technology is a promising collaborative learning technology**
- **Current works**
 - Authoring tool to allow teachers to use it in school
 - Exploring SSD for Science, Math and other subjects, range from different levels

In a nutshell..



- **Potential application domains**
 - **Creative Domain** where users are involved in a creative, expressive, or constructive task such as writing, drawing, artistic expression, programming, and brainstorming.
 - **Learning Domain** where users are involved in the exploration of new material such as a problem solving environment, learning new technology, debugging, or simulations
 - **Instruction Domain** where one user is more experienced than the other and has skill or knowledge to impart such as training to use software, peer teaching in a classroom, or informal help from an instructor
 - **Sales Domain** where a sales person and customer could configure products together.

Final words



Collaboration is a **trusting, working relationship** between two or more equal participants involved in *shared thinking, shared planning* and *shared creation of integrated instruction*. Through a **shared vision** and **shared objectives**, student learning opportunities are created that integrate subject content and information literacy by co-planning, co-implementing, and co-evaluating students' progress throughout the instructional process in order to improve student learning in all areas of the curriculum.

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To contact us:

Dr Cheah Wai Shiang – email: wscheah@fit.unimas.my

Dr Fitri Suraya Mohamad – email: mfitri@fcs.unimas.my

Universiti Malaysia Sarawak

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QUESTIONS?