

1. **Title:** *The Effects of Handheld Network Service, “LOOK”, on the Acquisition of Common Ground*

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7. **Abstract:**

Constructing common ground is critical to cooperative work and learning. Many handheld-computer mediated classroom activities aim to move easily between public and private use of the device. Whether the primary use is public or private, teachers and students need to engage in *ad hoc* interaction. A handheld network service, “Look”, provides a snapshot view of another person’s screen. We test empirically the value of this shared physical/virtual context by examining task performance and conversation quality.

8. SUMMARY: *The Effects of Handheld Network Service, “Look”, on the Acquisition of Common Ground*

Constructing common ground and the associated convergent conceptual change is critical to cooperative work and learning. Convergent conceptual change is achieved as participants in a conversation update common ground through presentations, repairs, and acceptances of utterances [1]. People employ available techniques that utilize the least collaborative effort for current purposes [2]. Although sharing physical co-presence of interlocutors’ facial expressions doesn’t make grounding more efficient even in more open-ended and less task-focused dialogues [3], visual co-presence of the addressee’s workspace is essential to work-related tasks, such as information transmission and collaborative problem-solving [4].

Many handheld-computer mediated classroom activities aim to move easily between public and private use of the device [5]. Whether the primary “official” use is public or private, the classroom is rife with the need for *ad hoc*, “unofficial” interaction. Students need to find out from others what the real meaning of the task is and teachers need to engage in formative assessment, that is, assessing what students know and can do. To do this, people need to become overhearers, overhearers need to become side participants, and side participants need to become central participants. Because of device glare and size, ordinary glancing is insufficient. We therefore created a new handheld network service called “Look,” designed to facilitate the acquisition of common ground and therefore of role transition during collaborative activities. Look works with the limitations and affordances of the device to provide a snap shot view of another person’s screen. We test empirically the value of this shared physical/virtual context in the task of creating common ground by examining task performance and conversation quality.

Hypothesis: Look functionality compared to its absence will help overhearers gain common ground.

Method

Participants: Via announcement on mailing lists, sixty students and human-computer interaction researchers in Virginia Tech were recruited to participate in the experiment in groups of three. None of them had prior knowledge of how to read Korean characters.

Materials: We created Korean Characters Matching (KCM), an electronic variant of the Tangram game which is widely used to explore the creation and maintenance of common ground in computer supported cooperative work and psycholinguistic literature. Our application adds to the basic game structure, infrared communication functionality (Look) which supports visual co-presence of workspaces by allowing the side-participant/newcomer to capture objects from other screens simply by beaming to them.

Procedure: Like traditional Tangram game, our game involves two participants, a matcher and a director. For each round, the director “shuffles” the order of ten Korean character images. The matcher has the same images, also in random order. By discussing

each image in turn, the matcher is able to put the images on his screen into the same order as those of the director. The game is complete when the matcher and the director agree that they have all images in the same order.

A third participant is instructed to play the role of the teacher and is assigned the task of determining whether the matcher-director group is making progress. The teacher has two additional mechanisms or components by which she can assist students: the names of the characters and the Look button.

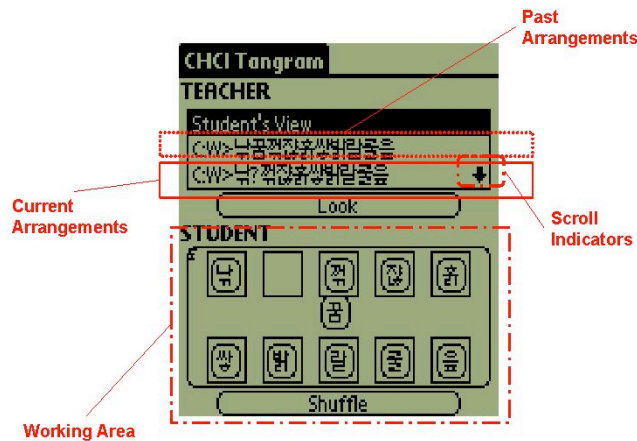


Figure 1. User interface of KCM game

Half of the groups (ten) were equipped with the Look functionality, while the other half were tested without it. Videotapes and field notes were recorded. After the experiment, a questionnaire gathered two kinds of learning measurements: from a list of the twenty Korean characters, participants were asked to pick out ten characters with which they had worked, and to match these characters with their English names. Finally, a number of open-ended positive/negative comments were requested.

Results and Discussion

Results of the experiment suggest that subjects whose handhelds were equipped with Look exhibited better performance. The number of errors recorded by each teacher in the naming of Korean characters was significantly smaller for the groups who had access to Look when compared to the results of those who did not. With Look, they made errors less than half of the time.

Responses to the questionnaire showed that most teachers whose handhelds were equipped with Look realized that they were at an advantage due to the fact that they could easily share indicatory context: *“It (Look) helps to see both people’s work; I like (it) that the teacher can easily communicate with both the director and the student (with Look).”*

Videotapes recorded during the experiment showed that teachers were able to move from being observers into the discussion, successfully indicating or identifying the specific

object under discussion. Often the teacher was able to cast light on confusion between matcher and director.

The main crux of collaboration is the creation of shared common understanding about a particular subject matter. The root of understanding complex concepts such as knowledge, beliefs, and suppositions, is understanding the material referents that people create to them. Despite the fact that the Look tool provides only a snapshot of these material referents, participants appear to utilize it to participate and to acquire sufficient comprehension to engage in the nuanced negotiation about their participatory status in the conversation. Using Look, an overhearer appears to be able to comprehend the shared physical/virtual context sufficiently for current purposes.

References

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