Instant Sharing Makes Task More Engaging in Computer Aided Classroom

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Abstract: With the advent of networked computers sharing of information and artifacts have become very convenient. From online multi-player games to social networking sites, instant sharing has become the norm of the day. Educational tools are trying to harness sharing as a potential tool to engage students in learning processes. But, does sharing lead to an improvement in academic performance? The present study investigates the role of instant sharing in the context of learning in a classroom setting. Two groups of students, from a suburban school in Mumbai, India, played an arithmetic game over a period of 7-8 months. The experimental group played on a platform that supported instant sharing, while the platform for the control group was standalone. All other aspects of both platforms were same. Analysis of process data of the two groups reveals that instant sharing increased engagement with the game. Students from control group lost interest in the game after some days, while experimental group students remained active on it till the end of the four-month period.

Introduction

Learning activities can broadly be thought about as self-learning, group mediated learning or learning by mentorship. Computer-based self-learning activities through standalone applications impose no time and location restrictions on the user. With advances in ICT (Information and Communication Technology), robust shared platforms are now possible. Networked computers have opened up many new possibilities for group activities. Learners no longer require to be in the same physical space to be able to participate in a group activity. Synchronous and asynchronous sharing makes varied types of interactions possible among peers in a group.

Measuring learning in computer-supported environments is a difficult task (Stahl, Koschmann, & Suthers, 2006). In such environments engagement has been used by researchers as one of the yardsticks for measuring learning. Engagement is considered as a good predictor of academic performance (Wise, Skues, & Williams, 2011). Student engagement is not an easy concept to define, there is a lot of literature which tries to establish its definition. For this paper, we borrow Wise et al., (2011)'s idea of student engagement. According to them, student engagement has three aspects: affective, behavioral and cognitive. Wise et al., (2011) also talk about the affective aspect of engagement as being a gateway to the behavioral and cognitive aspects of engagement. In this paper, we are only focusing on the behavioral aspect.

Researchers and educators are working with computer applications having sharing (synchronous or asynchronous) features and testing them through the lens of engagement. Some have found that sharing helps in learning (Shaikh, Nagarjuna, & Chandrasekharan, 2013; Junco, Heiberger, & Loken, 2011) whereas others say sharing increases social engagement but does not guarantee learning (Wise et al., 2011). The contradicting results of these studies indicate a lack of clear understanding of the interplay between sharing, engagement, and learning. The question which needs to be answered is: What does sharing add to (or subtract from) a learning activity?

There aren't many studies which look at the changes in learning processes when sharing is involved, especially for primary students. Most of the existing literature focus on the effect of sharing in distance learning which introduces many variables which are difficult to control (Kreijns, Kirschner, & Jochems, 2003). The present study is situated in a classroom space with synchronous sharing for the experimental group with tight control over variables. The study tries to analyze the effect of instant sharing on learning strategies.

Design features

Many computer applications today allow sharing of a screen space among multiple users where posts/entries by one user are instantly available to all the other users. From the perspective of distributed cognition framework, the shared screen is an extension of the user's memory to which others have access, which we term as "shared mental space". In the present study, instant sharing was instantiated by the use of shared screen (or "shared mental space") among multiple users.

OLPC (One Laptop Per Child) laptops called XOs with SLP (Sugar Learning Platform) operating system were used in this study. Papert's (1980) constructionist theory had a big influence on the laptop's design (hardware and software) and the theoretical framework being used for the present study. Every application in OLPC laptops is called "Activity". A simple arithmetic task was implemented as two activities, one with the feature of screen sharing across all the participants while the other one being standalone. Both the activities were designed to help the student learn arithmetic skills.

44 students (16 girls and 28 boys) of 4th grade from a single classroom in a local Municipal Corporation school in suburban Mumbai were selected for the study. The medium of instruction was Marathi (vernacular language) and one female teacher taught all the subjects. The students were divided into two groups, each consisting of 22 students. Researcher played the role of participant observer. Each group interacted with computers on alternate days for one hour. The same researcher conducted the one-hour sessions for both groups.

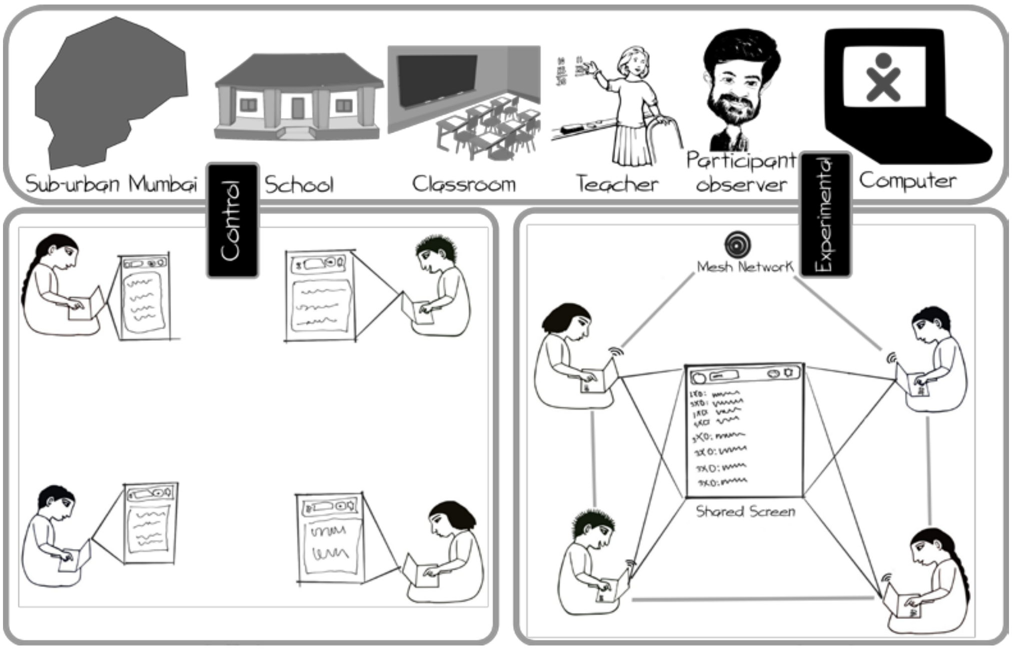

Figure 1. Experimental Setup.

Figure 1 shows the experimental setup followed for the study. The two groups were equivalent as based on an arithmetic test. Additionally, students of both the groups belonged to the same locality, studied in the same classroom, were taught all the subjects by the same teacher, used same laptops. While the experimental group played with/against their peers, the control group played against the computer. Activity for the control group was called Chat Studio Self (CS-Self) activity and activity for the experimental group was called Chat Studio Group (CS-Group) activity. The facilitator did not force the students to work on the activity designed for the experiment. The students were free to explore other applications present on the computer.

Data collection

The study was carried out over a period of 64 working days spanning over a period of 7-8 months. Data collected during the period included computer logs, computer meta-data, audio recordings of classroom transactions, video recording of few sessions, field notes taken by the researcher, students and teacher interviews and the arithmetic test performance before and after the study.

Results and discussion

The collected data are currently being analyzed, we are only presenting the analysis of computer logs and meta-data. The operational definition of engagement used in this paper (as we are only focusing on the behavioral aspect of engagement currently) is number of sessions of an activity. A session is a game completed by a student. Preliminary analysis shows different engagement patterns (number of sessions per day) for the experimental and control groups.

Considering the number of sessions (1 session = 1 game) of the designed activities (CS-Self and CS-Group), experimental group (n = 649) had played more number of sessions than the control group (n = 252). Considering the number of sessions of activities other than the designed ones (CS-Self and CS-Group), control group (n=792) had more sessions of such activities than experimental (n=540) group. The sessions of the designed activity (CS-Self and CS-Group) will now on be referred to focused sessions, while the sessions of activity other than the designed activity will be referred to as exploratory sessions.

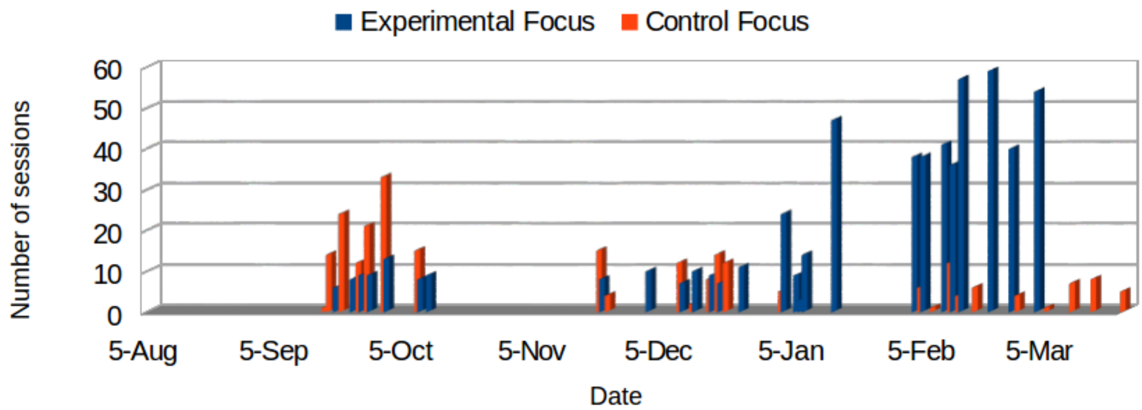

Figure 2. Number of focused sessions vs. time.

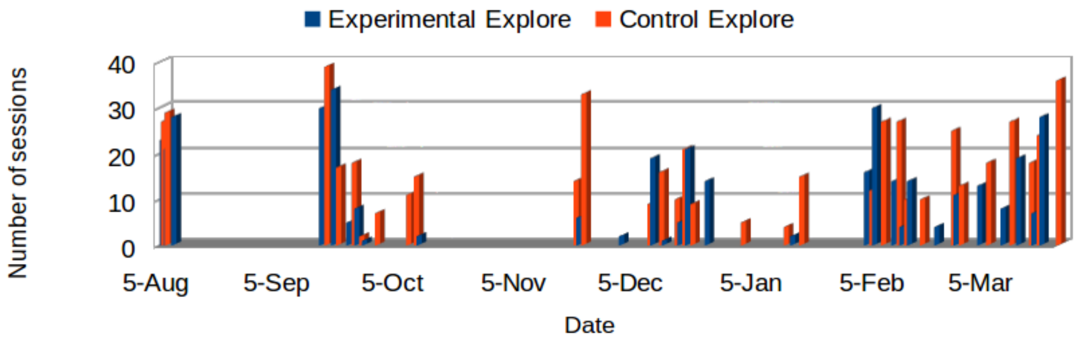

Figure 3. Number of exploratory sessions vs. time.

A deeper look at computer logs and meta-data showed that not every student from each group played the designed activities. 5 to 7 students from each group had only 1 or 2 focused sessions. Removing the data of such students from the analysis, top 15 students out of the total 22 students from each group were selected. Figure 2 and 3 show data of these top 15 students of both groups. Figure 2, the number of focused sessions plotted against time, shows that while the number of focused sessions for control group (CS-Self) is decreasing with time, it is increasing for the experimental group (CS-Group). A possible explanation could be the presence of instant sharing in the experimental group considering that all other known variables are controlled. Figure 3, shows that the control group was more consistent in exploring compared to the experimental group.

Both the groups showed significant improvement in performance on an arithmetic test (p=0.009 for the control group and p=0.068 for the experimental group). The process data offers some patterns to understand what lead to the apparent learning in both groups. A fairly strong correlation (r=0.67042) was found between improvement in arithmetic score and number of sessions of focused activity (CS-Group) for the experimental group, meaning students who played more session learned more. The same correlation (r=0.0260) does not hold for the control group.

With some confidence, it can be said that the experimental group students have learned arithmetic by playing focused activity but we cannot draw the similar conclusion for the control group. Students from the control group have learned arithmetic operations but the source is not focused activity (CS-Self) but something else. It can be exploratory sessions (many non-focused applications on the computer had some element of arithmetic) or it could be something extrinsic to the study.

A major chunk of the data (computer logs, meta-data, focused group interviews, audio and video recordings and field notes) is yet to be analyzed. A definitive conclusion cannot be made at this point, but the patterns emerging from data suggests that availability of instant sharing (shared mental space) in an activity (application) increases the probability of student engaging with that activity for longer time. In this study, the engagement with the arithmetic task was sustained for months in the experimental group.

Once students are engaged with an activity their chances of learning does increase but social engagement does not necessarily guarantee learning (Wise, Skues, & Williams, 2011). In the present case, it appears that student engagement has lead to learning. It seems that sharing emerges as a design feature for education tools to increase engagement and learning. The improvement in the performance of the control and experimental group in the arithmetic test suggests that there can be multiple routes to learning. As the data suggests, the experimental group was engaged with the designed task which could have resulted in learning while the exploratory nature of the control group sessions could have lead to learning in the control group. The present correlation data does not necessarily mean a causal connection. Further quantitative and qualitative analysis of data will bring more clarity, which could eventually bolster or enervate the claim.

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