

Critical Analysis of Are One-to-One Computers Necessary?

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Introduction

“There is a strong need to provide an effective mechanism which supports all learners to cohesively explore on the web together” (Chang, Liu, & Shen, 2012. p. 4). The authors Chang, Liu, & Shen offer this motivation for their qualitative research study. The purpose of their analysis is to determine if the number of computing devices (laptops) connected to a shared screen effects the collaboration in a group. Specifically Chang et al. (2012) state three goals:

- Do students take [sic] different exploratory activities when they explore the web with 1:1 computers?
- How the [sic] 1:1 computers may influence students’ discussion process?
- What are the benefits of using 1:1 computers with shared displays to support collaborative web exploration? (p. 4)

The authors give sufficient motivation for each question. Citing other research the authors suggest that shared displays can effect group members’ contributions; this supports the first two questions that guide the research. Also, some of their research suggests that 1:1 computers may negatively affect group performance by being a distraction. The authors are biased towards groupware that allows a shared screen; however, this bias does not seem to effect the acknowledgement of some of the shortcomings of a shared screen system. More important is the bias towards the success of 1:1 computing with a shared display. The third question is written in a way that assumes there will be benefits to this method, and creates a focus that doesn’t allow for the possible disadvantages of 1:1 computers with a shared display.

Research Procedures

The researchers used 9 grad students in three groups of three; each group would complete two different web searches. Each web search was motivated by a specific question. One search would let the participants share a single computer with one screen. The other lets the participant share one screen but every participant also had a laptop to use on their own. The participants' motivation was to answer two questions, after an introduction to the topic from an instructor, and report out the group findings at the end of a three hour activity session. The participants were "students from a course entitled 'The theory and practice of mobile learning' at a university in Taiwan." (Chan, et al., 2012. p. 4).

The participants and the questions of the inquiry did not seem appropriate for the research. First, the participants may have already established an academic relationship; thus there is a possibility that they work in pre-established roles that exist with or without the environment. Second, the questions for the activity were "how mobile technologies can be applied to support learning?" and "how groupware can be applied in classroom learning contexts" (Chang et al., 2012. p. 4). Both questions, and the second question in particular, could have led participants on a path of search that brought them to the very topic that they are the subject of. Though there is no evidence that the students came across documents that could have changed their habits during the study, it is a possibility. For example, if while working on the shared computer without 1:1 computers the students had come across an article about the best methods for using groupware in a classroom. This could have prompted the participants to start using those methods. This would cause an immediate change in social interaction. Finally, because the participants were likely interested in the field of study they may have been using some prior knowledge on the search that could affect the interactions.

To measure the social interactions the screens of the devices were recorded, the groupware created a map of the student progress, and video recorded the verbal interactions between students. With the small groups these three methods should provide information that can answer the first two questions of the study (activity and discussion); however, the data might not be as useful or clear cut for deciding the benefits of 1:1 computers are in this system. Also, the quantifying of the social interaction was based on classifying what the authors call dialog threads. These pieces of conversations were classified by two individuals, who agreed for the most part but had the occasional disagreement that was settled through discussion. This last piece of classifying the social interactions would be the most difficult to repeat in a larger scale version of this research. If there were 100 groups, each with 3 hours of recorded discussion, then the task to reproduce this method becomes extremely time intensive. This does not make it impossible, just less likely to be repeated. The authors gave no explanation for the process for categorizing; however, anyone trying to reproduce the method could use the classifications from the data.

Research Results

Using the quantities in each of the discussion categories the Chang et al. only used “major transitions among the dialogue threads by ignoring the transition [sic] with small probability” (2012, p. 9). This means the likelihood of a discussion changing topic was measured against the probability of the topic change happening by chance. The authors did not offer a reference to show that the Chi-square distribution is an acceptable tool for measuring the likelihood of an event (change of dialog thread) being significant. Omitted from Chi-squared calculation are the dialog threads that do not correlate to the group activity; specifically, “technological problem, action request, and informal conversation threads” (Chang et al., 2012. p. 9).

It was clear from the data that the participants spent different quantities of time on tasks in the two scenarios. With the shared screen much more time was spent working together, where participants with 1:1 computers and the shared screen spend more time working alone, and using the shared screen alone. However, this does not necessarily show that there are benefits to using a 1:1 system over a shared screen. The authors evaluate the benefits of the two methods by mapping the patterns of interactions. There is no evaluation of the participants' understanding of the two questions for motivation. Also, there is no clear distinction for which question the groups had for the shared computer activity or the 1:1 computer activity.

Discussion of Results

Chang et al. first conclude, "1:1 computers are necessary to support collaborative web exploration activity with shared displays" (2012. p. 10). This conclusion is not supported. The results suggested that 1:1 fostered more interaction between participants; however, the necessity is of 1:1 computers is not supported. The groups still collaborated when they had only one shared computer.

The second conclusion is "collaborative web exploration activities involved both group and individual activities" (Chang et al., 2012. p. 10). This is supported by observations in this study, but it is not a surprise. Collaboration is a term that is axiomatic in nature, and will always involve group and individual elements.

Finally the authors conclude "the lack of individual devices may limit the self-exploration activities during the [sic] collaborative learning" (Chang et al., 2012. p. 10). The evidence supports this claim, but again this is no surprise. Self-exploration activities are done alone, and if there is no open device for a participant to explore the web alone, there is no self-exploration.

The authors do offer suggestions for practice and identify some of the limitations of their study. There is a need for understanding the best kinds of collaborative systems; tablets, mobile devices, and shared displays in libraries. Suggestions for inquiries in the specific environment and software they used are offered; notably identifying the participants' experience and impressions of collaboration. Since this study was conducted with graduate students with favorable views of technology, Chang et al. suggest their findings are not extensive and cannot be extrapolated to larger populations (2012).

References:

Chang, C.-J., Liu, C.-C., & Shen, Y.-J. (2012). Are one-to-one computers necessary? An analysis of collaborative web exploration activities supported by shared displays. *Educational Technology & Society*, 15 (4), 3-13.