THE USE OF A LARGE INTERACTIVE DISPLAY SURFACE (LIDS) PROTOTYPE IN GRAPHIC DESIGN TEACHING

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Abstract

This paper examines the introduction of a Large Interactive Display Surface (LIDS) prototype in a graphic design teaching environment to see how it supports learning. The study was undertaken with a small tutorial class of seven students. Information gathering consisted of observations, video capture of the tutorial, questionnaires, a focus group session and an interview with the tutor. Several benefits were identified for the tutor, including the ability to directly manipulate from the screen surface and the ability to have multiple screens. A reduction in transition time was beneficial for students as was the transparency of the lecturer's actions. An impediment for the tutor was identified in the initial learning of pen use and the line of sight was identified as unfavourable for some of the students.

Keywords

Large interactive display surfaces, digital whiteboard, software tools training

LIDS

LIDS encompasses the digital whiteboard paradigm of Information Systems (IS). The digital whiteboard paradigm addresses the lack of access experienced by users when groups are using a personal computer. LIDS aims to allow groups of people a similar experience to whiteboard use while providing the additional benefits that are gained by the power of computing. A LIDS system provides desktop functionality on a large screen that can be manipulated with the ease of a whiteboard surface (Thorpe & Carter, 2002). Usually combining a computer, projector and specialist hardware, a LIDS system enables the presenter to share and manipulate a visual space with the audience.

Although LIDS systems are not novel, examples such as the Xerox Liveboard (Moran, van Melle & Chu, 1998) and DynaWall (Streitz, Tandler, Muller-Tomfelde & Konomi, 2001) introduced in the early 1990's are relatively expensive. However, recent hardware developments have made possible the construction of inexpensive LIDS systems (Apperley et al., 2001). Studies have explored the use of inexpensive LIDS systems in educational settings with success (Apperley et al, 2001; Plimmer & Apperley, 2002; Thorpe & Carter, 2002). This research has identified possible teaching benefits in Information and Communication Technology (ICT) courses, specifically in software tools training.

The Auckland University of Technology (AUT) System Usability Research Laboratory (SURL) have been working on parts of the Large Interactive Display Surfaces Project lead by the University of Waikato. The objective of the New Economy Research Funded (NERF) project is to develop a low cost LIDS system to support teaching and group collaboration, in both single and multi-site environments (Thorpe & Carter, 2002). The SURL's primary role in this project has been on the design, construction and usability testing of prototype LIDS systems.

The LIDS Prototype

The LIDS prototype used in this study was a rear-projected system using mirrors. Attached to the front surface was a Mimio device that tracked pen movements using infrared and ultrasound technology. Mimio software converted these strokes into mouse movements and click events through the use of a specialised pen and capture device. Actions, such as drawing and scribing, are captured by the device and used as mouse actions by the computer system. Figure 1 illustrates the LIDS prototype system in use for the study showing the position of the tutor and several of the participating students.

Figure 1: The LIDS system and class arrangement.

The Study

The objective of the study was to ascertain whether the use of a LIDS unit would support learning in a two and a half hour tutorial session. The purpose of the tutorial was to train students in the use of Adobe Streamline, Illustrator 9, and InDesign 1.5 software products. The tutorial required students to observe, take notes and at times, to replicate the tutor's actions on their individual iMac computers. The tutorial was held in the normal tutorial room with no modifications to the current seating arrangement or room setup. The LIDS prototype was placed at the front of the class as illustrated.

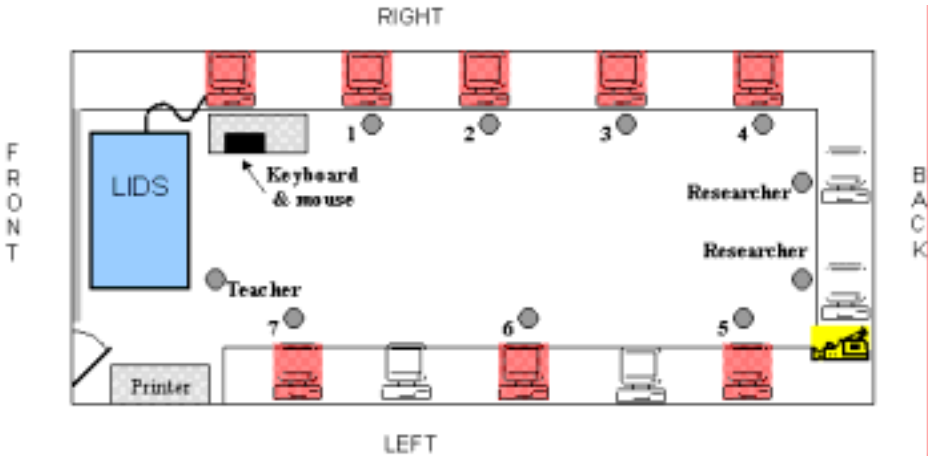

Figure 2: Setup of LIDS in the classroom.

Method

Observations were taken by two researchers through the use of video capture and note taking. These notes informed the questions for the interview and focus group session that took place 30 minutes after the completion of the tutorial. The purpose of the focus group was to determine how the LIDS prototype assisted students in their learning, and to compare the session with normal classes. At the end of the focus group a questionnaire was given to the students to assess whether the use of LIDS assisted their learning and to capture additional comments. The tutor was interviewed shortly after the student focus group. The purpose of the interview was to determine if the LIDS prototype assisted the tutor as a teaching tool.

Findings and Discussion

Benefits and impacts of LIDS use for the tutor

Direct manipulation

Having direct manipulation on the screen surface made it easier to work with the design software and navigate around the projected screen. In normal tutorials the tutor is required to use a remote control laser to navigate the audience around the screen. This is 'awkward' to view and often slow for the audience to follow. The tutor stated that it was easier working with the pen directly on the digital whiteboard than it was to use the remote or the mouse and keyboard.

Multiple screens

Often during a normal tutorial the whiteboard became full requiring the tutor to clear the whiteboard in order to create space for the projected image. The ability of LIDS to have multiple screens was considered invaluable by the tutor as it enabled him to quickly switch between relating screens. This meant that any annotations were not lost and could be referred to. The tutor could "flip" between using the whiteboard screen and the display of the software, without waiting for the projector to warm up again.

Learning of pen use

The tutor found the weight of the Mimio pen was comfortable and was not conscious of it while in use. However, he experienced some difficulty with tasks such as selecting thin lines and drawing curves. He stated that the experience was similar to learning a normal whiteboard and marker for teaching.

Benefits and impacts of LIDS use for students

Reduced transition time

Students found the time reduction in switching between the whiteboard and projected image was beneficial. The students were able to maintain their train of thought.

> That's the big advantage over the normal front projected system where the tutor is switching the projector off, doing some stuff on the whiteboard, making sure everyone has seen and written down what's on the whiteboard, switch the projector back on and wait for the image to come back up.

This supported student's learning as it helped them to maintain focus and not be distracted by waiting. The process of switching between the whiteboard and projected image is sped up. The students are not required to wait for the setup time involved when switching between the two tools. Students gained from this, as they did not need to urgently copy down information before it was cleared.

Transparency of lecturer actions

The LIDS system afforded the students the ability to follow the tutor's physical interactions.

> It was good…. made it really easy to work with. Especially with the tutor standing there and actually touching the same icons that we were hitting.

The students were better equipped to repeat the steps themselves, especially when the tutor was illustrating complex actions or using multiple menu options. Students sometimes found it difficult to follow the small laser pointer in the normal front-projected system.

> The (projectors) remote control mouse is only a small dot whereas the (Mimio) mouse pen allowed you to see where the tutor was actually hitting.

This transparent interaction helped students learn where the relevant menus and options were.

Audience line of sight
Figure 2 shows the setup of the LIDS unit positioned in front of the classroom whiteboard. The 1.2 metre depth of the LIDS unit impacted some of the student's view of the screen. Combined with the tutor's position impaired the line of sight for students on the left side of room. This was strongest when the tutor was situated on the left and using the icons or menus on the left of the screen. One student moved further forward to gain a better view and then moved back again. Another student regularly moved away from her workstation and leant back in her chair to see the LIDS screen. One student suggested positioning the LIDS unit on an angle in the corner of the room to improve the overall audience view.

Conclusion

From this study we have found several ways that learning was supported by the use of LIDS. Navigation was enhanced for the tutor through direct manipulation and easier for students to follow. Multiple screens allowed simple switching between screens without losing information and minimised transition time. This reduced transition time helped students maintain their train of thought and focus. The transparency of the lecturer's interaction helped students find and remember procedures for using the software. Initial learning was identified for the tutor in using the pen and the line of sight was identified as unfavourable for some students.

It appears that in general LIDS is supporting learning. We are therefore encouraged to continue our commercial development. As this will best be achieved by further research we are currently undertaking further studies in tertiary and secondary (high) schools. Is the use of LIDS working for learning? This study suggests that LIDS provides distinctive advantages in learning environments such as improving shared access and providing desktop functionality on a large surface that can be easily manipulated.

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