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**The Lids Research Project  
Appendage to Usability Study Report  
[1/2002]**

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## Executive Summary

This report is a follow on to an earlier report (titled: Usability Study Report [1/2002], dated: 1 July, 2002) that presented the University of Waikato Usability Laboratory's (Usability Laboratory) analysis of the Large Interactive Display Screen (LIDS) technologies as developed by the LIDS Research Project.<sup>1</sup>

In the first report, we described the organisation, analysis and results of three LIDS studies (Technology in Use for Teachers and Students, The Interactive Gesture Recognition Tools, and The Shadow Technology) that the Usability Laboratory carried out during the 2001/2002 summer break. We also described the analysis and results of a heuristic evaluation of the LIDS presentation review tool and observations of the LIDS physical technology in use.

This report presents the decisions made with regard to the usability problems identified and design recommendations made within the first report. Where possible we have provided graphic examples. The recommendations form the basis for a discussion on design and for determining what development and research activities the University of Waikato should carry out next with LIDS as part of the LIDS Research Project.

## Design Decisions

### The Presentation Tool

We recommended a number of changes to the presentation tool in the first report. In terms of the on-screen artefacts, these included changing the pencil image to a simple cross so that less of the screen content was hidden behind the image from the users. In this report, the design solution for this problem was to enable the users to choose whether to use an on-screen 'cursor' artefact or not. Users could specify this during setup.

In the first report, we also suggested that more functionality should be added and that better support should be provided for users when using the gestures. In this report, a number of additional changes and modifications to the earlier recommendations were suggested. These included placing the navigational buttons on a dockable toolbox, and incorporating a selection function to enable cutting, copying, scaling, moving, pasting, and selection adjustment.

In terms of the on-screen shadow, we recommended only one design change in the first report. That was to improve the quality of the on-screen shadow. It was agreed that the shadow should be improved although more research needs to be done to determine how much detail should be shown.

### The Presentation Review Tool

We recommended a number of changes to the presentation review tool in the first report. The changes were to the table of contents slides (now termed 'index') as well as the presentation slides.

During our discussions it was recognised that the two main uses of LIDS were storyboarding (i.e. starting out with a predominantly blank presentations; additions are made by hand-drawn text on blank screens) and lecture-type presentations (i.e. using a predominantly prepared Powerpoint™

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<sup>1</sup> The LIDS Research Project is part of the HCI Research Programme in the Department of Computer Science at the University of Waikato, Hamilton, New Zealand.

presentation; additions are made by hand-drawn annotations on the Powerpoint™ slides). Thus, for review it was important that each type of use be accounted for.

In this report, we suggested that when setting up a review of a storyboard presentation, that the index be presented with thumbnails. Users should be able to determine the size of the thumbnail images listed on the index slide. Additionally, for storyboard-type presentations, we suggested the inclusion of thumbnails for the previous and next slide links. We have provided graphic examples to illustrate possible solutions to these problems in this report.

We suggested that the index for a lecture presentation be displayed as a list of slide titles, instead of thumbnails as is currently implemented. The earlier recommendation of including previous and next slide titles with the next and previous slide links was also adopted.

In general, it was decided to have only one index (currently implemented as 'table of contents') slide and that the index should be accessible from each slide in the presentation. It was also decided to include an image of the presenter when standing at the screen on every slide, and to enable 'live' comments by the presenter to be incorporated. We have provided example solutions to these problems in this report.

The representation and presentation of the audio bar has remained a dilemma. Although, we all agreed that the audio bar needs simplifying and to be given better functionality, the solution to the problem remained unclear. Further research and usability studies need to be applied to help solve the issues involved. In the interim, we agreed that the best solution would be to remove the audio bar—but not the audio—from the slides. To enable users to replay a particular slide, inclusion of start/stop buttons on every slide were suggested.

## **Priorities**

In this report we have used three priority status' to categorise design issues and research priorities. There are low for those areas that would take a long time to fix or that needed further research before a clear solution could be found; medium for those areas that were required, but were not essential for a first release of the LIDS technology; and high for those areas that were essential for a first release of the LIDS technology, or were simple and quick to fix. The items are listed below in order of priority.

### **High Priority**

Those items with a high priority are listed below:

- Provide users with the choice of using a current pencil image, a simple cross, or no artefact to represent the on-screen cursor in the presentation tool.
- Incorporate generic next and previous links in the presentation review tool slides (an interim solution).
- Remove the audio bar from the presentation review tool and incorporate start/stop buttons in place (an interim solution).
- Linking back to the index in the presentation review tool.
- Incorporate undo and redo facilities (gestures and buttons) within the presentation tool.
- Incorporate a basic training module in the presentation tool (an interim solution).
- Make the hour glass figure larger and more predominant so that users are aware when the software is not ready when using the presentation tool.
- Remove the zigzag delete gesture from the gesture toolset. Replace it with the Mimio™ eraser, and enable selection and deletion functionality so that screen artefacts can be deleted.
- Add new edit features (copy, cut, paste, move, resize, and so on) to the presentation tool.

- Prompt users about whether they wish to (i) finish and save, (ii) finish without saving, (iii) return to the presentation on closing a presentation when using the presentation tool.
- Replace multiple table of contents slides with one index slide in the presentation review tool.

### **Medium Priority**

Those items with a medium priority are listed below:

- Provide the facility to enable users to incorporate a video of the presenter on each slide of the presentation review tool.
- Provide the facility to enable users to incorporate live comments by the presenter within the presentation review.
- Incorporate contextual next and previous links (titles or thumbnails) in the presentation review tool slides.
- Incorporate contextual next slide and previous slide links, with slide titles for lecture presentations or thumbnails for storyboard presentations, in the presentation tool.

### **Low Priority**

Those items with a low priority are listed below:

- Research the representation and presentation of the audio bar in the presentation review tool.
- Research various ways of enabling users to identify segments of audio on the audio bar in the presentation review tool.
- Determine users' requirements for the nature and functionality of a training module for gestures.
- Determine the preferred placement of navigational buttons when using the presentation tool.
- Determine the usability of the incorporation of an area set aside for the drawing of gestures when using the presentation tool.
- Determine the usability of a popup menu (or similar) of slide titles or thumbnails for easy navigation within the presentation review tool.
- Investigate the requirements for a range of users and the two types of uses (storyboarding and lecture mode) when using the presentation tool.
- Determine how much shadow detail should be shown on the LIDS screen in a collaborative session.
- Research the need for paint tool-type options for storyboarding when using the presentation tool.

## **Future Usability Studies**

A number of usability studies or ideas for further research were identified during our discussions. These include:

- Researching the representation and presentation of the audio bar in the presentation review tool.
- Researching various ways of enabling users to identify segments of audio on the audio bar in the presentation review tool.
- Determining users' requirements for the nature and functionality of a training module for gestures.

- Determining the preferred placement of navigational buttons when using the presentation tool.
- Determining the usability of the incorporation of an area set aside for the drawing of gestures when using the presentation tool.
- Determining the usability of a popup menu (or similar) of slide titles or thumbnails for easy navigation within the presentation review tool.
- Investigating the requirements for a range of users and the two types of uses (storyboarding and lecture mode) when using the presentation tool.
- Determining how much shadow detail should be shown on the LIDS screen in a collaborative session.

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## List of Figures and Tables

	<i>page</i>
Table 1.1 Terminologies used in this report.	4
Table 1.2 Typographic styles used in this report.	4
Figure 2.1 Existing pen image on the LIDS screen.	5
Table 2.1 LIDS gesture set.	6
Figure 2.2 Suggested replacement pen image for the LIDS screen.	7
Figure 2.3 Option of cursor in presentation tool setup.	7
Figure 2.4 Examples of problems with the next and previous slide gestures. Problems included (i) too large a shaped arrow head, (ii) the line in the return direction being too short, and (iii) the main horizontal line being too curved.	7
Figure 2.5 Suggested separate training module (see (ii) above), accessible from a help button on screen (see (i) above).	8
Figure 2.6 Suggested placement of next and previous slide buttons on the screen.	8
Figure 2.7 Suggested placement of gesture drawing area on the screen.	9
Figure 2.8 Suggested undo (see (i) above) and redo (see (ii) above) gestures. The arrows are used to indicate where the gestures should start	9
Figure 2.9 Examples of problems with the delete gesture. Problems included the delete gesture (i) not being big enough to fully cover the item to be deleted, (ii) comprising four not five strokes, (iii) starting from the top (as indicated by arrow) rather than the bottom, and (iv) being too curved.	11
Figure 2.10 Suggested gestures for (i.a) entering copy mode and (i.b) selecting the area to copy, (ii) for inserting a slide, (iii) for pasting the contents of the clipboard onto the current slide, (iv) for going to the first slide, and (v) for going to the last slide. The arrows are used to indicate where the gestures should start.	13
Figure 2.11 Suggested buttons for first screen, previous screen, next screen, last screen, undo, redo, copy, paste and insert. The help button still remains in the bottom right corner	14
Figure 3.1 The online review tool.	17
Figure 3.2 An example slide from the review tool.	18
Figure 3.3 An example table of contents screen from the review tool.	18
Figure 3.4 Another example slide from the review tool.	19
Figure 3.5 Inclusion of the image of presenter within the Presentation Review Tool.	20
Figure 3.6 Inclusion of image of presenter from in front of LIDS.	20
Figure 3.7 An example of incorporating introductory and interspersed segments throughout the presentation. Note the inclusion of the presenter's image.	20
Figure 3.8 An example of next and previous links for each slide.	21
Figure 3.9 Previous and next slide links for storyboard-type presentations.	22
Figure 3.10 Examples of interim previous and next slide links.	22
Figure 3.11 Audio bar as presented on the bottom of a slide.	23
Figure 3.12 An example of audio bar with thumbnails.	24

	<i>page</i>
Figure 3.13 Interim design solution for audio bar.	25
Figure 3.14 An example of the table of contents.	26
Figure 3.15 An example of the index for storyboard-type presentations.	26
Figure 3.16 An example of selecting size of thumbnails when setting up slides.	26
Figure 3.17 New example of slide with 'Up: Home' navigation link.	27
Figure 3.18 An example of Index instead of Table of Contents link.	28

# **1. Introduction**

The first report (titled: Usability Study Report [1/2002], dated: 1 July, 2002) described the Usability Laboratory's analysis of the LIDS technologies as developed by the LIDS Research Project.

The Usability Laboratory conducted three exploratory-type studies of the LIDS technology over January and February 2002. The studies each focused on individual elements of the LIDS technology, while at the same time contributing to the general understanding and knowledge of the technology.

The first study, Technology for Use for Teachers and Students, focused on the support that the LIDS technology provided for both the in-class presentation of learning information and the after-class review of the learning material. The second study, Interactive Gesture Recognition, focused on the use of sometimes-used gestures (on-screen strokes) that provided the ability to navigate a LIDS presentation. The third study, Shadow Technology, focused on the use of a shadow to facilitate awareness between LIDS users in distributed locations.

The Usability Laboratory also conducted a heuristic evaluation of the presentation review tool associated with the first usability study, Technology In Use for Teachers and Students, so as to highlight areas of the tool that could be improved upon.

The first report presented findings of each of the studies, and the separate heuristic evaluation of the presentation review tool. The findings were separated into usability problems and usability benefits. For every benefit that we highlighted, we provided a general description and discussed the participants' thoughts. For every problem that we described, we indicated the relevant usability principle (or principles) broken, and tried to recommend at least one design solution to the problem, although a range of alternate design solutions are generally sought. These were used as the basis for further discussion rather than being the ultimate and final solution. As such, and where applicable, we discussed the usability advantages and disadvantages of each recommendation given. Where possible, we also provided graphic examples.

## **1.1 Summary of Findings from Usability Study Report [1/2002]**

Many participants understood the value and could see many benefits of LIDS. They appreciated its utility, found it easy to use and enjoyed working with it. The usability benefits and problems discovered during the studies, and the heuristic evaluation and observation, are briefly discussed below. Before doing so, we highlight what we believe to be the three most important aspects of the technology that need to be solved first.

1. The most important aspect of the LIDS technology to solve is its technical instability. During all three usability studies bugs in the software caused problems for the participants. This meant that the participants focused more on the technology than on their tasks or their collaboration.
2. The second most important feature to solve is the lack of an undo feature. The inclusion of this feature will mean that incorrectly drawn gestures or unintentional collisions with existing gestures can be fixed by the user when using LIDS.
3. The third most important element to solve is the delete gesture. This caused major problems for most of the participants including the lecturer (Bill Rogers) in the first usability study. (Bill Rogers implemented the interactive gesture recognition tools and was more experienced



with using the gesture set than any of the other participants.) We recommend that if possible, the delete gesture be replaced with the Mimio™ eraser.

We also suggested that an important aspect of LIDS that needed further investigation was the physical LIDS technology. We felt that it was important that the quality and attractiveness of the technology be improved, to increase the adoption of LIDS with a range of solutions. In the first report, we have highlighted a number of usability problems with regard to the Mimio™ pen and the LIDS screen.

### **Usability Study 1: Technology in Use for Teachers and Students**

Our usability study of LIDS in use as a presentation and learning support tool for a lecture situation found that in general the participants viewed the technology positively. They indicated that it was as good as, if not better, than other more traditional or better-known presentation media (such as blackboard, whiteboard, OHP or Powerpoint™). The participants also liked being able to review material online after the lecture as it allowed them to reinforce or improve upon what they had learnt in class.

However, our usability study also highlighted elements of the technology that forced the users to focus on the technology rather than their tasks or the collaboration taking place. These include poor visibility and readability of the LIDS screen, and the technical instability of the LIDS software for presentation and review. The latter should be the first priority to solve. The benefits and problems associated with LIDS as a teaching and presentation review tool are discussed in more detail in section 3 of the first report.

### **Usability Study 2: Interactive Gesture Recognition Tools**

Our usability study of the LIDS interactive gesture recognition tools established that most participants found all of the gestures (except the delete gesture) easy to use, simple and reliable. The delete gesture proved to be a problem for most participants. All the participants indicated that they enjoyed using the LIDS technology and the gesture recognition tools to perform their presentations.

Several usability problems, other than the use of the delete gesture, were also found. These include gestures being drawn incorrectly, a lack of an easy undo mechanism, unclear software modes/states, collisions with unintentional gestures, hidden on-screen software options, difficult readability of on-screen user-drawn text, and a restricted set of interactive gestures. The benefits and problems associated with the interactive gesture recognition tools are discussed in more detail in section 4 of the first report.

### **Usability Study 3: The Shadow Technology**

Our usability study of the LIDS shadow technology established that most of the participants were generally positive about the use of the shadow to support awareness of other users during distributed collaborative activities. However, the participants indicated that they were not confident that the other user was aware of what they were doing. Further, they suggested that their interaction and communication with the other user was not as good as working in the same room together or even working in two separate locations that had no shadow. We believe that this is due to the nature of the tasks, which became competitive events in most sessions. We also believe that the very existence of the shadow did not encourage the participants to talk about what they were doing; instead, they tended to rely purely on the shadow for support and awareness. The benefits and problems associated with the shadow technology are discussed in more detail in section 5 of the first report.

### **The Presentation Review Tool (A Heuristic Evaluation)**

Our heuristic evaluation of the presentation review tool highlighted several additional usability problems to those observed during the first usability study, that will need to be solved for users to

gain further satisfaction from using the tool. We suggest that the tool lacks a number of features, in particular previous slide and next slide buttons. Further, a number of features that already exist with the tool need to be improved. These features include the audio bar and the table of contents pages. The problems associated with the presentation review tool, as identified with the heuristic evaluation, are discussed in more detail in section 6 of the first report.

## **Summary**

We suggested that improving the usability of the LIDS software (the presentation tool, the presentation review tool, the interactive gestures and the shadow technology) would promote better use of LIDS by users. Users would be better able to interact with other users, whether in a distributed setting or within the same room, share the same artefacts equally, and collaborate over the same goals and tasks more easily. We also suggested that the most successful environment would allow users to feel comfortable with the technology, be aware of what other users are doing, and enable the users to feel that they have met their goal-oriented tasks satisfactorily.

## **1.2 Design Resolution Process**

The findings from the first report were discussed during three two-hour meetings (held on Tuesday 25, Wednesday 26 and Friday 28 July, 2002). Bill Rogers, Masood Masoodian, Kirsten Thomson, Laurie McLeod and Dana McKay attended.

### **Design Decisions**

The following process was followed to determine what design decisions should be made:

- Description of structure of the first report.
- Description of the three most important aspects to solve, as identified in the first report.
- Discussion of the design recommendations as found in the summary of the first report (section 8, Summary). For each item, we:
  - Highlighted the problem.
  - Described the problem.
  - Described and then discussed the suggested design recommendation.
  - Discussed other design solutions, if these existed.
  - Determined a resolution. For most problems, one solution was sought, although several were chosen in some instances where we felt that flexibility of use was important.
  - Decided on a solution (which may have been interim), or decided to resolve the problem through further usability studies.

### **Priorities**

We also tried to give each problem a priority rating so as to indicate its importance in the subsequent development phase. Establishing priorities was seen to be important, as developing LIDS to a reliable working state, even without the “bells and whistles”, is essential. We used three priority status: low for those areas that would take a long time to fix or that needed more research before a clear solution could be found; medium for those areas that were required, but were not essential for a first release of the LIDS technology; and high for those areas that were essential for a first release of the LIDS technology, or were simple and quick to fix.

### 1.3 Future Usability Studies

Where we were unable to find a clear resolution to some of the problems highlighted in the first report, we tried to provide a simple interim solution and then set the problem aside for exploration through further usability studies. It seems likely that a majority of these studies would be comparative and/or exploratory studies, although requirements gathering for a range of users and uses, and collaborative design sessions would also need to be used.

### 1.4 Terminology

A number of specific terms have been used in this report. These are listed below in Table 1.1.

<i>Term</i>	<i>Description</i>
User	Throughout this report, the term “user” or “end user” has been used to refer to the real intended end user of the of the technology.
Participant	Throughout this report, the term “participant” has been used to refer to those users who helped test the usability of the technology.
LIDS technology	Throughout this report, the terms “LIDS technology” and “LIDS” have been used to refer to aspects of the LIDS software and hardware that have been the focus of the usability studies.
section	Throughout this report, the term “section” has been used to refer to the main sections of this report.

*Table 1.1 Terminologies used in this report.*

### 1.5 Typographic Styles

A number of typographic styles are used in this report to indicate participant users’ comments and particular aspects of the application interface. These are listed below in Table 1.2.

<i>Typographic Style</i>	<i>Description</i>
Interface Artefacts	Throughout this report, any existing interface buttons or menu options are written in the Arial font. For example, the Start button is written as Start.

*Table 1.2 Typographic styles used in this report.*

### 1.6 Structure of the Report

The remainder of this report is structured as follows. Section 2 describes the discussion of problems with and design resolutions for the presentation tool (including the interactive gestures). Section 3 describes the discussion of problems with and design resolutions for the presentation review tool. The final section of the report, section 4, presents some concluding remarks and a summary of the design decisions.

## 2. The Presentation Tool

The following discussion about design decisions for the presentation tool include (i) artefacts such as the on-screen cursor, (ii) the interactive gestures, (iii) additional functionality and (iv) the shadow technology.

### 2.1 Background

#### General Description

The LIDS Research Project have constructed their own LIDS screens that are used in conjunction with rear-computer projection. A Mimio™ digitiser sits on one side of the screen and captures the presenter's on-screen movements. These movements include interactive gestures that are used to explore the presentation (such as moving between Powerpoint™ slides) or record annotations. On-screen movements and explorations are performed with a pen-like device. The off-screen movements (such as moving sideways) of the presenter is able to be recorded and displayed on the screen as a shadow. The presentation is able to be stored on computer and made available for on-line review after the presentation (see section 3 of this report for a discussion about the presentation review tool).

#### The Interactive Gesture Recognition Tools

To explore (e.g. move between Powerpoint™ slides) or manipulate the presentation, the LIDS Research Project have incorporated interactive gestures. These gestures are made by the user with the Mimio™ pen on the screen. A range of gestures have been implemented (see Table 2.1 on the following page). The shape and form of the gestures have been designed to enhance the whiteboard paradigm.

#### The Shadow Technology

To better support awareness of the presenter's movements during distributed activities, the LIDS Research Project have incorporated an on-screen shadow. A small camera, which sits in front of and facing the screen and the presenter, is used to capture the outline of the presenter. This outline, which is then filled in with gray, then becomes part of the image that the other distributed party sees.

### 2.2 Results of the Discussions

The results are presented by the items listed in the section Summary of Design Recommendations in section 8 of the first report. For each issue, we describe the problem and the recommendation from the first report before discussing the solution.

#### Enable Users to Choose an On-Screen Cursor Artefact

(was Replace the Pencil Image with a Simple Cross)

##### *Problem*

When the presenter draws/annotates on the screen, the LIDS software indicates the position of the pen on the screen with a pencil image (shown in Figure 2.1).



Figure 2.1 Existing pen image on the LIDS screen.

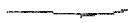
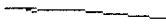

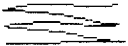

<i>Name</i>	<i>Gesture</i>	<i>Description</i>
Next slide		The next slide gesture is used for moving forward to the next slide in the presentation. This entails the user drawing a horizontal line from left to right on the screen, and then drawing the line back on itself for a distance. (This is analogous to a right-facing arrow in which the arrowhead is very narrow.) Moving forward to the next slide saves any text or drawing that has been added to the slide.
Previous slide		The previous slide gesture is used for moving back to the previous slide in the presentation. This entails the user drawing a horizontal line from right to left on the screen, and then drawing the line back on itself for a distance. (This is analogous to a left-facing arrow in which the arrowhead is very narrow.) Moving back to the previous slide saves any text or drawing that has been added to the slide.
Erase all		The erase all gesture is used for erasing the contents of the slide. This entails the user drawing a vertical line from the top to the bottom of the screen, and then drawing the line back on itself for a distance. (This is analogous to a down-pointing arrow in which the arrowhead is very narrow.) Only text or drawings that have not been saved can be deleted in this way.
Delete		The delete gesture is used for deleting an object on the slide in the presentation. This entails the user drawing five zigzag lines back and forth over the object in such a way as to create the corners of a box that completely encompasses the object to be deleted. The gesture has to begin in a bottom corner and zigzag upwards. Only text or drawings that have not been saved can be deleted.
Finish and save		The finish and save gesture is used for finishing and saving the presentation. This entails the user drawing a vertical line from the bottom to the top of the screen, and then drawing the line back on itself for a distance. (This is analogous to an up-pointing arrow in which the arrowhead is very narrow.)

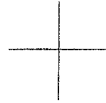
Table 2.1 LIDS gesture set.

However, some participants found the image distracting as it covered up existing text.

#### *Recommendation from First Report*

In the first report, we recommended that the pencil image be replaced with a simple cross (see Figure 2.2) with the centre of the cross corresponding to the tip of the pen when placed on the screen. We

felt that this would minimise the graphics used and cause existing text that originally sat behind the image to be viewable.



Pen image replaced by a simple cross.

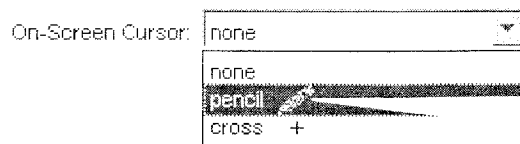
Figure 2.2 Suggested replacement pen image for the LIDS screen.

#### *Design Solution (Priority: High)*

The pen image was initially incorporated with LIDS for a conference presentation. Before that, no images had been used to indicate the pen 'cursor', except when in character recognition mode where the 'cursor' was represented differently for upper- and lower- cases. One of the goals of the project is to use the whiteboard paradigm as the basis for design as much as possible. A whiteboard does not use such an artefact. As such, the question was asked whether any artefact was necessary to enable users to determine the placement of the pen on the screen.

The group remained undecided whether the use of an artefact (i.e. a cross) would be beneficial. Some members felt that the use of a cross-type 'cursor' added to the usability of the screen, especially as the pen and the drawings on the screen were not properly aligned.

It was decided that the users would be allowed to choose whether to use a 'cursor' during setup time. In this case, the users could be offered the ability to choose from a number of 'cursor' options: none, a cross, a pencil, etc. An example is shown in Figure 2.3.



Note: The image that would be shown on the screen is shown in the pull-down list.

Figure 2.3 Option of cursor in presentation tool setup.

### **Provide Users with Better Control and Alternatives When Using Gestures** (was Enable Gestures to be Used Correctly)

#### *Problem*

Four of the participants in the Interactive Gesture Recognition Tools study experienced problems while drawing the next slide and previous slide gestures. Problems occurred because of unusual or too large a shaped arrow head (see (i) in Figure 2.4), the line in the return direction being too short (see (ii) in Figure 2.4), and the main horizontal line being too curved (see (iii) in Figure 2.4).



Figure 2.4 Examples of problems with the next and previous slide gestures. Problems included (i) too large a shaped arrow head, (ii) the line in the return direction being too short, and (iii) the main horizontal line being too curved.

The learning curve was relatively high for some participants. Some took up to fifteen times before they were able to complete the gesture successfully the first time. Others had to try it two or three times per time.

Problems also occurred, as the next and previous slide gestures, if drawn unsuccessfully, remained on the screen as unrecognised gestures or unintentional drawing by the user. Frequently, the participants left the unrecognised gestures on the slide as they went to the next or previous slide, which meant that unwanted strokes remained.

#### *Recommendation from First Report*

In the first report, we gave a number of recommendations.

- Provide a separate training module where each of the gestures is pre-drawn (similar to those that were drawn on the whiteboard for the training part for each session for the second and third usability studies) and the user over-draws the gestures, mimicking the size and shape of each gesture as it is pre-drawn on the slide. We suggested that this would offer users with the ability to train and practice at any time. Further the users would have an on-line reference tool from which they could determine the right size and shapes to use. To access this module, we recommended that a separate help (?) button should be added to the screen (perhaps in one of the bottom corners, see (i) in Figure 2.5), which when accessed would pop up a separate window which could contain the training module (see (ii) in Figure 2.5).

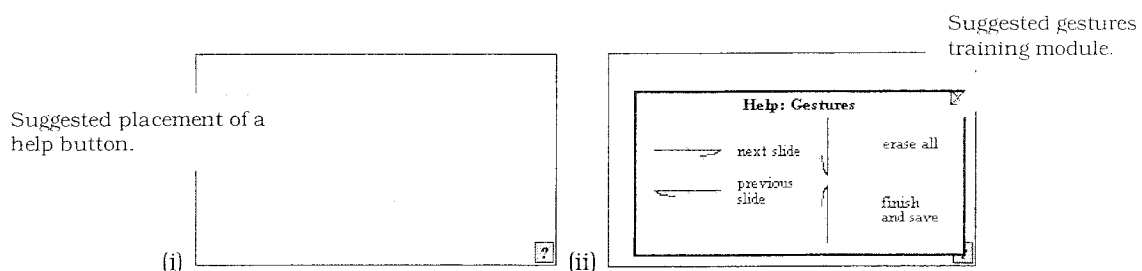


Figure 2.5 Suggested separate training module (see (ii) above), accessible from a help button on screen (see (i) above).

- Provide users with the choice of having navigational (i.e. next and previous slide) buttons on-screen. We suggested that a suitable location for these might be at the bottom centre of the screen (see Figure 2.6).

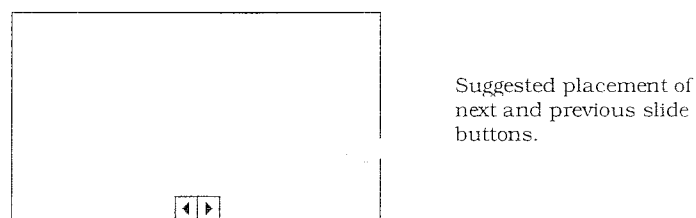


Figure 2.6 Suggested placement of next and previous slide buttons on the screen.

We felt that having the buttons located here, rather than on the left- or right- hand side of the screen would mean that the users would not have to reach to one side of the screen to access the buttons. Further, providing these buttons would mean that the users are not forced into using the gestures if they do not wish to.

Unfortunately, this would mean that the users would need to take the existence and placement of the buttons into account when preparing their presentations and that additional use of the screen, e.g. for annotations, would be restricted to a slightly smaller area. Further, it also seemed likely that the users might need to move to a position more suitable for using the buttons whenever they wished to access the previous or the next slides.

- Set an area of the screen, say the bottom of the screen, aside for drawing gestures (see Figure 2.7).

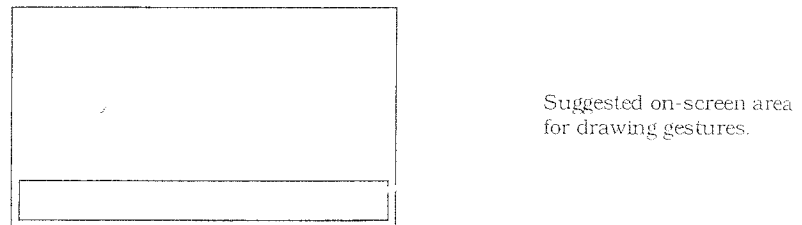


Figure 2.7 Suggested placement of gesture drawing area on the screen.

We suggested that this could allow for a little more flexibility for the users when they draw a gesture. For example, if they drew a next or previous slide gesture with a too large a shaped arrowhead the software could properly recognise it.

However, we also felt that the users would need to take the gestures area into account when preparing presentations, and that additional use of the screen, e.g. for annotations, would be restricted to a smaller area. Further, the users may have needed to move to a position more suitable for using this area whenever they wished to use a gesture.

- Provide an undo (and possibly redo) gesture to remove unsuccessful strokes. We suggested that this would mean that the users could remove unrecognised and unwanted strokes, minimising the clutter on the slide.

The gestures we suggested are given in Figure 2.8 (for undo see (i); for redo see (ii)).

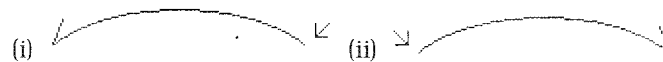


Figure 2.8 Suggested undo (see (i) above) and redo (see (ii) above) gestures. The arrows are used to indicate where the gestures should start.

*Design Solution (Training module-Priority: Low; Previous and next buttons-Priority: Medium; Specific gesture area-Priority: Low; Undo and redo features-Priority: High)*

The group discussed the idea of incorporating a training module into the LIDS technology. They felt that users would like a more interactive training module than that suggested in the first report and that the example would not contain enough functionality. However, the group was not clear as to what functionality would actually be required, and it was decided that this should become the basis of further investigation.

The concept of having previous and next buttons for users who were not able to master, or who did not want to use the previous or next gestures, was considered useful. It was suggested that the best location for the buttons might be on the sides of the slides (the left button on the left-hand side, the right button on the right-hand side) rather than in the middle (as was suggested in the first report). It was also suggested that the buttons could be incorporated into some type of dockable tool box, so that users could move the toolbox to a more suitable location. It was also decided that these suggestions would require further research.

It was also suggested that the buttons could be utilised in some way to provide training for the users. For example, the previous and next gestures could be depicted on the buttons, or the users could draw a previous or next gesture onto the buttons. However, this idea was not readily adopted, but could be incorporated in future studies.



The idea of having an area set aside for the drawing of gestures was positively received. However, it was not clear whether this would constrain advanced users, and it was decided that the concept would need to be further studied.

Undo and redo were recognized as important features to incorporate within the software. The suggestion that they be available as gestures and buttons was readily adopted. The inclusion of undo and redo as buttons also makes the earlier suggestion of a toolbox feasible. The recommended gestures were thought to be suitable.

#### *Interim Design Solution (Training module-Priority: High)*

Until we have a better idea of what functionality should be incorporated within a training module, it was thought that having a quick reference tool, similar to that suggested in the first report, would be sufficient.

#### **Make 'Not-Ready' Modes Clearer** (was Make Modes Clearer)

##### *Problem*

Most participants in the Interactive Gesture Recognition Tools study experienced problems drawing the next (two participants) and previous (four participants) gestures due to the LIDS software not being ready. The participants started to use the gestures while the software was not in a 'ready' state or mode. Although the interface does indicate the change in mode with an hour-glass in the centre of the screen, it does not make the change in mode clear enough to the users. This meant that the participants had to redraw the gesture once the software was ready, a redundancy in use.

##### *Recommendation from First Report*

In the first report, we recommended that modes should be explicitly recognised in the interface design. We suggested that the different states ('ready' and 'not ready') should be indicated clearly and distinctly by providing some form of feedback to the users. Thus, we felt that it would be less likely that the users would experience problems while the system was in a 'not ready' state. Literature recommended that one way of achieving this would be to add different sound effects, while another way would be to change the colour of the windows.

##### *Design Solution (Priority: High)*

Due to the recommendations described below, the explicit recognition of modes has become an important issue. In this instance, we are describing a mode to depict when the software is not ready (rather than when it has gone into an editing mode, see below). The current application depicts the system when not 'ready' with an hour glass. The group decided to keep this feature, but to increase the size of the hour glass to take up a larger portion of the screen.

#### **Remove the Delete Gesture and Make the Mimio™ Eraser Functional** (was Remove the Delete Gesture)

##### *Problem*

All of the participants in the Interactive Gesture Recognition Tools study experienced problems with the delete gesture. The problems included the delete gesture:

- i. Not being big enough i.e. not fully covering the item to be deleted (this occurred 29 times, see (i) in Figure 2.9).
- ii. Comprising four not five strokes (this occurred 26 times, see (ii) in Figure 2.9).

- iii. Starting at the top rather than the bottom (this occurred eight times, see (iii) in Figure 2.9).
- iv. Being too curved (this occurred five times, see (iv) in Figure 2.9).

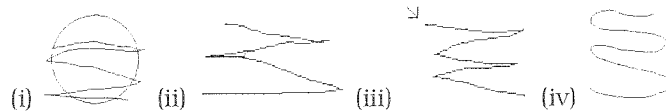


Figure 2.9 Examples of problems with the delete gesture. Problems included the delete gesture (i) not being big enough to fully cover the item to be deleted, (ii) comprising four not five strokes, (iii) starting from the top (as indicated by arrow) rather than the bottom, and (iv) being too curved.

Five of the six participants in the Interactive Gesture Recognition study used the delete gesture successfully the first time in fewer than half of the instances in which it was used. In other words, for each time the delete gesture was used the participants had to attempt it more than once before they were successful. At the extreme, one participant attempted the delete gesture more than 20 times before it worked successfully.

Part of the problem involving the delete gesture is that if it is not successfully used the first time the unsuccessful gesture remains on the slide, producing a mess. During the Interactive Gesture Recognition study, when this happened the participants then tried to remove the unsuccessful gesture by using another delete gesture. If this was not successful, then the participants were left with a large mess on the screen.

At times during the Interactive Gesture Recognition study, this problem got so bad (and frustrating) that the participants either gave up or resorted to using the erase all gesture.

The participants experienced other difficulties when using the delete gesture.

- The gesture sometimes removed more material than was wanted.
- The participants sometimes unintentionally simulated the gesture when trying to colour an object.
- The gesture does not remove material that has already been saved. For example, during the training session of the Interactive Gesture Recognition study one participant tried using the delete gesture several times in succession to remove material. The gesture should have worked and this puzzled the participant until it was realised that the slide had been moved from and then back to.

#### *Recommendation from First Report*

In the first report we offered a range of recommendations.

- Make the software work with the Mimio™ eraser. The Mimio™ eraser has two contact areas: a small and a large pad (see Figures 2.6 and 2.7 of the first report). We felt that using this tool would be more analogous to using a whiteboard duster. Further, the Mimio™ eraser could be developed and incorporated as part of the LIDS pen, so that it is more like a pencil with a writing point (lead) at one end and eraser at the other.
- Incorporate an undo mechanism (see Figure 2.7, above), so that if the user erases a greater areas than is required, then the user can undo the last action and try again. We felt that this would provide users with added flexibility and control.

- Enable existing and saved material to be removed. Again, we felt that this would provide users with added flexibility and control.

#### *Design Solution (Priority: High)*

The three recommendations made above were all accepted. It was further recommended that the existing zigzag gesture be dropped from the gesture tool set.

### **Incorporate Better Anti-Aliasing**

#### *Problem*

Another aspect of the technology that the participants in the Interactive Gesture Recognition study noted was the size of the on-screen user-drawn text and restrictions this presented in doing the task. One participant chose to write all of the text in the presentation in block case to improve the legibility of the writing. Some participants, when asked how the software could be improved, indicated the need for some form of hand writing recognition.

#### *Recommendation from First Report*

We felt that the users' ability to annotate or write on the screen directly where the text is to be placed with hand written text a significant benefit to the user. As noted in the Technology in Use for Teachers and Students study (see part 3 of the first report), this meant that additions were highlighted against the prepared material, focusing the users' work. Thus, to suggest that some form of hand writing recognition technology be adopted instead would work against this benefit. Having the choice of which mode to work in would provide greater flexibility for the users.

In terms of the problem with the size of the text, we suggested in the first report that perhaps the issue could be at least partially improved by having better anti-aliasing.

#### *Design Solution (Priority: None)*

We were not entirely sure about the cause of this problem when we wrote the first report. It seems this issue is due to technical limitations, for example, the resolution of the projector. A more expensive projector would provide greater clarity.

### **Better Sensitivity of Software**

#### *Problem*

At one stage, one participant in the Interactive Gesture Recognition study tried to draw a dot on the screen. This was not registered by the software. Instead, the participant had to use a small coloured-in circle in place of a dot. Two participants in that study experienced difficulties trying to join lines that did not meet.

#### *Recommendation from First Report*

In the first report we were a little unsure as to what to recommend for this problem. We thought that, perhaps, the software could be a little more sensitive in what it recognises.

#### *Design Solution (Priority: None)*

It was suggested that the problem with the incorrect registration of the on-screen text was that the users had been inexperienced and perhaps did not apply enough pressure with the pen. However, technical limitations, such as projector resolutions, thickness of glass, and inaccuracies with calibration could also influence the existence of this problem.

## Add New Editing Features

(was Add New Interactive Options)

### Problem

Some participants in the Interactive Gesture Recognition study indicated that some useful interactive options were missing from the software. These included gestures for copying an existing slide and placing the content on a new slide, and gestures to directly return the user to the beginning of the presentation (without having to navigate all the in-between slides in the presentation). We felt that this issue had implications for also including a gesture to go to the last slide directly.

### Recommendation from First Report

In the first report we recommended that the following features be incorporated into the software:

1. A copy gesture that copies the existing drawing and text on a slide to the computer clipboard. We suggested that this gesture can be extended so that users can select a portion (i.e. either a part or the whole) of the slide and copy this onto the clipboard. The suggested gestures are given in (i.a) for entering the copy mode and (i.b) for selecting a portion of the screen, of Figure 2.10.
2. An insert gesture for manually inserting a slide after the current slide. The suggested gesture is given in (ii) of Figure 2.10.
3. A paste gesture that pastes what is currently on the computer clipboard onto the current slide. The suggested gesture is given in (iii) of Figure 2.10.
4. A gesture to enable the user to go directly to the first slide in the presentation. The suggested gesture is given in (iv) of Figure 2.10.
5. A gesture to enable the user to go directly to the last slide in the presentation. The suggested gesture is given in (v) of Figure 2.10.

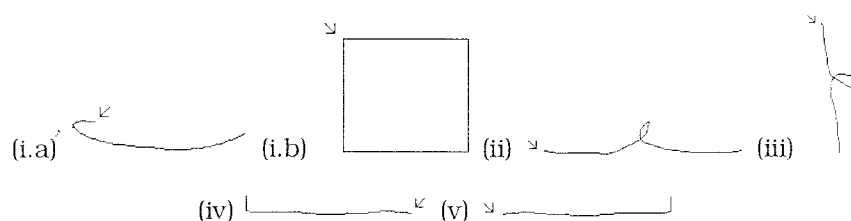


Figure 2.10 Suggested gestures for (i.a) entering copy mode and (i.b) selecting the area to copy, (ii) for inserting a slide, (iii) for pasting the contents of the clipboard onto the current slide, (iv) for going to the first slide, and (v) for going to the last slide. The arrows are used to indicate where the gestures should start.

We also recommended that if buttons were to be provided at the bottom of the screen (as suggested for the next and previous slides above), then the actions i.a, ii, iii, iv, v should also be represented as buttons (see Figure 2.11). The action i.a places the software in a copy mode, i.b should still be used as a gesture to select the area of the slide to copy.

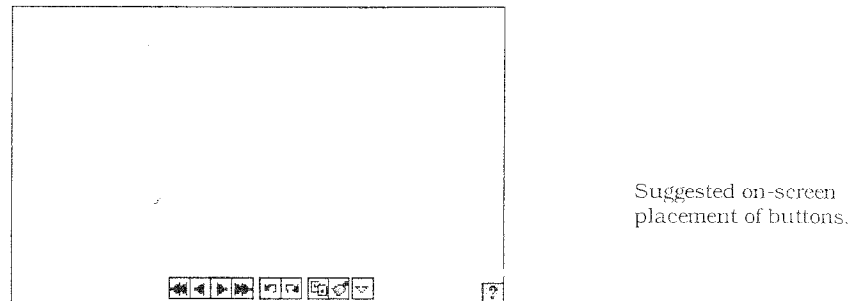


Figure 2.11 Suggested buttons for first screen, previous screen, next screen, last screen, undo, redo, copy, paste and insert. The help button still remains in the bottom right corner.

### *Design Solution (Priority: High)*

This suggestion for adding more functionality highlighted the need for additional research. The main issue was: for each type of presentation (lecture mode or storyboarding), what functionality would the users require? For example, when using LIDS for storyboarding, are the users likely to want to copy a slide or part of a slide and paste it on another slide?

We decided on the following:

- Users would want to edit (copy, cut, paste, delete, move, resize) a whole or part of a slide.
- Users would probably want to edit at a pixel, rather than an object, level (which is similar to a whiteboard).
- For users to edit, they must first enter an edit mode. They can do this by placing the pen on one place on the screen for about one second.
- A selection would be made by the user dragging the pen across the area to be selected. The user completes the selection by lifting the pen from the screen.
- In edit mode, the selection would be highlighted in some way e.g. with handles.
- Once a selection had been made, a popup menu with edit functions would be displayed on the screen near the last place the pen was lifted off the screen. Users would choose the appropriate function from the displayed menu. These functions could also be made available as gestures and as buttons on a dockable toolbox.
- The edit functions on the displayed menu should include adjust selection, cut, copy, paste, scale and move.

### **Inclusion of Paint Tool-Type Options**

#### *Problem*

Some participants in the Interactive Gesture Recognition study felt that to improve their presentation and therefore interaction with others they would like paint tool-type options e.g. paintbrush with different sizes and colours, a fill tool, etc.

#### *Recommendation from First Report*

In the first report, we did not recommend that these suggestions be incorporated. We felt that doing so would diverge too much from the whiteboard paradigm.

#### *Design Solution (Priority: Low)*

Although in the first report, we recommended that these suggestions should not be incorporated, we now suggest that further research should be carried out to determine the requirements of the different users and the different type of presentations.

#### **Prompt Users About Whether They Wish To Finish and Save**

##### *Problem*

A technical problem was noted by one participant in the Interactive Gesture Recognition study while using the finish and save gesture. At the end of the task, he reviewed his presentation and added more drawing to an intermediate slide before using the finish and save gesture to exit the presentation. As the presentation closed, it appeared to remove the additional drawings he had done. When the presentation was reopened, the additional drawings had not been saved as part of the presentation.

##### *Recommendation from First Report*

In the first report, we did not make any recommendation regarding this issue.

#### *Design Solution (Priority: High)*

Although we made no recommendation regarding this issue in the first report, the group discussed the need for a prompt to ask the users whether they wished to finish and save what they had been working on when they used the finish and save gesture. The prompt should give the users three options:

1. Finish and save.
2. Finish without saving.
3. Return without saving.

#### **Improve the On-Screen Shadow**

##### *Problem*

In terms of the interface or integration with LIDS, the aspects of the shadow technology that participants from the Shadow Technology study most frequently disliked related to the quality of the shadow. There were 17 comments, including the large size of the shadow, the low resolution or "grainy" image, the lack of smooth edges, and that the shadow did not provide enough detail about the other participant's gestures.

Seven participants from that study disliked the way in which the shadow technology cast extraneous shadows other than that of the participant. They noted that when other things were cast on the screen it became difficult to read or was confusing.

Further, when asked to rate the shadow technology along a number of scales, the participants rated the attractiveness and quality of the shadow lower than any other rating. The mean over all of the ratings was 1.35. The mean for attractiveness and quality was considerably lower at 0.4 and 0.6, respectively.

##### *Recommendation from First Report*

In the first report, we recommended that the resolution or graininess of the image and lack of smooth edges be improved.

### *Design Solution (Priority: Low)*

The group decided that the extraneous shadow was a problem and should be solved. It was also decided that further research should be conducted to determine how much shadow/how much detail should be shown on the screen.

## **2.3 Summary**

We recommended a number of changes in the first report. In terms of the on-screen artefacts, these included changing the pencil image to a simple cross so that less of the screen content was hidden behind the image from the users. In this report, the design resolution for this problem was to enable the users to choose whether to use an on-screen 'cursor' artefact or not. Users could specify this during setup.

In the first report, we also suggested additions be made to the functionality and that better support should be provided for users when using the gestures. In this report, a number of additional changes and modifications to the earlier recommendations were suggested. These included placing the navigational buttons on a dockable toolbox, and incorporating a selection function to enable cutting, copying, scaling, moving, pasting, and selection adjustment.

The discussion also highlighted an important issue to do with the global LIDS concept: how far should computer-related functionality extend into the whiteboard paradigm?

In terms of the on-screen shadow, we recommended only one design change in the first report. That was to improve the quality of the on-screen shadow. It was agreed that the shadow should be improved although more research needs to go into determining how much detail should be shown.

## 3. The Presentation Review Tool

### 3.1 Background

The sequence of interaction and edit events in a presentation are captured by the computer. The end result is a file that contains the original presentation, alterations to the presentation and exploration of the presentation. For example, say a presenter prepared a five slide presentation in advance. As the presenter moves between each slide, the path of exploration is recorded and upon review each slide is listed in the same order as the path of exploration. Thus, if the presenter visits the slides in the following order, 1,2,3,4,3,4,5, then the review tool presents these slides in the same order. If the presenter makes annotations to an existing slide then these are recorded and on review are presented on the appropriate slide. Any slides that are created during the presentation, having been appended to the end of the presentation after the last slide are also made available for review.

The review facility is an online tool.

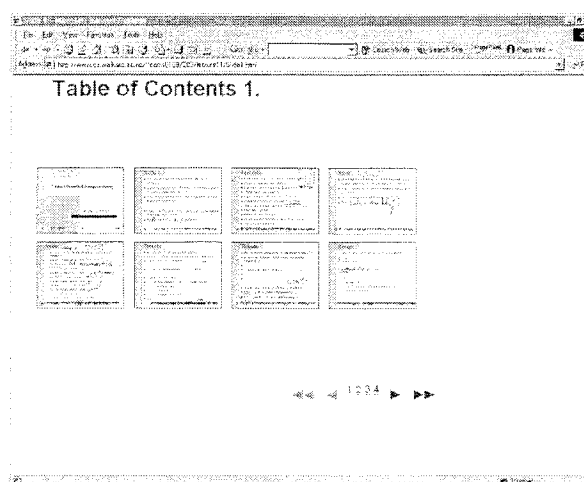
#### Process of Use

The first screen that the users see is a table of contents (see Figure 3.1 and below for a fuller description).

The user locates the slide that he or she wishes to review and then selects the slide with the computer mouse. The slide then becomes 'live', replacing the table of contents page (see Figure 3.2), and the audio recording for that slide begins to play automatically.

Title of Table of Contents  
slide

Thumbnails of slides



Navigation through Table  
of Contents pages

Figure 3.1 The online review tool.

#### The Table of Contents

The table of contents (see Figure 3.3) currently consists of one or more screens with each screen containing a two-by-four matrix of slides. If more than eight slides exist in the presentation then additional table of contents screens are provided. Arrows, displayed at the bottom of the table of contents screens, enable the user to navigate to the first (◀◀), previous (◀), next (▶) and last (▶▶) table of contents slides. A numeric list (e.g. 1 2 3 4), used to represent each of the table of contents



slides, is also given. The numbers are underlined to indicate that these are navigable. On selection the user is able to navigate directly to a particular table of contents screen. Each table of contents screen also displays the title “Table of Contents” and a number to represent the table of contents screen that the user is currently viewing. Thus, the second table of contents screen would have the title “Table of Contents 2.”.

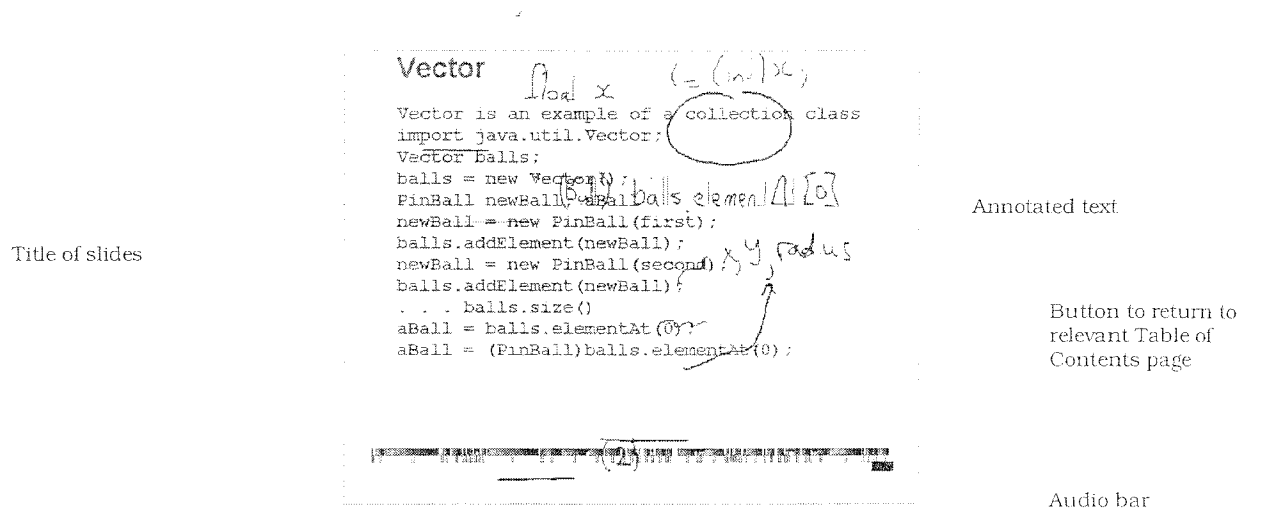


Figure 3.2 An example slide from the review tool.

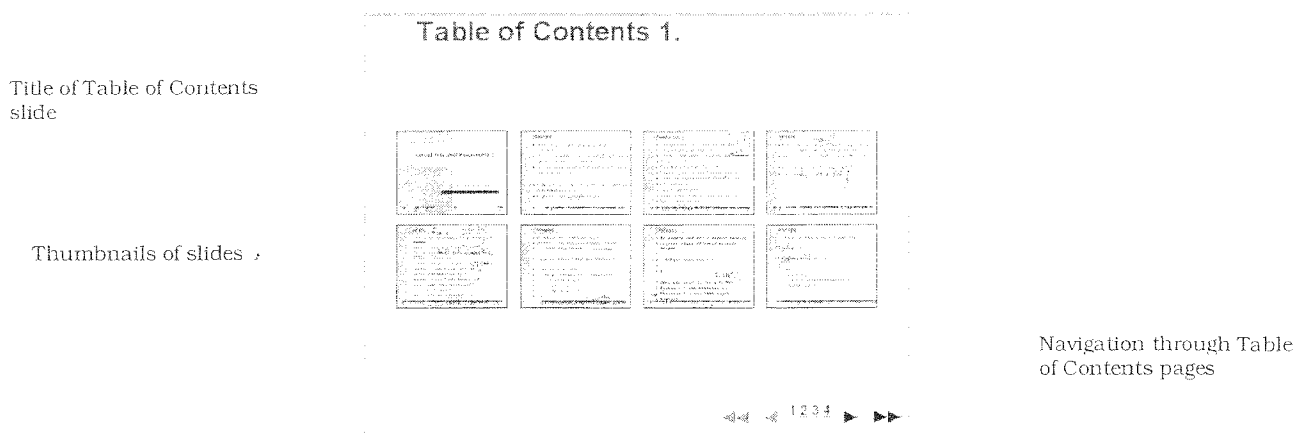


Figure 3.3 An example table of contents screen from the review tool.

## Features of the Slides

Each slide contains the visual/textual presentation (including annotations), as well as an audio bar which is located at the bottom of the screen (see Figure 3.4). The audio bar is used to indicate the saved audio file for that slide. The audio bar represents the audio file in blocks—pauses in the audio are represented by breaks in the bar. Each block represents audio with no pauses. The arrows beneath each block enable the user to recognise each block. The users are able to access a particular piece of audio by selecting its block. (How the users know which block to select is not clear.) This enables the user to review a specific aspect of the slide if they wish to, rather than forcing the user to

listen to the entire audio file for each slide.

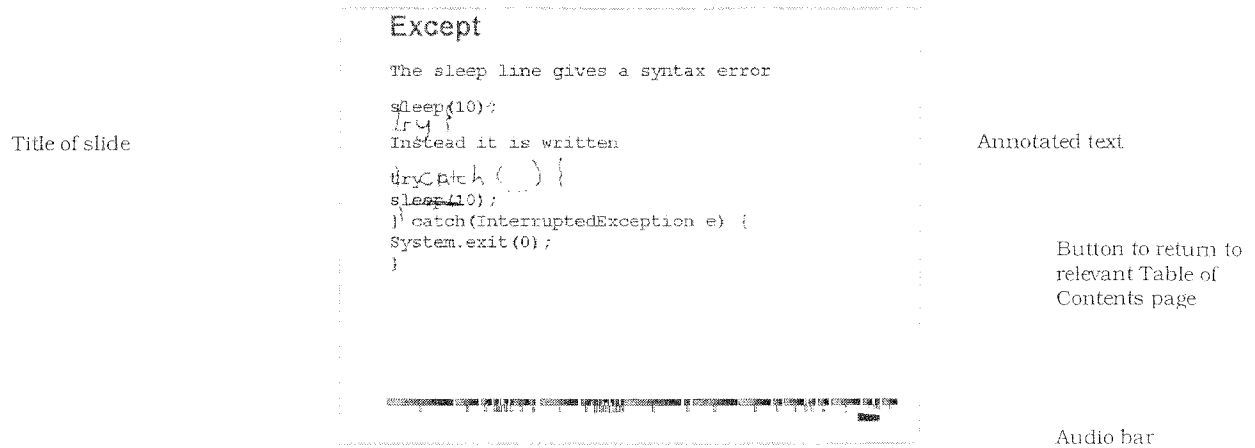


Figure 3.4 Another example slide from the review tool.

To return to the previous slide or go on to the next slide the user must first return to the appropriate table of contents page. The user is able to do so by selecting the blue ToC (Table of Contents) button usually found towards the end of the audio bar.

### 3.2 Results of the Discussions

The results are presented by the items listed in the section Summary of Design Recommendations in section 8 of the first report. For each issue, we describe the problem first before discussing the solution.

#### Incorporate the Video of the Presenter within the Review of the Presentation

##### Problem

The presenter's image is not present in the review tool. This can lead to a lack of presence and awareness, both important elements of a collaborative tool.

##### Recommendation from First Report

In the first report, we recommended that where possible the presenter's image should be recorded throughout the presentation and then incorporated within the review tool. We suggested that the image did not need to be large (see Figure 3.5), and the position of the image within the slides could be determined by the presenter before putting the material online.

##### Design Solution (Priority: Medium)

The group thought that it would be a good to incorporate the presenter into the review of the presentation in some way. We came up with two possible choices:

1. Incorporate a live image of the presenter as described in the first report. To add more value to the inclusion of the presenter, the image should be a recording of the presenter as he or she works at the screen (see Figure 3.6). However, this solution might have a high computer memory overhead.

There is no reason why either or both methods could not be used. However, it will be important to ensure that the method for incorporating either is quick and easy.

### **Incorporate Next and Previous Links**

#### *Problem*

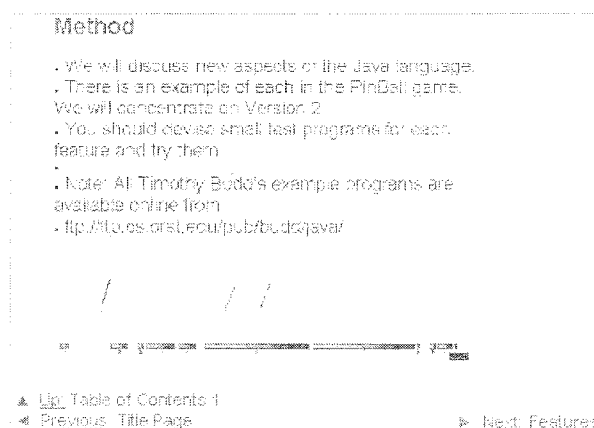
There are obvious linear sequences within any presentation. These specifically involve moving from one slide to the next, or back to the previous slide. While reviewing the material, the users are not given this opportunity. Instead the users are required to return to the associated table of contents page to select the next or previous slide.

#### *Recommendation from First Report*

In the first report, we recommended that sequential previous and next links should be incorporated onto every slide. We felt that it was important that, where applicable, these same links should be placed on every page so that users would learn to expect, and thus use, these for easy and fast navigation. We suggested that generic links such as 'next' or 'previous' could be used, but that this would provide little indication of what content these pages contain. Instead, if able to be implemented, we suggested using 'Next: <title of the next slide>' and 'Previous: <title of the previous slide>'.

We also thought that it would be important for the users to be able to return to the relevant table of contents from any slide. Instead of placing the link at the end of the audio bar and representing it as a blue 'ToC' button, we recommended that it should be represented as 'Up: Table of Contents <#>' and placed along the new navigation line at the bottom of each slide. We have provided an example in Figure 3.8.

Example of Up and  
Previous links.



Example of Next links.

Figure 3.8 An example of next and previous links for each slide.

#### *Design Solution (Priority: High)*

It was suggested that users could go to the next slide just by clicking on the current slide. However, this is a feature of Powerpoint™ and does not exist within the LIDS context. Thus, it was decided that enabling the users to easily go to the next slide or return to the next slide in a more direct way than what is currently available would be a good idea.

Although the method recommended in the first report was seen as sufficient for lecture-type presentations (where page titles could be incorporated), the method would not be suitable for storyboard presentations (where a page title would not formally exist). As this was the case, the group decided on two separate solutions:

1. Use text-based page titles for lecture modes (see Figure 3.8, above). These could easily be derived from titles placed in a title location.
2. Use a thumbnail of the relevant page for storyboard presentations (see Figure 3.9). The size of the thumbnail should remain constant for all presentations of this type.

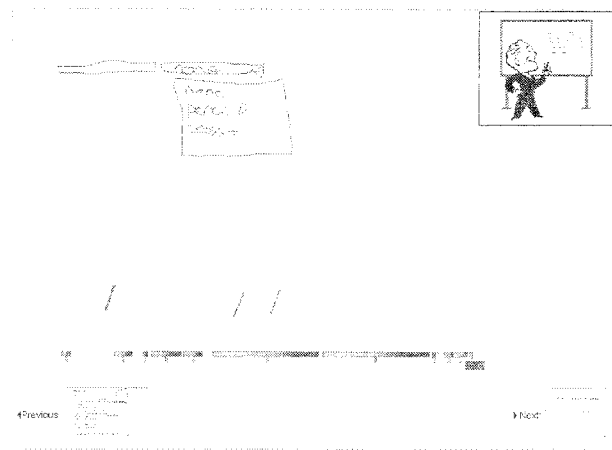


Figure 3.9 Previous and next slide links for storyboard-type presentations

#### *Interim Design Solution (Priority: High)*

In the interim, generic links could be used for both types of presentations (see Figure 3.10).

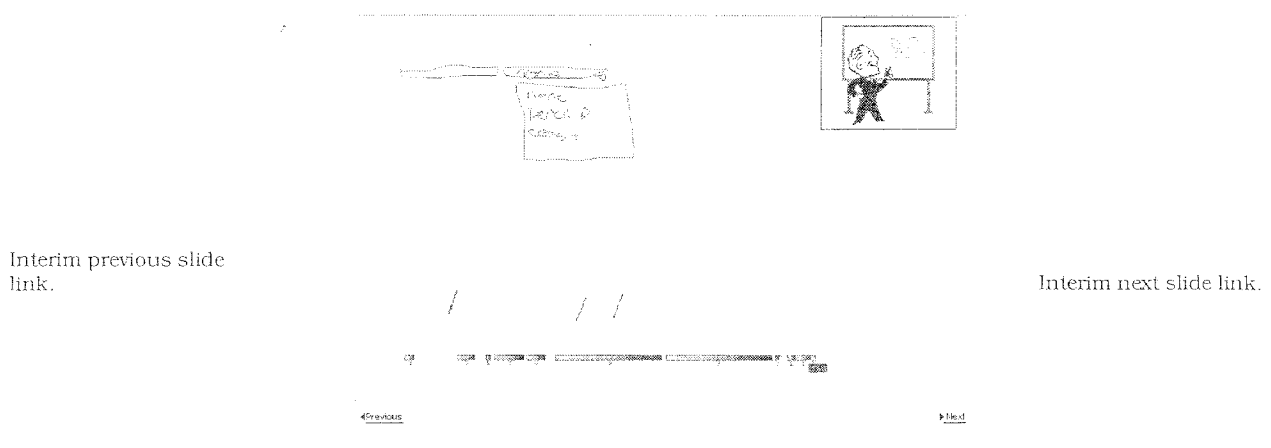


Figure 3.10 An example of interim previous and next slide links.

## Insertion of Identical Slide After Some Time

### *Problem*

Each slide contains the visual/textual presentation (including annotations), as well as an audio bar (see Figure 3.11) which is located at the bottom of the screen. The audio bar is used to indicate the saved audio file for that slide. The audio bar represents the audio in blocks. Pauses in the audio are represented by breaks in the bar. Each block represents audio with no pauses. The arrows beneath each block enable the user to recognise separate block. The users are able to access a particular piece of audio by selecting each block, although which block to select is not clear. This enables the user to review a specific aspect of the slide if they wish to, rather than forcing the user to listen to the entire audio file for each slide.

Individual blocks.

Arrows.



Figure 3.11 Audio bar as presented on the bottom of a slide.

[Table of Contents link.](#)

One problem is that some audio files can become large, and audio bars can become very long and complicated due to an indefinite amount of time spent discussing a slide. The worst case would be when none of the blocks are defined.

### *Recommendation from First Report*

In the first report, we recommended that after certain length of time, say 10 minutes, on one slide that an identical slide be inserted into the presentation and the presenter works on the inserted slide. We suggested that if this recommendation was adopted, the insertion would need to be seamless, as if nothing has taken place. However, this would mean that discussions on one topic might continue over more than one slide, which may mean that locating a specific item can become more difficult.

### *Design Solution (Priority: None)*

This issues is closely related to that of the following issue, Replace Audio Bar With Simplified Version and Incorporate Thumbnails of Slide. Please see the following issue for a description of the decisions made.

## Replace the Audio Bar With a Simplified Version and Incorporate Thumbnails of Slide

### *Problem*

Following on from above, another problem is that users are unable to relate the blocks with any significant occurrence during the presentation of that slide. The arrows are used only to identify individual blocks.

### *Recommendation from First Report*

In the first report, we recommended that to simplify the graphics involved, that the audio bar be replaced with one long continuous bar with arrows removed. (We suggested that colours might still be used to indicate when the presenter is actually saying something.) To enable users to better relate the audio with a significant occurrence during the presentation of the slide we suggested that

thumbnails of the presentation of the slide be placed at regular intervals along the bar. The thumbnails should be used to represent snapshots of the presentation taken at regular intervals (see Figure 3.12). We felt that instead of selecting the audio bar to play audio, the users might be able to select the thumbnails to indicate that they wish to listen from that point on the slide onwards. We thought that this would enable users to better associate sections of the audio with progression through the slide and it would look less complicated than the current audio bar.

However, we also indicated that the problem with this recommendation was that it assumed that the presenter would make annotations so that the user could easily differentiate between phases on the slide, and as seen in Figure 3.8 (above) it would take up more space on the slide.

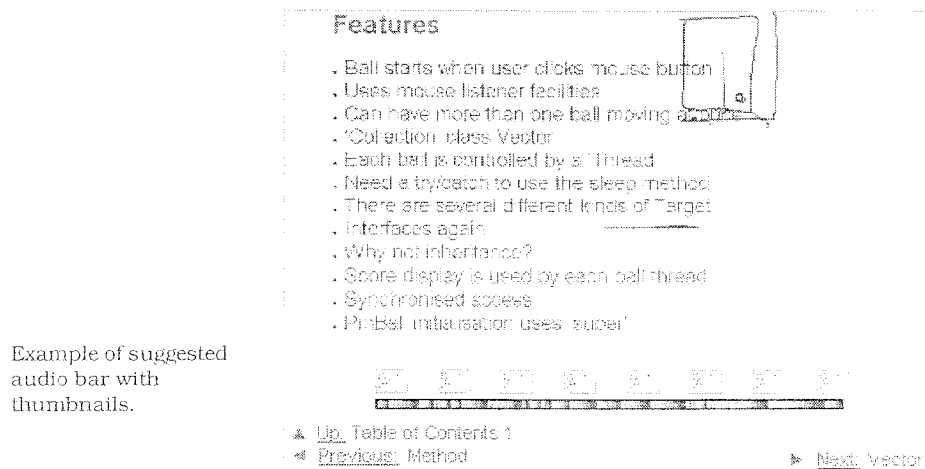


Figure 3.12 An example of audio bar with thumbnails.

#### *Design Solution (Priority: Low)*

The group agreed that the presentation of the audio bar on the slides is a major problem. The solution was not clear, but its resolution is important. The root of the problem lies in the representation of the audio—should the audio be represented in absolute or relative terms, and how will this impact the representation of pauses and blocks of discussion?

An additional problem is determining which segment of audio is represented by which block of the audio bar. There are a number of ways, some of which the group did not consider. Using thumbnails was recognized as one solution. Another might be the use of keywords.

It was decided that the best way forward was through further research.

#### *Interim Design Solution (Priority: High)*

In the interim, the group decided that the best approach was to remove the audio bar (but keep the audio) from the slides. It was decided that a Start/Stop button should be incorporated to enable users to replay the slide (although this will mean the whole slide) as they wish. See Figure 3.13 for an example.

### **Replace Multiple Table of Contents Slides with One Index Slide**

(was Replace Multiple Table of Contents Slides With One Table of Contents Slide)

#### *Problem*

The table of contents slides currently consists of one or more screens with each screen containing a two-by-four matrix of slides. Thus, if more than eight slides exist in the presentation then additional

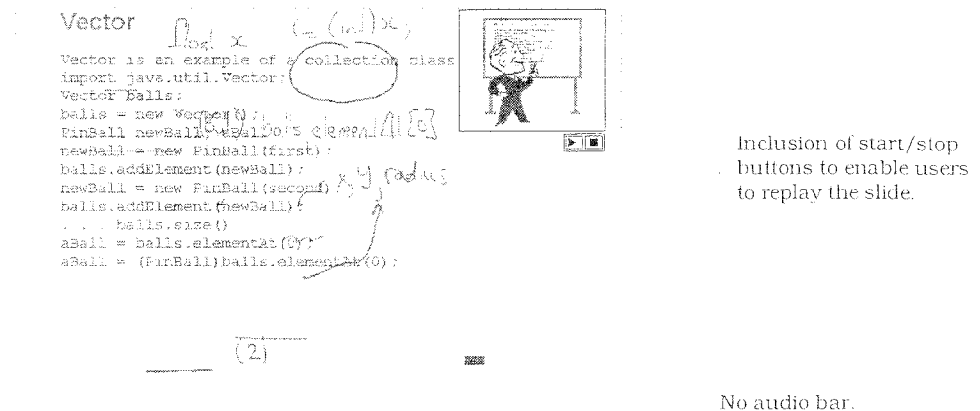


Figure 3.13 Interim design solution for audio bar.

table of contents screens are provided. Arrows, displayed at the bottom of the table of contents screens, enable the user to navigate to the first (◀◀), previous (◀), next (▶) and last (▶▶) group of table of contents slides. A numeric list (e.g. 1 2 3 4) that represents each of the table of contents screens is also given. The numbers are underlined to indicate that these are navigable. On selection, the user is able to navigate directly to a particular table of contents screen. Each table of contents screen is also listed with the title "Table of Contents" and a number to represent the table of contents screen that the user is currently viewing. Thus, the second table of contents screen would contain the title "Table of Contents 2."

The issue with the table of contents slides is that the users are not able to determine the full range of topics within the presentation at a glance. Because the table of contents are displayed over multiple slides, users who require a particular slide but are unsure of where in the presentation it was displayed are forced to navigate through each table of content slide until they locate the required slide.

#### *Recommendation from First Report*

In the first report, we recommended that the multiple table of contents slides within the presentation review tool be replaced by a single table of contents slide (see Figure 3.14 for an example).

#### *Design Resolution (Priority: Medium)*

The recommendation made above was accepted by the group, but only for lecture-type presentations. The recommendation would not support storyboard presentations where slide titles are unlikely to be present. Thus, in the instance of a storyboard presentation, the list of page titles (as pictured in Figure 3.14) could be replaced with a list of thumbnails (see Figure 3.15).

Suggestions were made to enable the users to determine the size of the thumbnails while setting up the presentation review so that the table of contents could fit on only one slide. See Figure 3.16 for an example.

List of entries in Table of Contents. They are underlined to indicate that they are navigable.

Object Oriented Programming	
Lecture 11: PinBall	
1 <u>Title Page</u>	19 <u>Inheritance</u>
2 <u>Method</u>	20 <u>Object</u>
3 <u>Features</u>	21 <u>Interface</u>
4 <u>Vector</u>	22 <u>Substitutability</u>
5 <u>Vector (cont'd)</u>	23 <u>Modifiers</u>
6 <u>Threads</u>	24 <u>Modifiers (cont'd)</u>
7 <u>Threads (cont'd)</u>	25 <u>Modifiers (cont'd)</u>
8 <u>Except</u>	26 <u>Modifiers (cont'd)</u>
9 <u>Targets</u>	27 <u>Reasons</u>
10 <u>Targets (cont'd)</u>	
11 <u>Score</u>	
12 <u>Score (cont'd)</u>	
13 <u>Puzzle</u>	
14 <u>Super</u>	
15 <u>ILB</u>	
16 <u>Super</u>	
17 <u>ILB</u>	
18 <u>Super</u>	

Figure 3.14 An example of the table of contents.

Thumbnails are selectable and will take the user directly to the chosen slide.

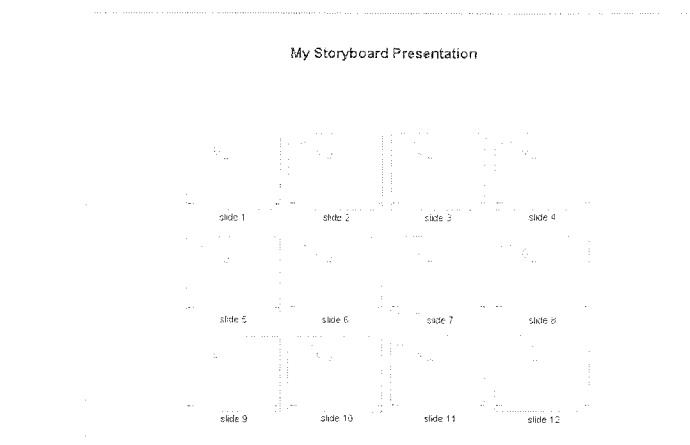


Figure 3.15 An example of the index for storyboard-type presentation.

Note use of slide numbers to depict the order of the slides.

Thumbnail Size: ☐ 1/4" x 1/4" ☐ 1/2" x 1/2"  
☐ 3/4" x 3/4" ☐ 1" x 1"

Note: use of inches only. It would be better to use inches with centimetres in brackets alongside.

Figure 3.16 An example for selecting size of thumbnails when setting up slides.

Note: If represented as a matrix on an index or table of contents page, it will be important to make the order of the slides clear. In the example in Figure 3.15 above, we have used slide numbers to solve this problem.



## List Slides By Their Title

### *Problem*

The small size of the thumbnails currently used make it difficult to determine the exact contents of a slide other than its title. For this reason we suggest that providing thumbnails in the table of contents does not add anything useful.

### *Recommendation from First Report*

In the first report, we recommended that only the titles of each slide be displayed, instead of a thumbnail image.

### *Design Solution (Priority: None)*

This issue has been solved through the design solution of the previous problem. Replace Multiple Table of Contents Slides With One Table of Contents Slide.

## Alternative TOC Solution

(was Alternative Up Solution)

### *Problem*

The suggestions of having only one table of contents slide has ramifications for the 'Up: Table of Contents <#>' navigation feature suggested earlier. Instead of having multiple table of contents slides, there would now be only one.

### *Recommendation from First Report*

In the first report, we recommended that the 'Up: Table of Contents <#>' could be replaced with 'Up: Table of Contents' or by 'Up: Home', where 'Home' represents the table of contents slide (see Figure 3.17).

Suggested 'Up: Home' entry instead of 'Up: Table of Contents #'.

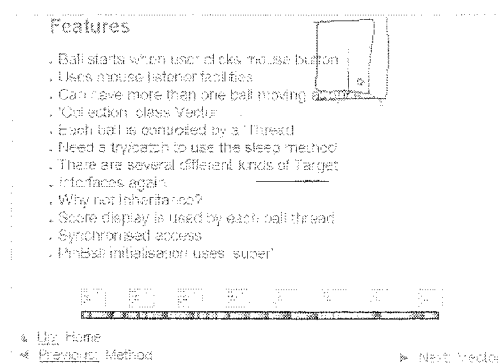


Figure 3.17 A new example of slide with 'Up: Home' navigation link.

### *Design Solution (Priority: High)*

The group felt that this recommendation could be further improved by using the term 'Index' instead of 'Up: Home' (see Figure 3.18), which could be confusing for some users.

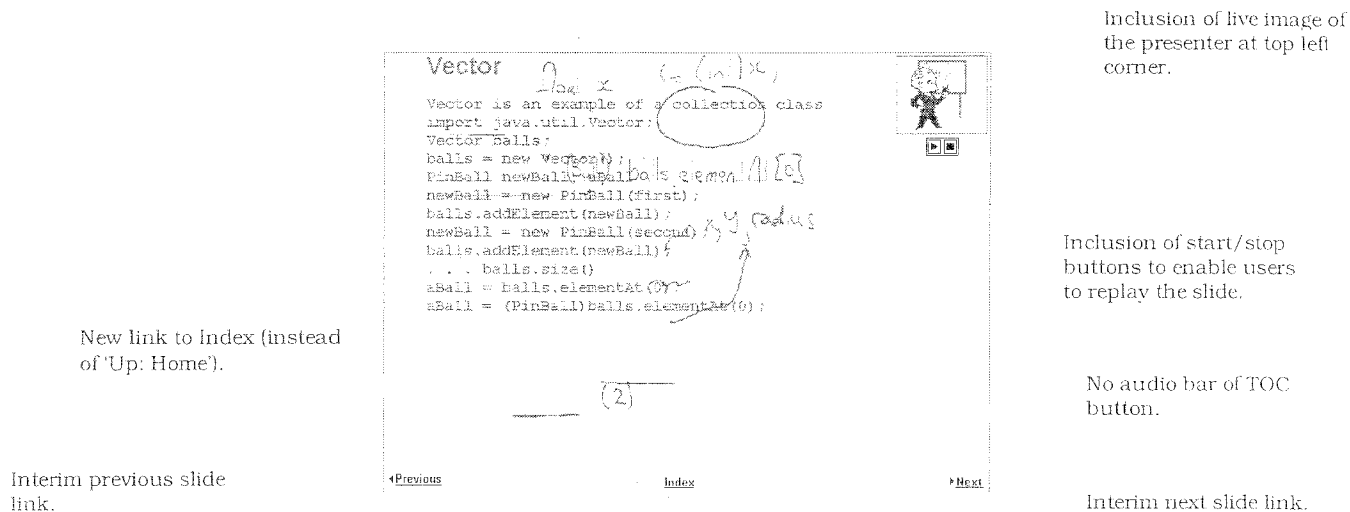


Figure 3.18 An example with Index instead of Table of Contents link.

The group also suggested that a popup menu of slide titles (if a lecture-type presentation) or thumbnails (if a storyboard presentation) might also be a good idea. However, this would need to be researched further.

### 3.3 Summary

We recommended a number of changes in the first report. The changes were to the table of contents slides as well as the presentation slides.

During our discussions it was recognised that the two main uses of LIDS were storyboarding (i.e. starting out with a predominantly blank presentations; additions are made by hand-drawn text on blank screens) and lecture-type presentations (i.e. using a predominantly prepared Powerpoint™ presentation; additions are made by hand-drawn annotations on the Powerpoint™ slides). Thus, for review it was important that each type of use be accounted for.

In this report, we suggested that when setting up a review of a storyboard presentation, that the index be presented with thumbnails. Users should be able to determine the size of the thumbnail images as they are listed on the index slide. Additionally, for storyboard presentations, we suggested the inclusion of thumbnails for the previous and next slide links. We have provided example solutions to these problems in this report.

When setting up a review of a lecture-type presentation, we suggested that the index be presented as a list of slide titles, instead of thumbnails as is currently implemented. The earlier recommendation of including previous and next slide titles with the next and previous slide links was also adopted.

In general, it was decided to have only one index (currently implemented as 'table of contents') slide and that the index should be accessible from each slide in the presentation. It was also decided that it would be a good idea to include an image of the presenter when standing at the screen on every slide, and to also enable 'live' comments by the presenter to be incorporated. We have provided example solutions to these problems in this report.

The representation and presentation of the audio bar has remained a dilemma. Although, we all agreed that the audio bar needs simplifying and better functionality, the solution to the problem remained unclear. Further research and usability studies need to be applied to help solve the issues involved. In the meantime, we agreed that the best solution would be to remove the audio bar—but

not the audio—from the slides. To enable users to replay a particular slide, inclusion of start/stop buttons on every slide were suggested.

## **4. Summary**

This report follows on from an earlier report (titled: Usability Study Report [1/2002], dated: 1 July, 2002) that represented the University of Waikato Usability Laboratory's (Usability Laboratory) analysis of the Large Interactive Display Screen (LIDS) technologies as developed by the LIDS Research Project.

In the first report, we described the organisation, analysis and results of the three LIDS studies (Technology in Use for Teachers and Students, The Interactive Gesture Recognition Tools, and The Shadow Technology) that the Usability Laboratory carried out during the 2001/2002 summer break. We also described the analysis and results of a heuristic evaluation of the LIDS presentation review tool and an observation of the LIDS physical technology in use.

This report discussed the decisions made with regard to the usability problems identified and corresponding design recommendations made within that first report. The recommendations have acted as the basis for a discussion on design and for determining what development and research activities the University of Waikato part of the LIDS Research Project should carry out next with LIDS.

### **4.1 Results of the Design Discussions**

#### **The Presentation Tool**

We recommended a number of changes to the presentation tool in the first report. In terms of the on-screen artefacts, these included changing the pencil image to a simple cross so that less of the screen content was hidden behind the image from the users. In this report, the design resolution for this problem was to enable the users to choose whether to use an on-screen 'cursor' artefact or not. Users could specify this during setup.

In the first report, we also suggested that more functionality should be added and that better support should be provided for users when using the gestures. In this report, a number of additional changes and modifications to the earlier recommendations were suggested. These included placing the navigational buttons on a dockable toolbox, and incorporating a selection function to enable cutting, copying, scaling, moving, pasting, and selection adjustment.

In terms of the on-screen shadow, we recommended only one design change in the first report. That was to improve the quality of the on-screen shadow. It was agreed that the shadow should be improved although more research needs to go into determining how much detail should be shown.

#### **The Presentation Review Tool**

We recommended a number of changes to the presentation review tool in the first report. The changes were to the table of contents slides (now termed 'index' slides) as well as the presentation slides.

During our discussions it was recognised that the two main uses of LIDS were storyboarding (i.e. starting out with a predominantly blank presentations; additions are made by hand-drawn text on blank screens) and lecture-type presentations (i.e. using a predominantly prepared Powerpoint™ presentation; additions are made by hand-drawn annotations on the Powerpoint™ slides). Thus, for review it was important that each type of use be accounted for.

In this report, we suggested that when setting up a review of a storyboard presentation, that the index be presented with thumbnails. Users should be able to determine the size of the thumbnail images listed on the index slide. Additionally, for storyboard-type presentations, we suggested the inclusion of thumbnails for the previous and next slide links. We have provided example graphic solutions to these problems in this report.

We suggested that the index for a lecture presentation be displayed as a list of slide titles, instead of thumbnails as is currently implemented. The earlier recommendation of including previous and next slide titles with the next and previous slide links was also adopted.

In general, it was decided to have only one index (currently implemented as 'table of contents') slide and that the index should be accessible from each slide in the presentation. It was also decided that it would be a good idea to include an image of the presenter when standing at the screen on every slide, and to also enable 'live' comments by the presenter to be incorporated. We have provided example graphic solutions to these problems in this report.

The representation and presentation of the audio bar has remained a dilemma. Although, we all agreed that the audio bar needs simplifying and better functionality, the solution to the problem remained unclear. Further research and usability studies need to be applied to help solve the issues involved. In the meantime, we agreed that the best solution would be to remove the audio bar—but not the audio—from the slides. To enable users to replay a particular slide, inclusion of start/stop buttons on every slide were suggested.

## **4.2 Future Usability Studies**

A number of usability studies or ideas for further research were identified during our discussions. These include:

- Researching the representation and presentation of the audio bar in the presentation review tool.
- Researching various ways of enabling users to identify segments of audio on the audio bar in the presentation review tool.
- Determining the user requirements for the nature and functionality of a training module for gestures.
- Determining the preferred placement of navigational buttons when presenting using LIDS.
- Determining the usability of the incorporation of an area set aside for the drawing of gestures when presenting using LIDS.
- Determining the usability of a popup menu (or similar) of slide titles or thumbnails for easy navigation within the presentation review tool.
- Investigating the requirements for a range of users and the two types of uses (storyboarding and lecture mode) when using LIDS.
- Determining how much shadow detail should be shown on the LIDS screen in a collaborative session.

## **4.3 Summary of the Design Decisions**

### **The Presentation Tool**

*Enable Users to Use an On-Screen Cursor Artefact (Priority: High)*

- Enable users to choose whether to use a 'cursor' during setup time. In this case, the users could be offered the ability to choose from a number of 'cursor' options: none, a cross, a pencil, etc.

*Provide Users with Better Control and Alternatives When Using Gestures (Training module-Priority: Low; Previous and next buttons-Priority: Medium; Specific gesture area-Priority: Low; Undo and redo features-Priority: High)*

- Provide a quick reference tool as a training module, similar to that suggested in the first report, until further research has been performed.
- Provide previous and next buttons for users who are not able to master or who do not want to use the previous or next gestures. These should be placed on the sides of the slides (the left button on the left-hand side, the right button on the right-hand side). The gestures could be depicted on the buttons.
- Provide an area for the drawing of gestures. This should be at the bottom of the screen, and should take up the entire screen width.
- Provide undo and redo functionality as gestures and buttons.

*Make 'Not-Ready' Modes Clearer (Priority: High)*

- The current application depicts the system when not 'ready' with an hour glass. Keep this feature, but increase the size of the hour glass to take up a larger portion of the screen.

*Remove the Delete Gesture and Make the Mimio™ Eraser Functional (Priority:High)*

- Drop the zigzag delete gesture from the gesture tool set.
- Make the software work with the Mimio™ eraser.
- Enable existing and saved material to be removed.

*Add New Editing Features (Priority: High)*

- Provide editing at a pixel, rather than an object.
- For users to edit, they must first enter an edit mode. They can do this by placing the pen on one place on the screen for about one second.
- A selection would be made by the user dragging the pen across the area to be selected. The user completes the selection by lifting the pen from the screen.
- In edit mode, the selection would be highlighted in some way e.g. with handles.
- Once a selection had been made, a popup menu with edit functions would be displayed on the screen near the last place the pen was lifted off the screen. Users would choose the appropriate function from the displayed menu. These functions could also be made available as gestures, as well as buttons on a dockable toolbox.
- The edit functions on the displayed menu should include adjust selection, cut, copy, paste, scale and move.

*Inclusion of Paint Tool-Type Options (Priority: Low)*

- Carry out further research to determine the requirements of the different users and the different types of presentations.

*Prompt Users About Whether They Wish To Finish and Save (Priority: High)*

- Prompt users when they use the current finish and save gesture. The prompt should ask whether the users wish to:
  1. Finish and save.
  2. Finish without saving.
  3. Return without saving.

*Improve the On-Screen Shadow (Priority: Low)*

- Solve the problem of the extraneous shadow was a problem and should be solved.

**The Presentation Review Tool**

*Incorporate the Video of the Presenter within the Review of the Presentation (Priority: Medium)*

- Incorporate a live image of the presenter (a recording of the presenter as he or she works at the screen) as described in the first report.
- Incorporate introductory and summary segments (plus others where required), similar to those used for television news.

*Incorporate Next and Previous Links (Priority: High)*

- *Interim Solution:* Use generic links for both types of presentations could be used.
- Use text-based paged titles for lecture modes. These could easily be derived from titles placed in a title location.
- Use a thumbnail of the relevant page for storyboard-type. The size of the thumbnail should remain constant for all presentations of this type.

*Replace the Audio Bar With a Simplified Version and Incorporate Thumbnails of Slide (Priority: High)*

- *Interim Solution:* Remove the audio bar (but keep the audio) from the slides and incorporate a start/stop button to enable users to replay the slide (although this will mean the whole slide) as they wish.

*Replace Multiple Table of Contents Slides With One Index Slide (Priority: Medium)*

- List lecture-type presentations by the slide titles.
- List storyboard-type presentations by thumbnails. Enable the users to determine the size of the thumbnails while setting up the presentation review so that the table of contents could fit on only one slide. Ensure that the order of the thumbnails is clear to the users.

*Alternative TOC Solution (Priority: High)*

- Replace the current TOC with an Index link. The Index link could be placed between the new previous slide and next slide links.