THE EFFECT OF PRESENTING LONG DOCUMENTS WITH LARGE HIGH-RESOLUTION DISPLAYS ON COMPREHENSION OF CONTENT AND USER EXPERIENCE

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Overview

- Introduction
- Hypotheses
- Experiment
- Results and Discussions
- Design Implications
- Conclusion and Future Work

Introduction

- Introduction
  - Problem
  - Research Questions
  - Large High-Resolution Display
- Hypotheses
- Experiment
- Results and Discussions
- Design Implications
- Conclusion and Future Work

Problem

- Comprehending long documents (e.g., ETDs) :
  - Is time-consuming
  - Requires a massive amount of cognitive resources

- Define 'comprehension' in this study:
  1) Seeing the forest : understand overall content
  2) Seeing the trees: find/re-find/compare/contrast information detail in the content

Research Question 1

- Does viewing all the pages of a long document on an LHRD improve users' overall understanding of the content?

Research Question 2

- Does viewing all the pages of a long document on an LHRD improve users' information finding and comparisons?

Research Question 3

- Does viewing all the pages of a long document on an LHRD provide a better user experience?

Large High-Resolution Displays (LHRD)

Hypotheses

- Introduction
- Hypotheses
  - Hypothesis 1
  - Hypothesis 2
  - Hypothesis 3
  - Hypothesis 4
- Experiment
- Results and Discussions
- Design Implications
- Conclusion and Future Work

Hypothesis 1

- The users of the Gigapixel display will summarize a long document with better quality compared to those in the Single Monitor or Paper on Table groups.

Hypothesis 2

- The participants in the Gigapixel group will find/compare information in a long document faster than those in the Single Monitor or Paper on Table groups.

Hypothesis 3

- The Gigapixel group will answer more accurately in finding/comparing information, when compared to either the Single Monitor or Paper on Table group.

Hypothesis 4

- Participants in the Gigapixel group and Paper on Table group will perceive a higher level of efficiency and effectiveness for using their display medium compared to the Single Monitor group.

Experiment

- Introduction
- Hypotheses
- Experiment
  - Participants
  - Experimental Setting
  - Gigapixel ETD Viewer
  - Tasks and Procedure
- Results and Discussions
- Design Implications
- Conclusion and Future Work

Participants (1/2)

- 12 grad students (5 female, 7 male)
  - 4 people participated in each of 3 settings
- Ages 22-40 years
- Familiarity of resource type:
  - Web pages > conference proceedings > journal articles > theses & dissertations

Participants (2/2)

- Preference for text presentation (1:least - 5:most):
  - Computer screen: 4.25 out of 5
  - Paper: 3.17 out of 5
  - Reasons: digital docs are easier to manage/search/store
- Read texts on computer screens
  - More than 8 hrs/week
- In ETDs, participants were interested in:
  - Specific info (75%)
  - Methodologies (75%), literature reviews (83.3%)
  - Overall topics (50%)

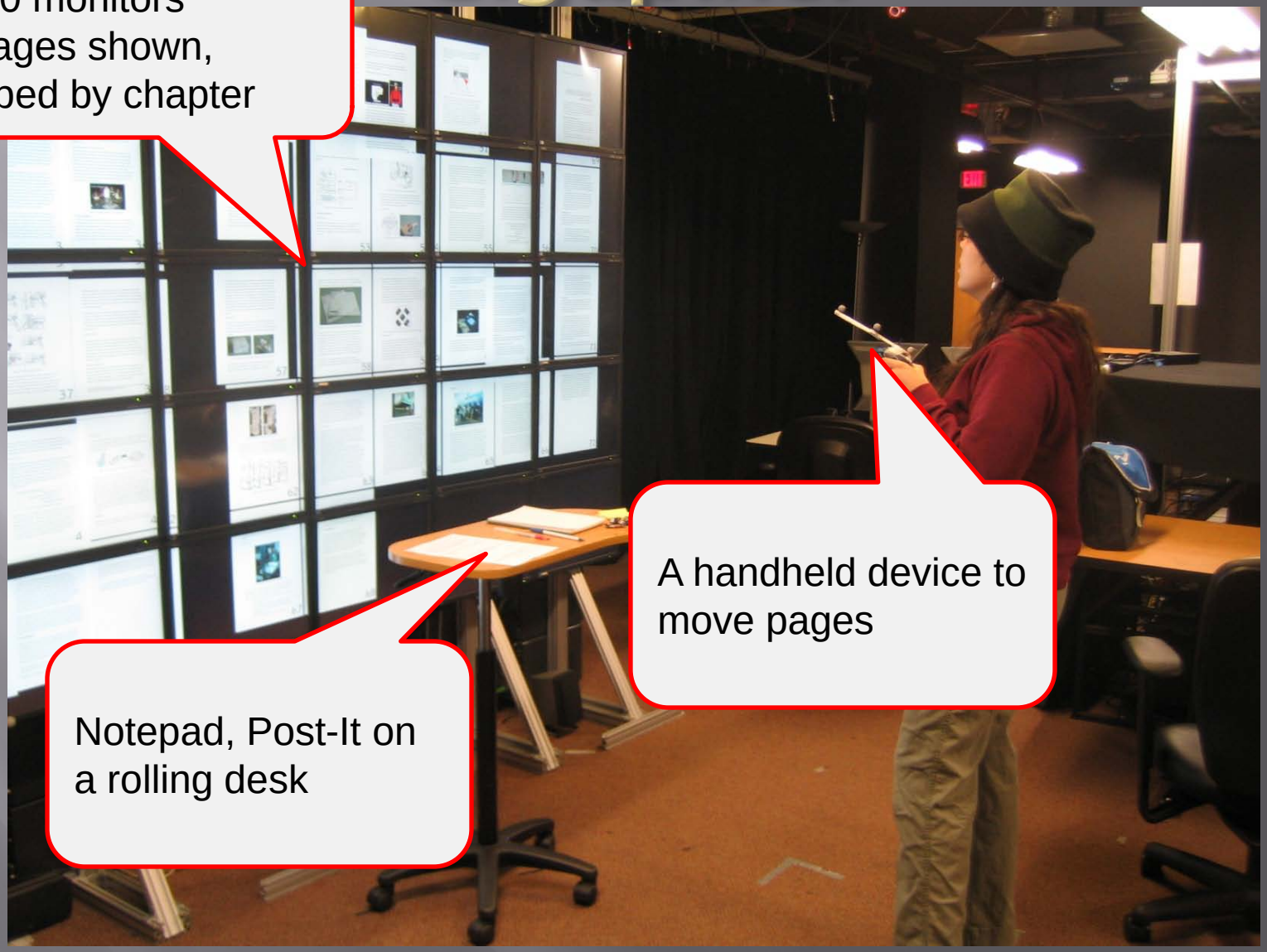
Gigapixel Experiment Video

- Example video

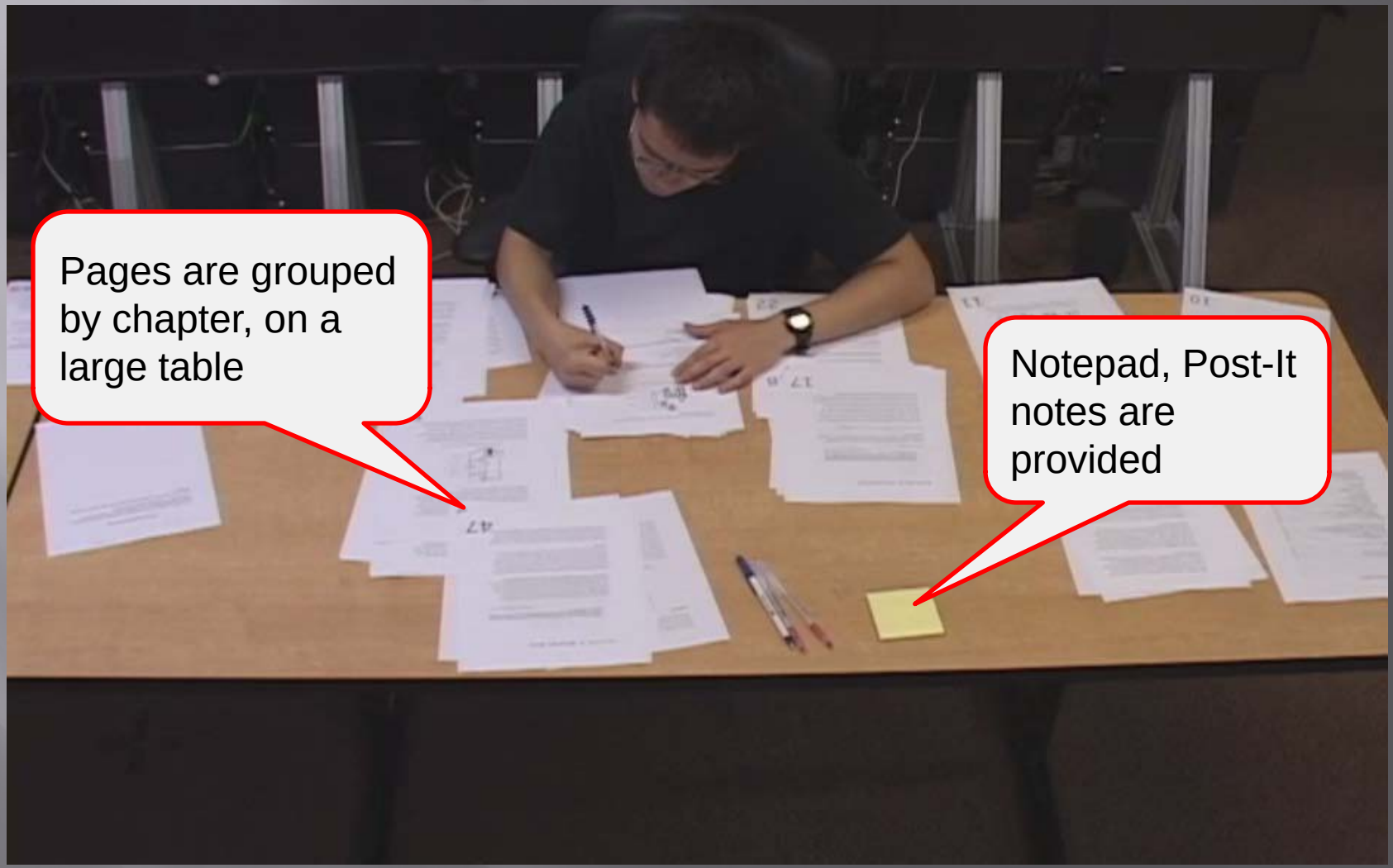
Experimental Setting

- A Master's thesis, "The Design of Active Workspace," was used
  - Approx. 70 pages
  - Easy reading, HCI-related paper
  - Font size of each page enlarged
- 3 Settings
  - Gigapixel
  - Paper on Table
  - Single Monitor

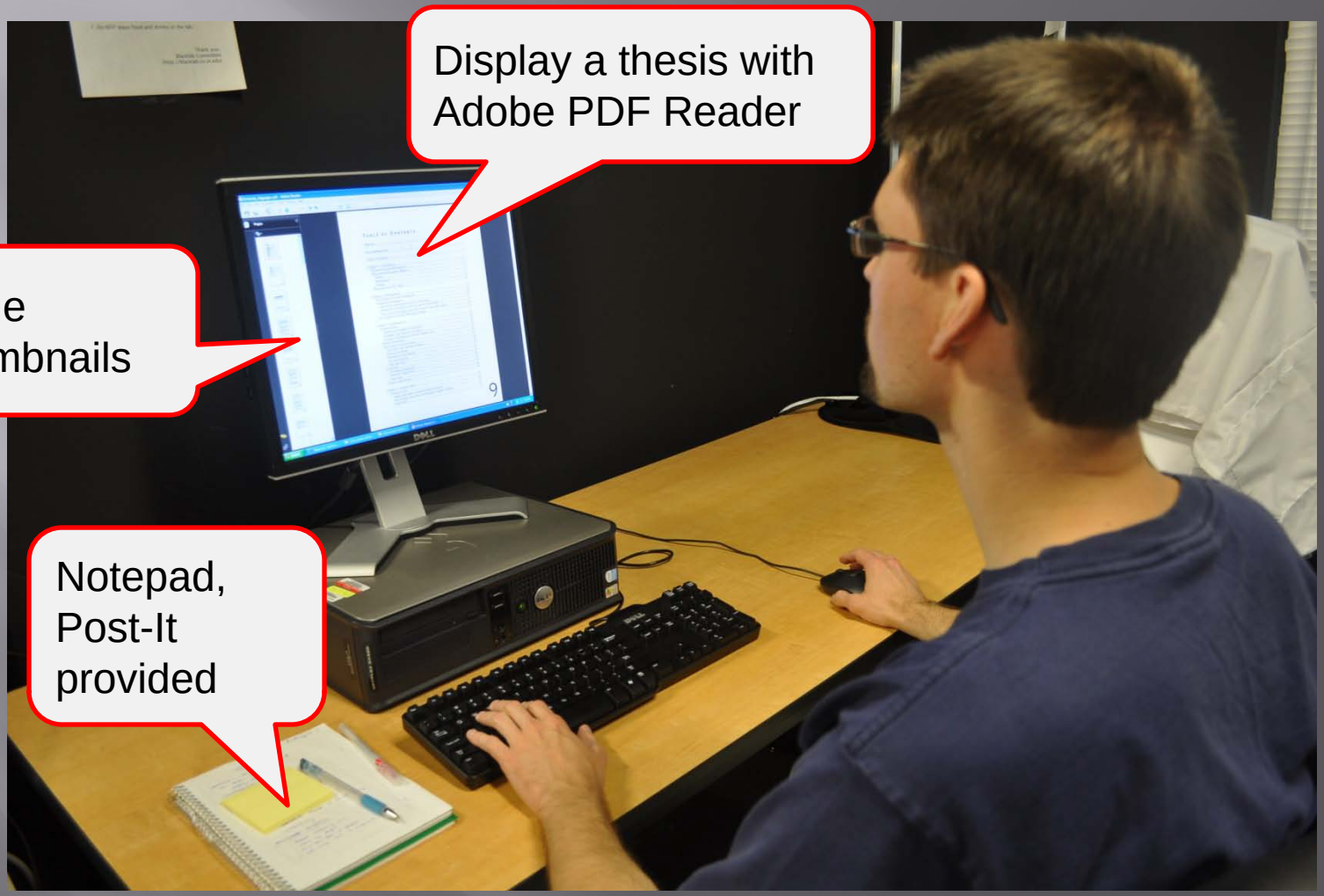
Gigapixel


5 x 10 monitors
All pages shown, grouped by chapter
A handheld device to move pages
Notepad, Post-It on a rolling desk

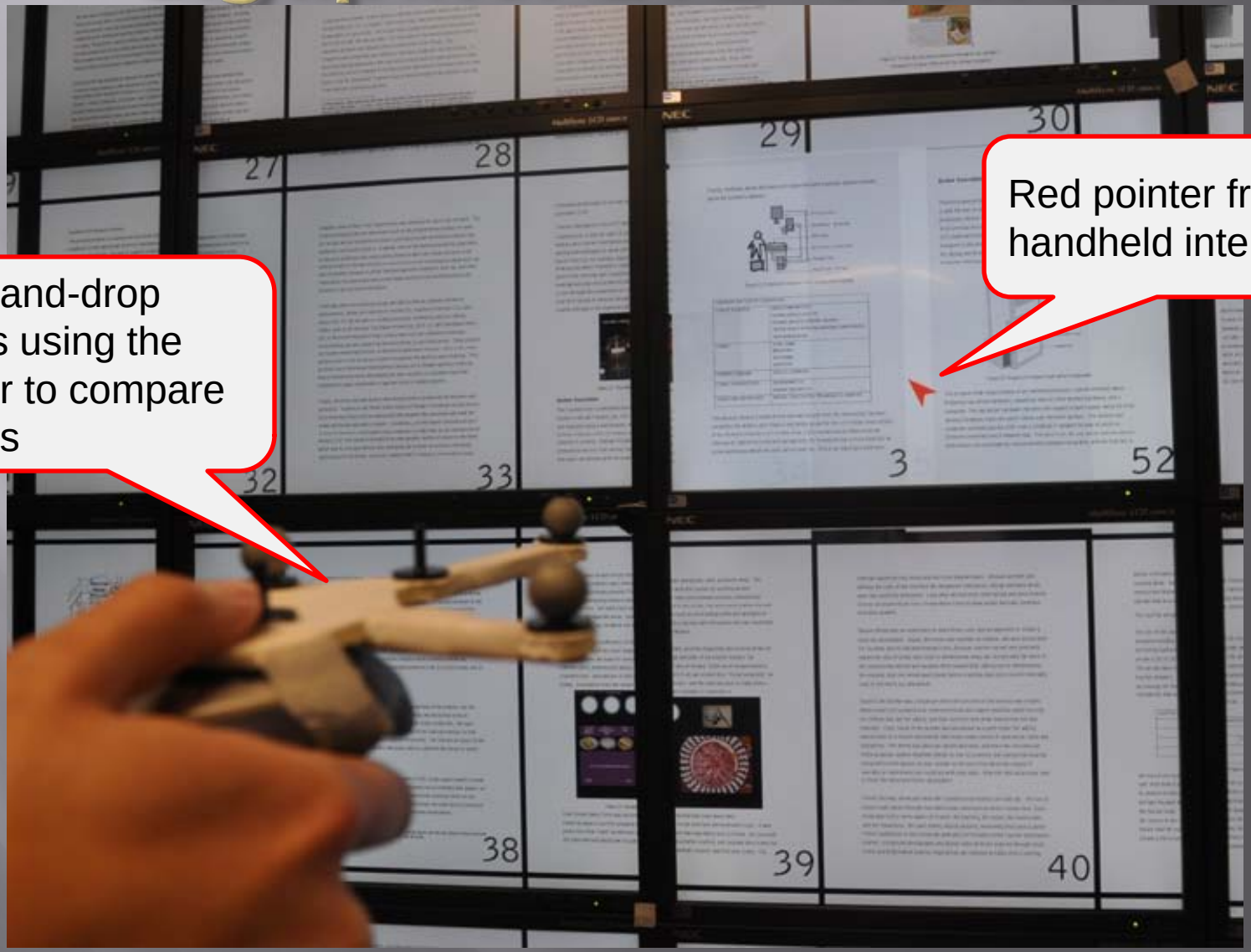
Paper on Table



Single Monitor



Gigapixel ETD Viewer



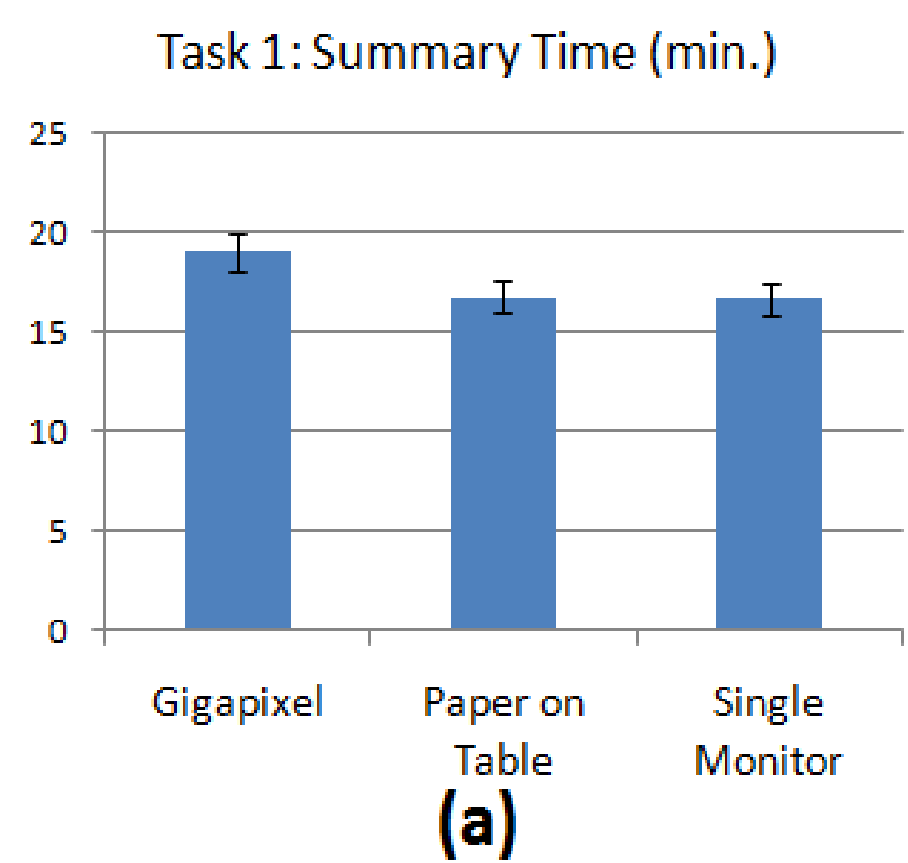
Tasks and Procedure

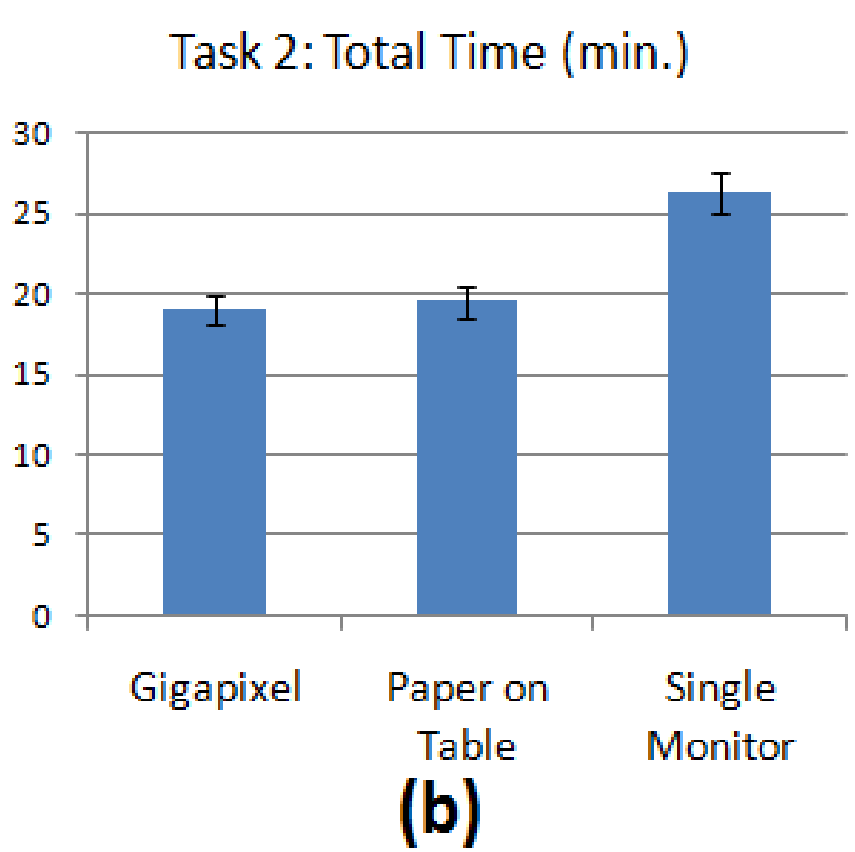
- Participants performed two tasks:
- Task 1 for overall comprehension
  - Read thesis for 30 minutes, move/reorganize pages
  - Write 200-300 word summary
- Task 2 for info finding/comparison (6 questions)
  - Q 1,2: finding specific info
  - Q 3: similarities and differences between systems
  - Q 4: finding info based on another info
  - Q 5,6: comparing figures, figure details

Results and Discussions

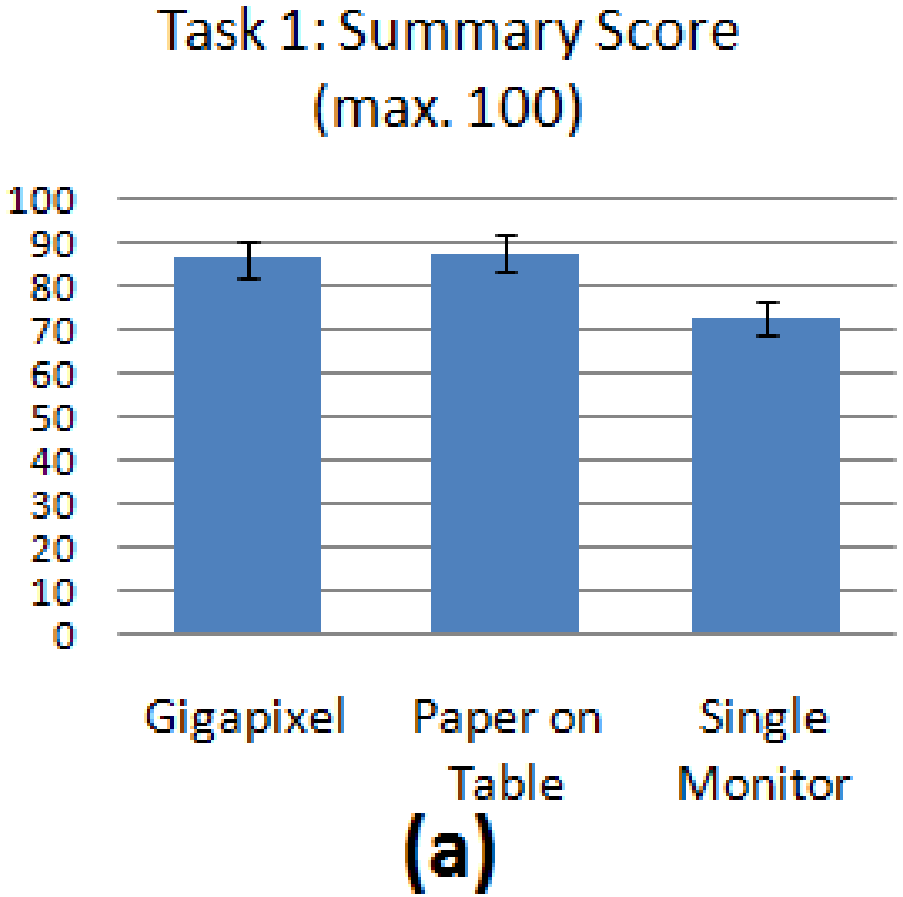
- Introduction
- Hypotheses
- Experiment
- Results and Discussions
  - User Performance
  - User Perception of Efficiency & Effectiveness
  - User Behaviors
- Design Implications
- Conclusion and Future Works

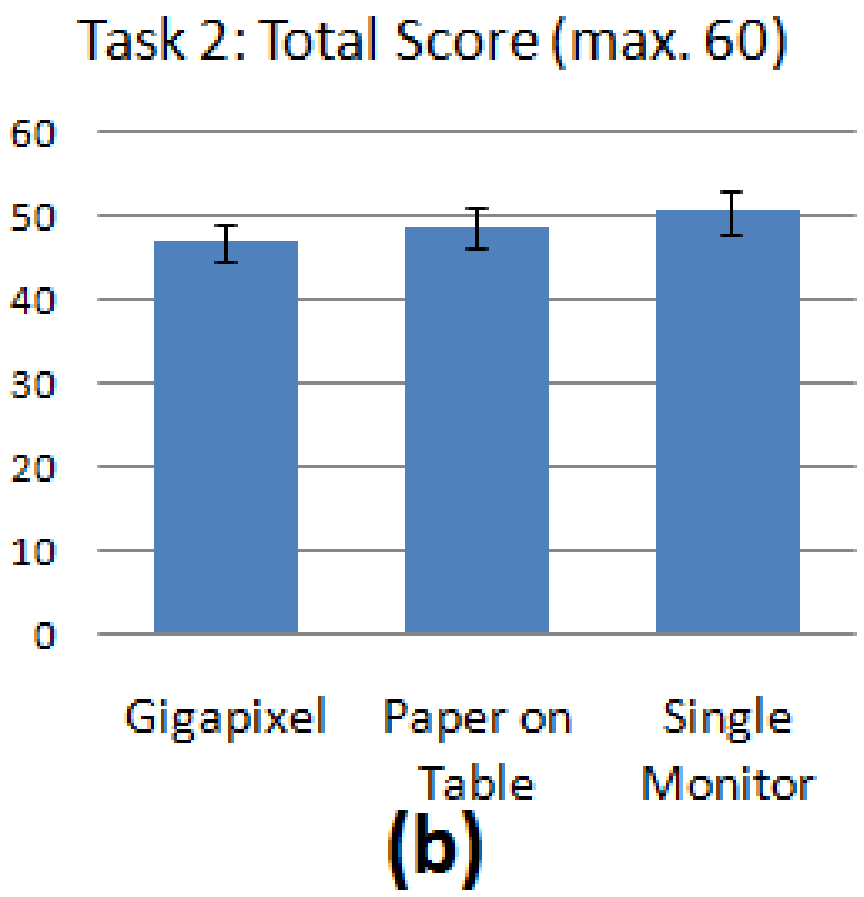
Group Average Time of Task 1&2



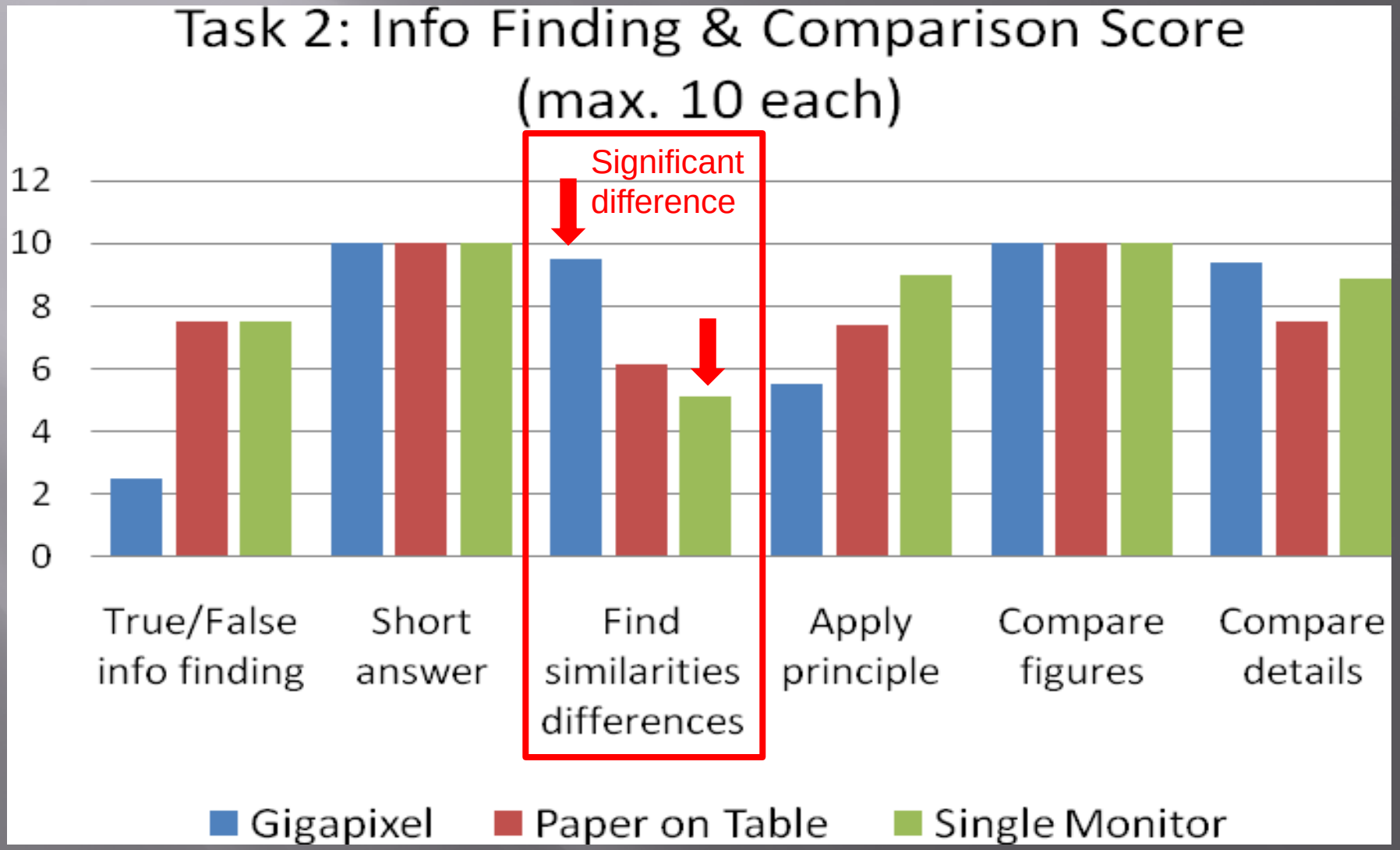


Group Average Score of Task 1&2

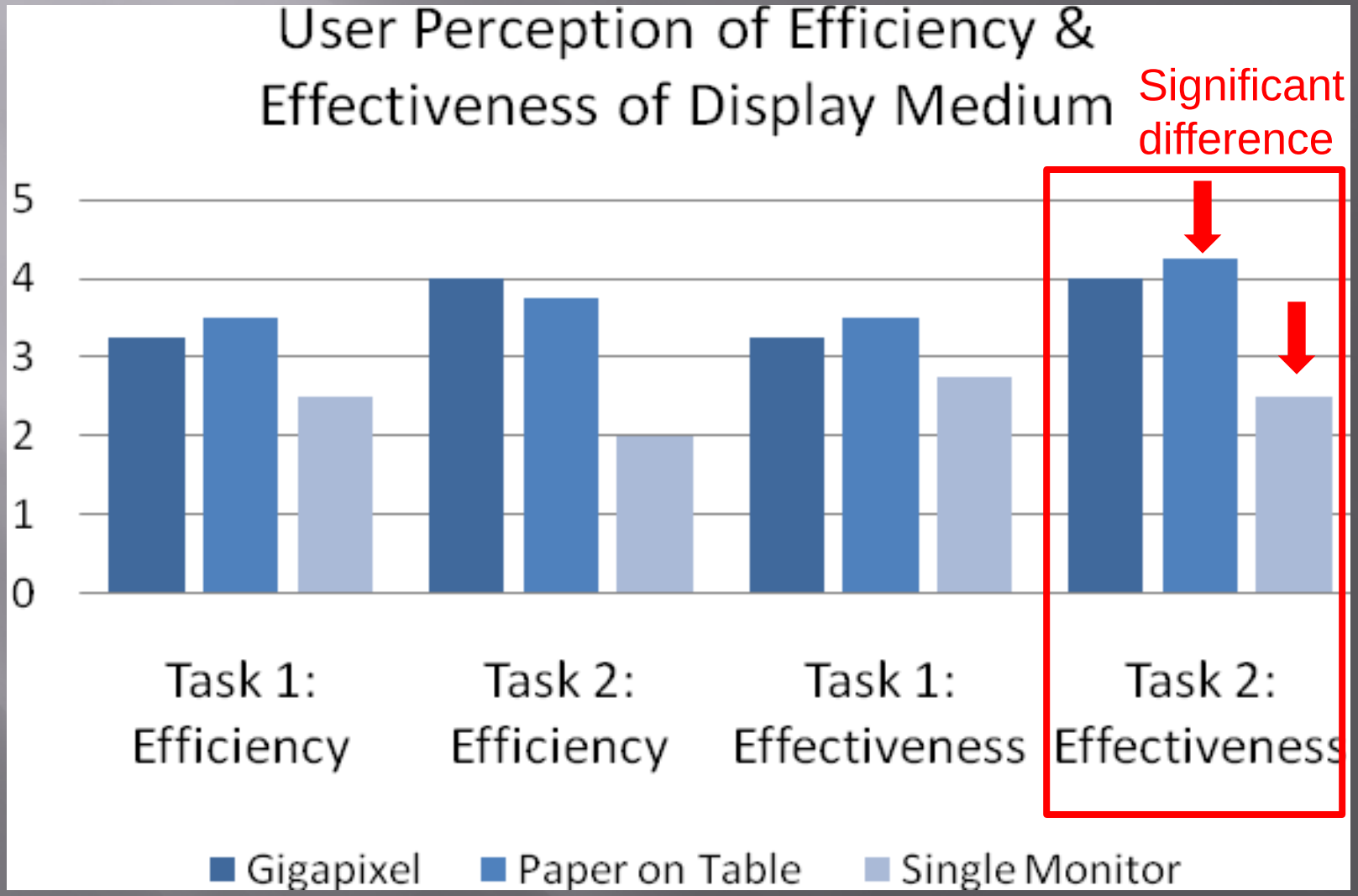




Group Average Score of Questions in Task 2



User Perception of Efficiency & Effectiveness



List of Significant Results

- Group average score for task 2, question 3:
  - Gigapixel group >> Single Monitor group
  - Partially confirming *Hypothesis 3*
- User perception of effectiveness for task 2
  - Paper on Table group >> Single Monitor group
  - Partially confirming *Hypothesis 4*

User Behaviors

Four common behaviors identified from observations and post-questionnaire analysis

1. Physical Navigation
2. Reading and Page Switching Strategies
3. Arrangement of Pages
4. Comparing Pages

Design Implications

- Introduction
- Hypotheses
- Experiment
- Results and Discussions
- Design Implications
  - Additional Features
- Conclusion and Future Works

Additional Features

- Annotation, searching, and highlighting
- Connecting related pages visually
- Changing page size
- Multiple document/reference support
- Supporting different page layouts
- Aligning pages with bezels
- Temporary move

Conclusion and Future Works

- Introduction
- Hypotheses
- Experiment
- Results and Discussions
- Design Implications
- Conclusion and Future Works
  - Summary
  - Future Plans

Summary (1/4)

- Hypotheses 1 and 2 have not been confirmed.

- In general, compared to the other two groups, people in Gigapixel group could
  1. Summarize the document with better quality
  2. Find/compare information faster
- But, we did not find a statistically significant effect.

Summary (2/4)

- Hypotheses 3 have been partially confirmed.
- A significant performance improvement by the Gigapixel group was found:
  - Could answer more accurately only for question 3 in task 2, which is to find similarities and differences of two systems, compared to Single Monitor group.

Summary (3/4)

- Hypotheses 4 have been partially confirmed.

- A significant performance improvement by the Paper on Table group was found:
  - Paper on Table group's perception of their performance effectiveness for task 2 was significantly higher than that of Single Monitor group.
  - But, the perceptions of efficiency for task 1,2 and effectiveness for task 1 were not found to be significant.

Summary (4/4)

- Large field of view and physical navigation helped people recognize the structure of the thesis and quickly navigate it to re-find information.
- Physically navigating to nearby pages is almost instantaneous (eye glance, head rotation); scanning multiple pages or comparing 2 pages is faster.

Future Plans

- Incorporate new features from Design Implications section
- Study collaborative work using Gigapixel
  - E.g., Two people review scholarly publication together on a Gigapixel
- Use many more participants

Thank you!

Questions?