

Usability Issues for E-commerce and E-learning: a Developing Country Perspective

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Complexity of Emergent IS

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Workshop UUCEIS

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Namur, Belgium



Overview

- Introduction
- Usability & Design Principles
- Situation in South Africa (SA)
- E-commerce & E-learning
- Research Results
- Usability Implications
- Conclusions

Introduction

- Significant recent growth in Internet and Web.
- Two key applications are E-commerce and E-learning.
- Usability has become a critical success factor for both these applications.
- SA has a very diverse user population which presents several challenges.
- Aim of paper:
 - Explore current design issues for E-commerce and E-learning.
 - Discuss results of two recent experiments conducted in SA.

Design Principles

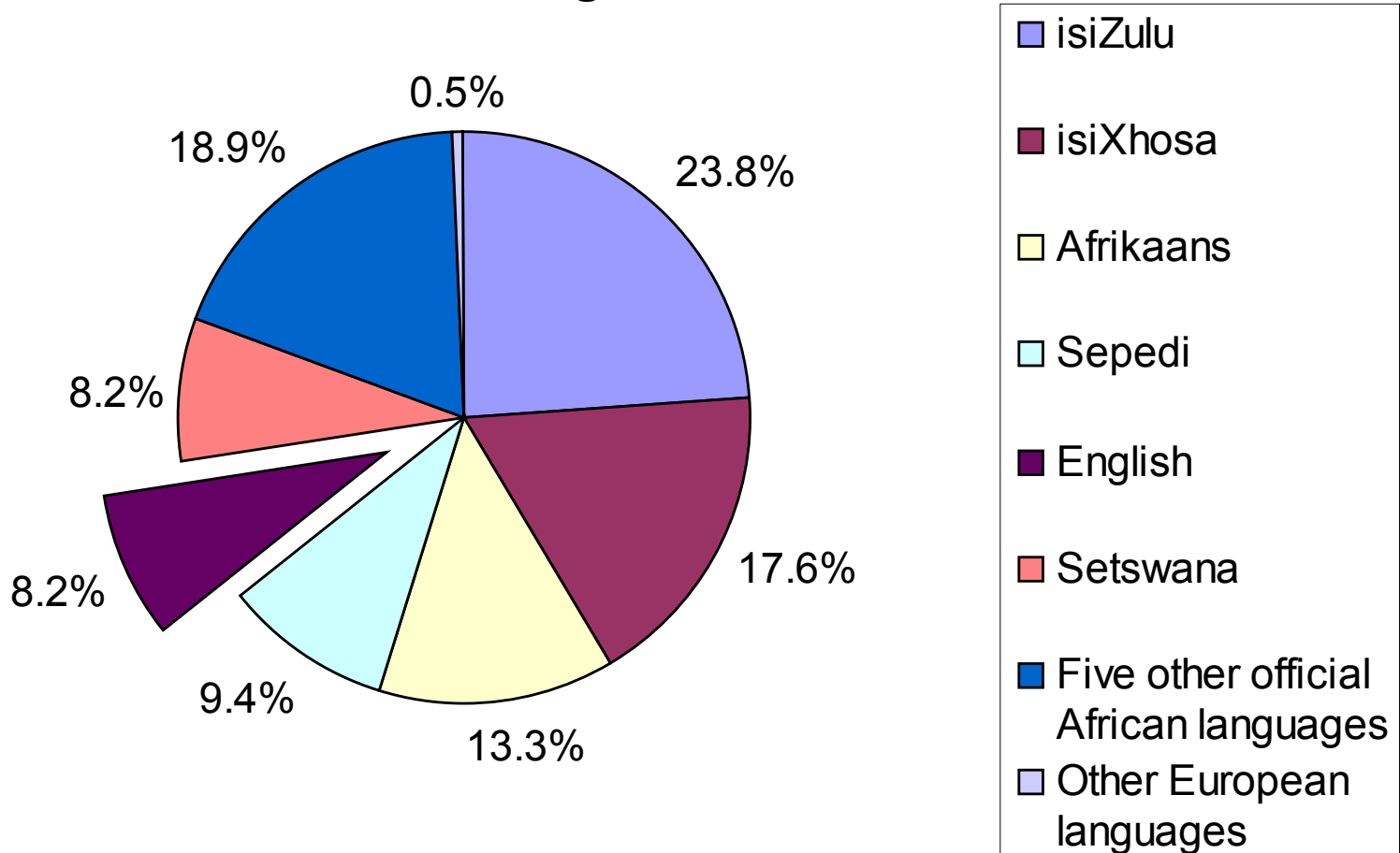
- Definition of usability [ISO9241]:
 - *“The effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments.”*
- Typical *usability goals*:
 - Effectiveness, efficiency, safety, utility, learnability and memorability.
- Usability can be conceptualized in terms of *design principles*.
- *Usability principles* are used mostly for evaluating prototypes or systems.

Usability Heuristics & Design Principles

Usability Heuristics	Web Design Principles
1. Visibility of system status	Interface design , Site design, Page design
2. Match between system and real world	Interface design, Site design, Page design and Editorial style.
3. User control and freedom	Interface design and Site design
4. Consistency and standards	Interface design, Page design and Typography
5. Error prevention	Site design and Page design
6. Recognition rather than recall	Site design (menus and subsites)
7. Flexibility and efficiency of use	Interface design, Site design (search features)
8. Aesthetic and minimalist design	Page design, Web graphics, Typography and Multimedia.
9. Help users recognize, diagnose and recover from errors	Site design (custom server error pages)
10. Help and documentation	Site design (site guides, FAQ pages, contact information and user feedback)

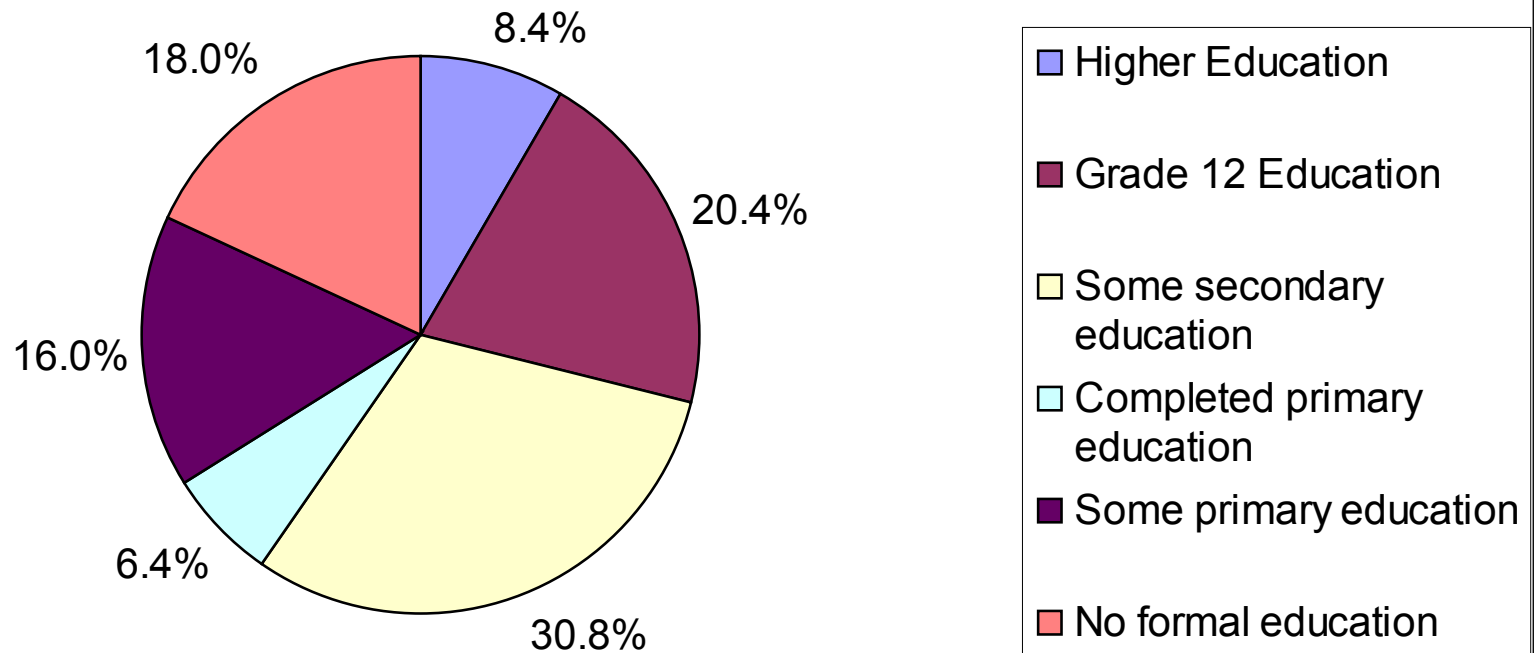
SA Demographics

**Home Language Distribution in South Africa
according to Census 2001**



SA Demographics (contd)

Level of Education Distribution in SA according to Census 2001



SA Demographics (contd)

- Access to a telephone [Census01]:
 - 42%.
- Owned a TV:
 - 53.8%.
- Owned a PC:
 - 8.6%.
 - <2% of African-headed households.
 - 46% of White-headed households.
- Access to the Internet [Goldstuck02]:
 - 2.9 million (1:14).
- Prediction for 2003:
 - 3.1 million.

E-commerce

- Definition of E-commerce:
 - *“All transactions that take place via a communications medium, such as the Internet.”*
- Transactions include buying and selling of products as well as support services.
- First law of E-commerce [Nielsen01]:
 - *“If customers cannot find a product, they cannot buy it!”*
- Several studies have shown that Internet users have serious concerns regarding trust and security.
- Definition of trust:
 - *“Willingness of a party to be vulnerable to actions performed by another party.”*

E-commerce in SA

- E-commerce has grown significantly in SA in last few years:
 - E-commerce revenue doubled in SA in 2001.
 - Kalahari.net increased its sales by 111% in 2001.
 - More than 30% of E-commerce sites that were online in 2001, no longer existed in 2002.
- Predicted that online retail (B2C) would grow by 30-60% in 2003 [Goldstuck02].
- B2B E-commerce revenues in SA exceeded that of B2C for the first time in 2001.
- In 2000, 44% of SA companies did not regard E-commerce as a strategic business imperative.

Some E-commerce Guidelines

A: Category Pages	
A1	Category Pages: Store Home Pages
a	Show what merchandise you sell and don't sell.
b	Beware of over-emphasizing promotional items.
c	The home page should show the purpose of the site.
d	Don't hide the catalogue – enable shopping from the home page.
e	Reveal the product hierarchy.
f	Provide links on the home page to purchasing options, return policy, shipping and delivery information.
A2	Category Pages: Classification Schemes
a	Choose classifications that are useful to your customers.
b	Consider multiple classification schemes.
c	Provide cross-references.
d	Classify items consistently.
e	Don't over-classify.

Research: E-commerce

- Conducted in SA in 2002.
- Item selection – Book:
 - Items most frequently purchased online in SA in 2001 were groceries, books & music.
- Site selection:
 - Sell books & accept credit card as payment.
 - 4 South African sites:
 - Kalahari.net, ExclusiveBooks.com, TheShoppingMatrix.co.za, WordsWorth.co.za.
 - 1 international (American) site:
 - Amazon.com

Questionnaire Design

- Screening questionnaire:
 - Based on work done by Spool et al. [1999]
 - Collected biographical data to enable participant selection.
- Background questionnaire:
 - Biographical data;
 - Internet experience (duration & frequency);
 - Online shopping / banking experience.
- Post-test questionnaire:
 - Site ratings based on tasks (scale of 1–5).
 - Specific questions relating to purchase task.

Participant Selection

- 850 questionnaires were distributed in PE area.
- Response rate: 12,4% (105); only 24 suitable.
- Requirements:
 - Should have used Internet before;
 - 18+ years old;
 - Have a credit card and an interest in reading; and
 - Be willing to give \pm 2 hours of their time.
- Participants were reimbursed R200.

N	Gender		Age				Duration (years)			Frequency (hours)		
	M	F	18-24	25-34	35-49	50+	<1	1-3	3+	<2	2-4	4+
16	8	8	4	6	3	3	3	6	7	8	6	2

Research Design

- Test method:
 - **Goal:** To determine if usability problems exist on selected E-commerce sites.
 - Usability testing conducted in UPE usability laboratory.
- Test Tasks:
 - *Find* specific information on travel books for Canada published after 1999 on each site.
 - *Compare* information across sites.
 - *Purchase* any book from one site.



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- Jewelry & Watches (Beta - [What is this?](#))
- Gourmet Food (Beta - [What is this?](#))
- Sporting Goods (Beta - [What is this?](#))
- Apparel & Accessories
- Office Products
- Toys & Games

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- Video

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Your Shopping Cart

You have [2 items](#) in your Shopping Cart.

Your New Releases



> Sell in Afrikaans!

> Site Map

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> AIRTIME

> BOOKS

- BBC Food
- Boeke
- Business
- Christianity
- Computers
- Fiction
- Harry Potter
- Homegrown
- Kids' Corner
- Learning
- Sexual Wellbeing
- SF & Fantasy
- The Tolkien Room

> CAMERAS

> COMPETITIONS

> COURIER

> DVD / VIDEO

- 24hr-delivery DVDs
- A - Z list of videos
- A - Z list of DVDs
- Kids' DVDs & Videos
- New on DVD

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- Playstation 2
- Playstation
- Gamecube
- Electronic Arts

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1. Return Of The Naked Chef, The (1)
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2. Happy Days With The Naked Chef (1)
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Order by these dates to ensure delivery by 24 Dec!

International Books 2 Dec
Items excl books 10 Dec
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FANATICS

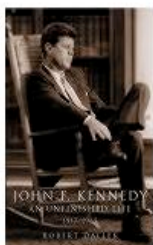
You can now earn full Fanatics points when you purchase on line

Quick Search: ?

Tuesday, 2 December 2003

Welcome to Exclusive Books.Com (Already a customer? [sign in](#). New customer? [register here](#))

► Book of the Week:

**John F Kennedy**

John F Kennedy: An Unfinished Life is the first major single-volume chronicle the life of the former United States President in almost 40 years. Robert Dallek does a masterful job in revealing the all-round personality of this 20th century icon, and the book is packed with revelations. One of the most astonishing disclosures upon opening previously restricted archives by Dallek is that Kennedy was a sickly man, relying heavily on a cocktail of medication that he took unbeknownst to the public at large.

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► Author of the Week:

**Pat Barker**

Pat Barker is one of the most acclaimed writers to emerge from England in the 1980s. Her novels have earned praise for both their spare, direct prose and their depictions of working-class life in the north of England, and she is also the winner of the [Booker Prize](#).

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► Bestsellers:

► Fiction #1:

**The Five People You Meet in Heaven** by [Mitch Alborn](#)

Mitch Alborn's first attempt at novel writing surges to the top of our charts.

► Non-fiction #1:

**It's Not About the Bike** by [Lance Armstrong](#)

After a one week absence, Lance Armstrong makes it back to the top of the chart.

[See them all](#)

► Birding Feature:



Birdwatching is easy, and also a foremost hobby amongst nature lovers. In this feature we present five African field guides and five coffee table bird books that are

► Publishers' Choice 2003:



We've got something for everyone, from cookery to humour, business and current affairs to children's books, and a great selection of biography and fiction. So delve into the [2003 Publisher's Choice](#) catalogue and you're sure to come up with some gems.

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► Tracey Cox visit:



The author of the sexy sensation *Superfirt* will be visiting South Africa in December, so [find out](#) how to meet her

► Paper heavyweights:



Our next entry in the paper heavyweights Hall of Fame is Joseph Conrad's chilling classic [Heart of Darkness](#).

► Journals



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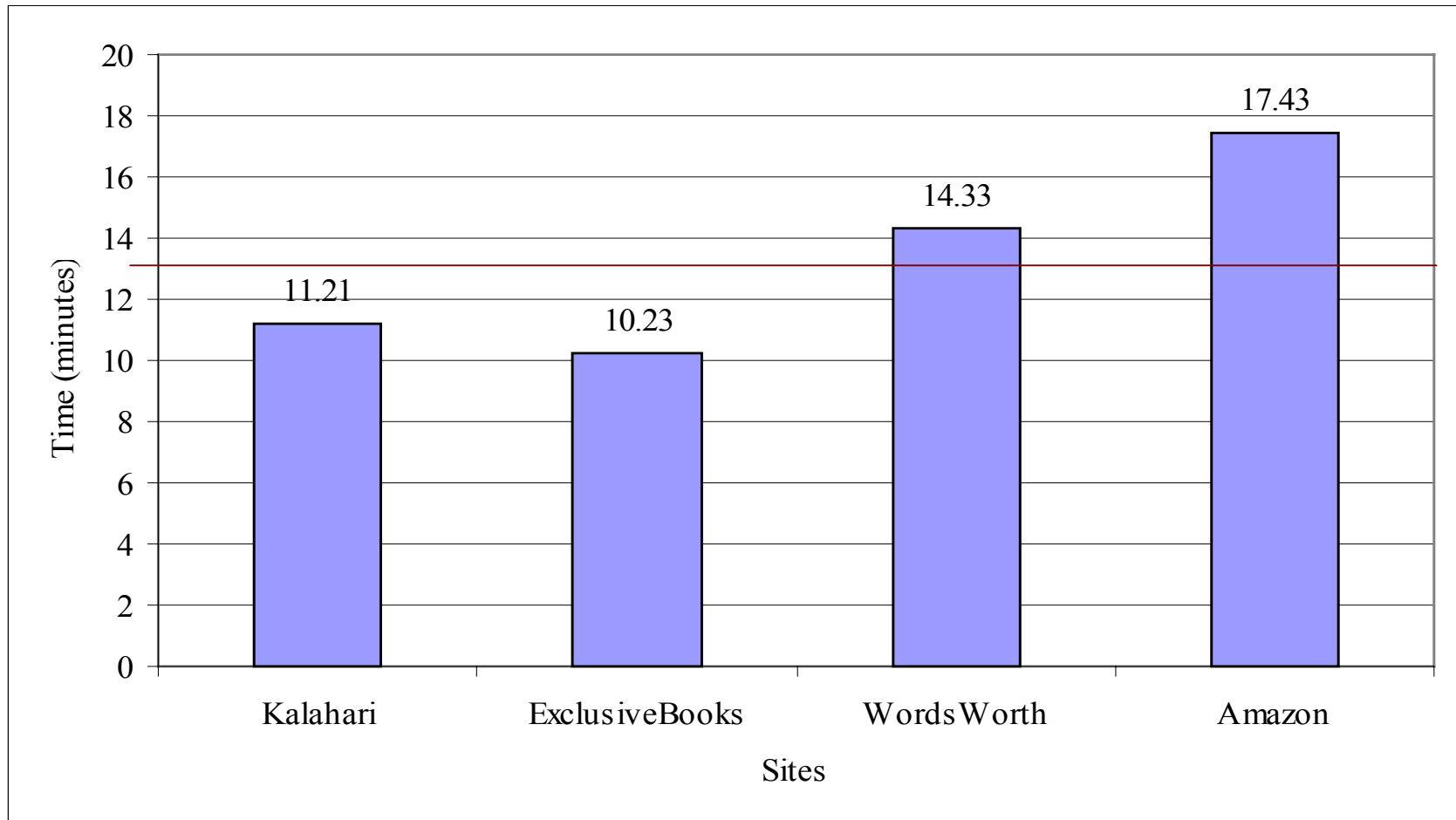
Customer Review Competition
Winner will be picked weekly
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Research Results

- All participants purchased from SA sites:
 - 7 (47%) → Kalahari
 - 3 (20%) → WordsWorth
 - 5 (33%) → ExclusiveBooks
- Significant differences were recorded for individual task times per participant.
- Reasons for not purchasing from Amazon:
 - No currency converter; and
 - Uncertainty about delivery to SA.
- Only one site scored significantly positive with respect to consumer trust:
 - Kalahari

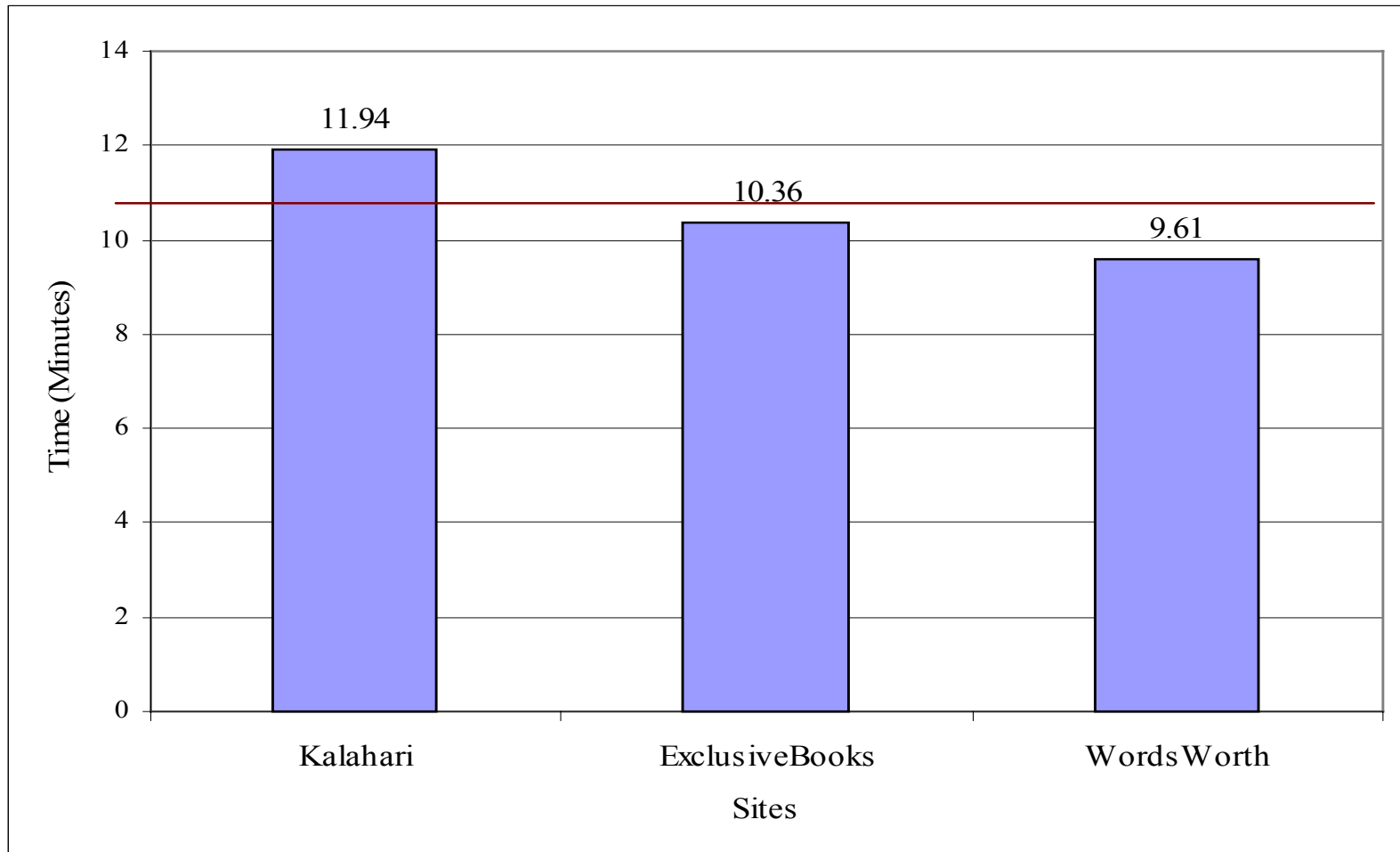
Efficiency: Find task

- ExclusiveBooks most efficient; Amazon least



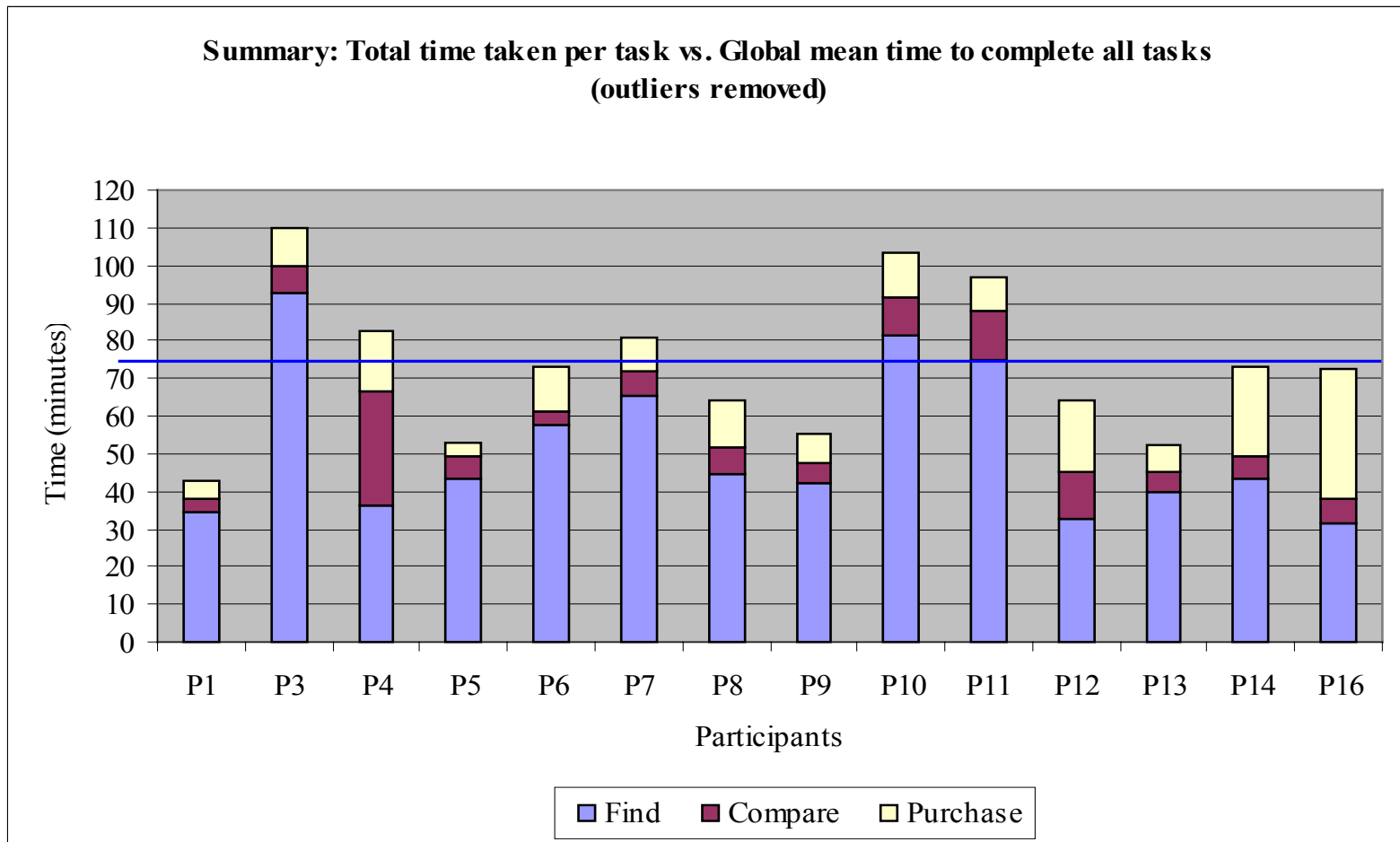
Efficiency: Purchase task

- WordsWorth most efficient; others comparable



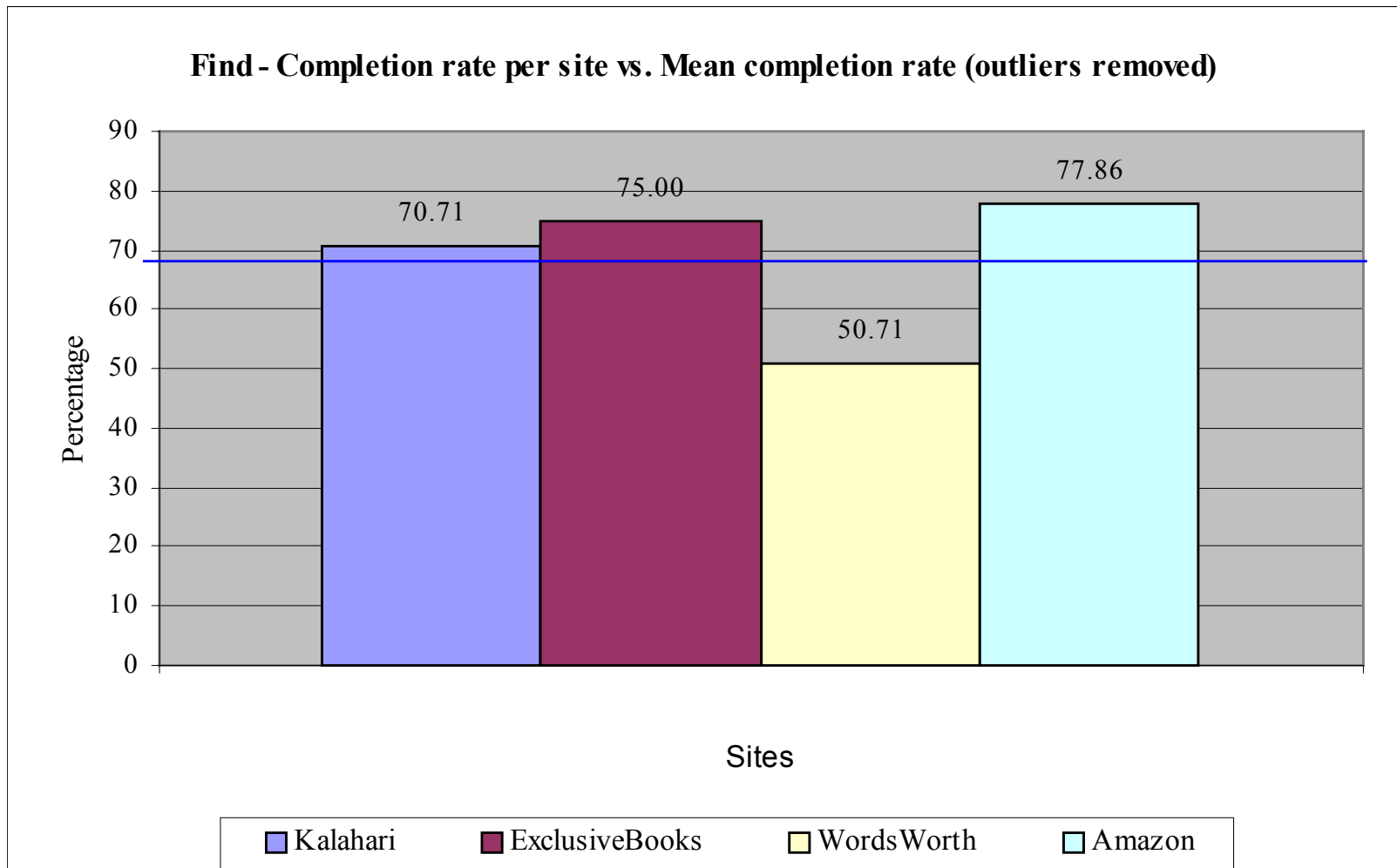
Efficiency: All tasks

- Mean time: 73.14 min
- Max time: 110.19 min
- Min time: 42.56 min



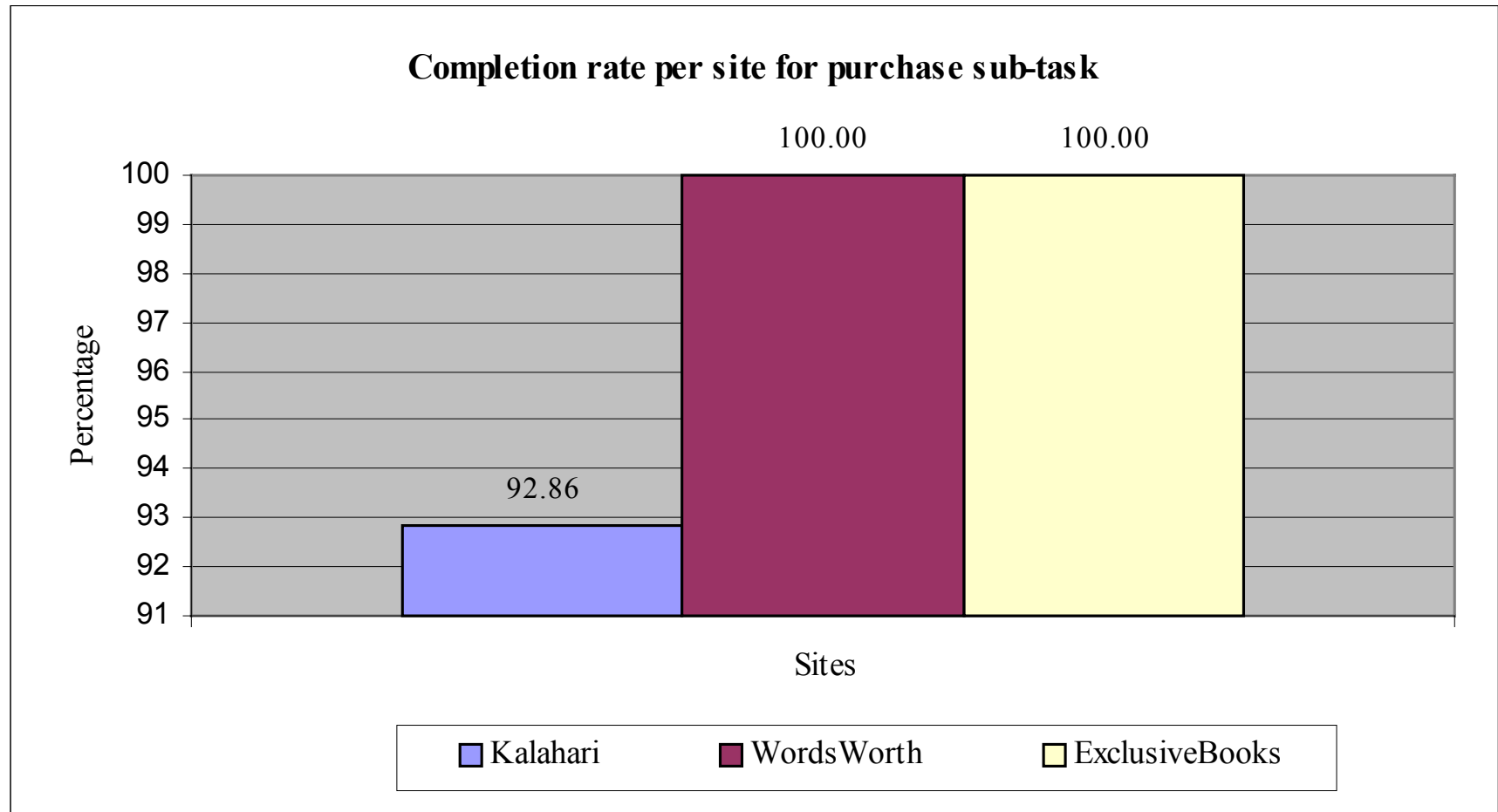
Effectiveness: Find task

- Amazon most effective site; Wordsworth least.



Effectiveness: Purchase Task

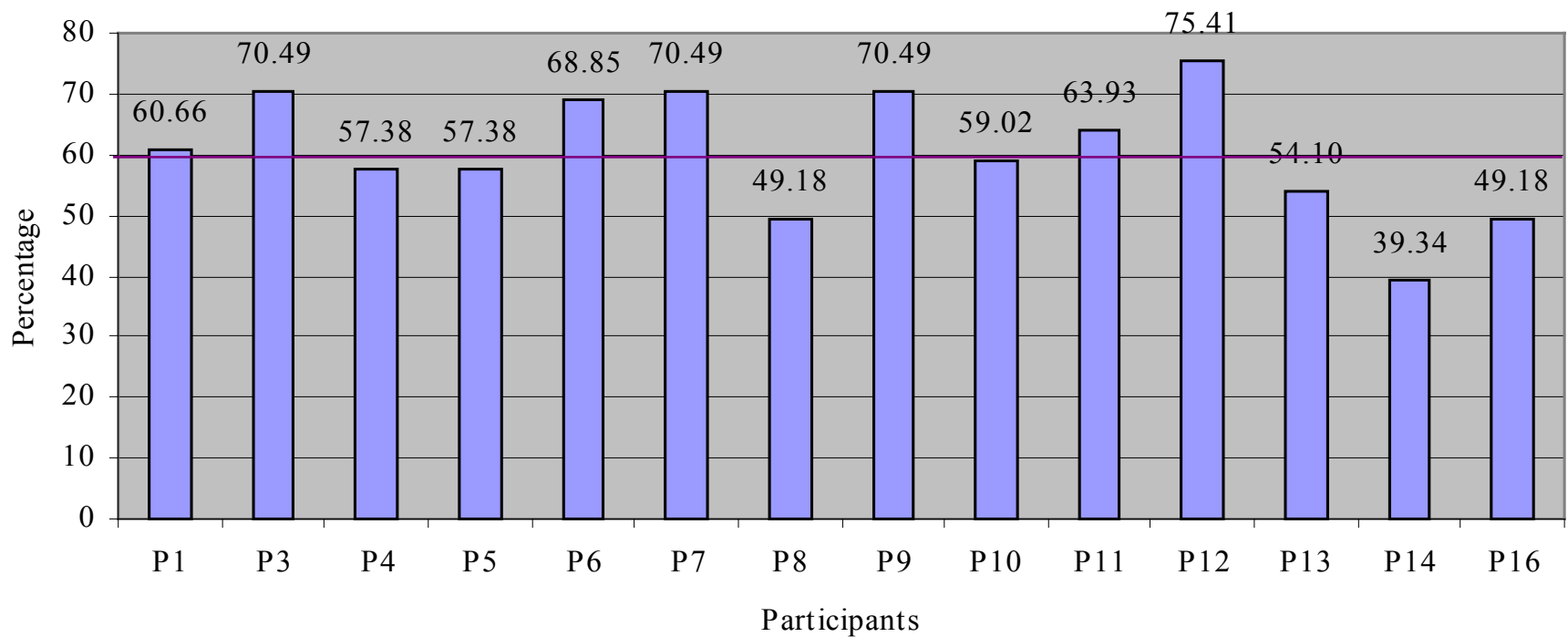
- One participant had insufficient funds



Effectiveness: All Tasks

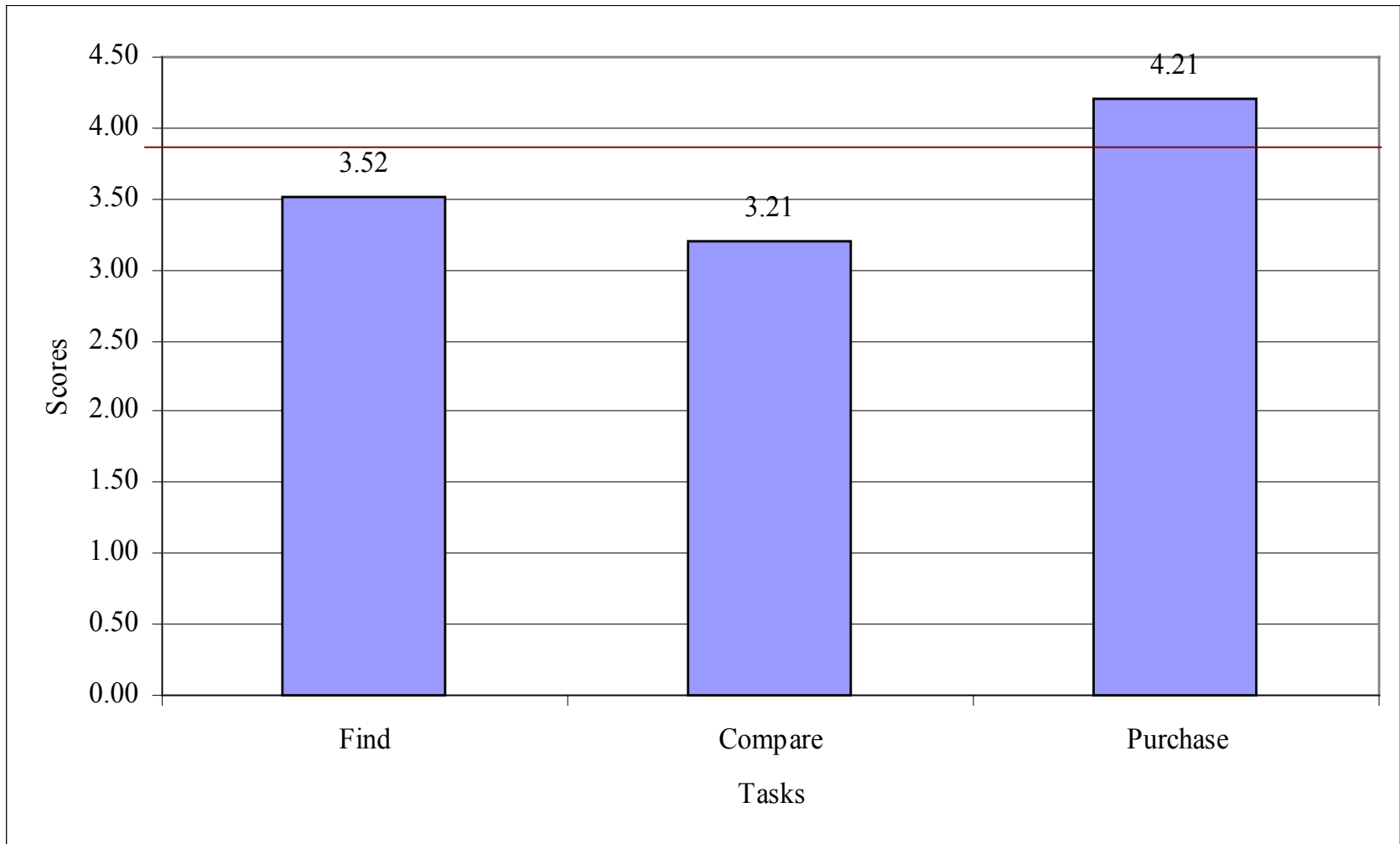
- Mean completion rate: 60%

Summary: Task completion rate (all tasks) across all sites vs. Global mean (outliers removed)



User Satisfaction

- Users were least satisfied with compare task.



Five worst site features

- Supply detailed information on product availability.
- Provide detailed cost information, including shipping and delivery costs.
- Show product reviews.
- Allow customers to reduce number of items displayed using specified criteria.
- Provide enough detail to enable product comparison.

E-learning

- Definition:
 - *“E-learning involves using new mechanisms for communication, including networks, multimedia, content portals and Web-enabled classrooms.”*
- The use of the Web is expected to have more impact on learning than all previous developments in instructional technology.
- E-learning can be used to replace or supplement existing teaching and learning programmes.
- A learning and content management system (LCMS) can be used to support E-learning.
- The usability of the LCMS can have a significant impact on the learning process.

E-learning in SA

- Several HEIs in SA have introduced E-learning:
 - Either to support DE; or
 - As a blended model of teaching/learning.
- Some of these use LCMs such as:
 - WebCT or Blackboard.
- Others have developed their own in-house software:
 - Knowledge Environment for Web-based Learning (KEWL) at UWC (<http://kewl.uwc.ac.za/>).
- 2002 survey of IT departments in SA:
 - Only 67% considered using technology to support learning as more effective than traditional methods.
 - 92% indicated that they used the Web in some way to support their courses.

INFORMATION ^{in²} KNOWLEDGE



bridging the digital divide

technology

knowledge

information

educating the new generation

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OPEN STANDARDS
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Knowledge Environment for Web-based Learning

Username:

Password:



University of the Western Cape

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Forgot your password on the KEWL system? Enter your username in the box below and click the button to have a password emailed to you. *Note that this will generate a new password (Why?).*



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Research: E-learning


- Pilot project launched at UPE in 2001 to determine usefulness of E-learning to support IT education.
- Two courses selected:
 - End-User Computing 1.2 (n=61); and
 - Human-Computer Interaction 4 (n=23).
- Experimental and control groups for EUC group only.
- Just-in-Time Teaching (JITT) methodology.
- WebCT used to create E-learning environment.
- Quantitative and qualitative data collected.

End User Computing - WebCT 3.0.23 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Links

Address http://cs4:8900/SCRIPT/WRU102/scripts/serve_home.pl Go

 MYWEBCT | RESUME COURSE | COURSE MAP | HELP

Content Module: View Designer Options

End User Computing
[Home](#) > [Content Module](#)

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- ▼ 2. **Study guides**
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 - 2.1.1. [Learning Outcomes](#)
 - 2.1.2. [Chapter 5](#)
 - 2.1.3. [Chapter 6](#)
 - 2.1.4. [General Self check](#)
 - 2.1.5. [Study guide 13 - Review](#)
 - 2.2. **Study guide 14**
 - 2.3. **Study guide 15**
 - 2.4. **Study guide 16**

Hide Navigation, Expand Content

Control Panel
 Visible to Designers
 Take Guided Tour
 View Designer Map
 Add Page or Tool
 Manage Files
 Manage Course
 Change Settings
 Content Assistant

Course Menu
 Homepage
e-Learning Hub
 Course Content
 Syllabus
 Calendar

Opening page doc_tree.pl?959112278++START++_side_nav at cs4 ... Local intranet




End User Computing - WebCT 3.0.23 - Microsoft Internet Explorer

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Chapter 5: View Designer Options


End User Computing
[Home](#) > [Content Module](#) > [Chapter 5](#)

Hide Navigation, Expand Content

Control Panel
 Visible to Designers
 Take Guided Tour
 View Designer Map
 Add Page or Tool
 Manage Files
 Manage Course
 Change Settings
 Content Assistant

Course Menu
 Homepage
e-Learning Hub
 Course Content
 Syllabus
 Calendar
 Content Module
 Glossary

ACTION MENU: [Previous](#) [Next](#) [Contents](#) [Retrace](#) [Refresh](#) [Glossary](#) | [Take Notes](#)

 **Chapter 5: Computer Architecture**


These concepts were covered in Study-guide 5 in End User Computing 1.1. Review the notes you made on this section. For those students who did not follow End User Computing 1.1, follow these guidelines when reviewing the material.

A Digital Electronics

Inside the System Unit

While it is not important at this stage for you to be able to identify all the various components of the system unit, it is useful to have an idea of what their functions are. See Figure 5.4.

Content Module: Page 5/11 Local intranet



Data Collection Methods

Data Source	Type of questions
Questionnaire for User Interaction Satisfaction	User satisfaction, Usability problems
Course marks	Impact on performance
Focus group interviews	Impact on learning style, time spent
WebCT	Submissions, marks, time spent
Course evaluation	Course satisfaction

Student Performance

Mean (Control)	Mean (Exp)	T-Value	P-value
-0.158	-0.165	0.348	0.728

Table 1: EUC progress %: (Sem1 – Sem2)

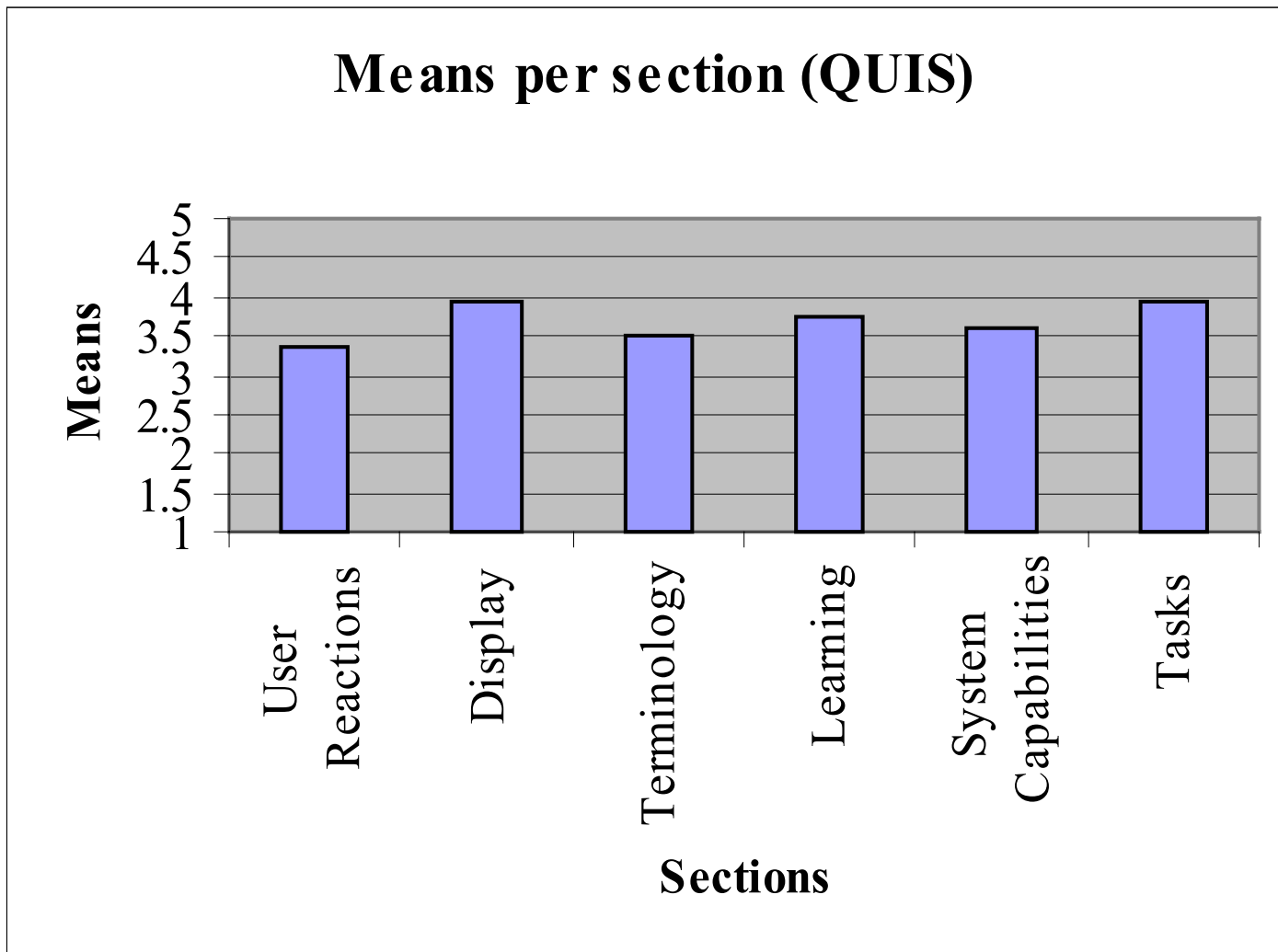
Mean Sem1	Mean Sem2	T-value	P-value
56.6	67.3	-3.839	0.000391

Table 2: HCI marks (Sem1 – Sem 2)

More Results

- Collaboration:
 - Did not increase, due to proximity of students.
- Attendance:
 - EUC students: skipped contact sessions.
 - HCI students: usually attended.
- Learning style:
 - Unchanged.
- Course satisfaction:
 - Positive.
- Student time on course work, preparation level:
 - Different per group.
- Instructor skills and knowledge:
 - No extra knowledge needed.
 - Initially very time intensive.

Satisfaction with WebCT



Worst features of WebCT

- Error messages clarify the problem:
 - Never
- Submitting answers to assignments:
 - Gave problems
- Overall reactions to the system:
 - Dull
 - Inadequate functionality
 - Frustrating

Common Issues

- Several of the usability problems identified were very similar, especially:
 - Poor task support, and
 - Inadequate flexibility.
- Target user population is very similar:
 - Age, gender, language and educational level.
- Reasons identified:
 - Delivery platform (Internet).
 - User profile.
 - Environmental constraints (slow access speed, high cost).

Usability Implications

Usability Heuristics	E-commerce	E-learning
1. Visibility of system status	Need to provide the customer with adequate feedback.	Need to provide the student with adequate feedback.
2. Match between system and real world	Need to supply detailed product information, including cost, availability, delivery charges and product reviews.	Need to enable the student to access content, answer quizzes and upload assignments easily.
5. Error prevention	Required fields and field validation should be used to prevent data entry errors.	
7. Flexibility and efficiency of use	Steps required to purchase products should be as efficient as possible.	Navigation needs to be highly flexible and efficient. Content should be downloadable for offline access.
10. Help and documentation	Provide customer support, FAQs, contact information and order tracking.	Provide communication via email, discussion forums and chat groups.

Conclusions

- Diversity of user population in SA presents many challenges.
- Use of Internet is growing rapidly.
- E-commerce and E-learning are two key web applications.
- Our research highlighted:
 - Importance of usability for both applications.
 - Common design issues: Flexibility and efficiency of use.
 - Trust and security are key factors for E-commerce growth.

Any questions?

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