User Input Devices’ Impact on Virtual Desktop Trainers

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Agenda

• Introduction
• Background
• Methodology
• Results
• Recommendations
Introduction

• Motivation
• The Interface Issue
• Problem Statement
  – “When using a virtual desktop simulation for training, do commercial head tracking devices and game controllers improve training effectiveness?”
Background

• Literature Review
  – Evolution of game controllers
  – Use of Game controllers outside of video games
  – Personnel computers verses console video games
• Virtual Battlespace 2 (VBS2™)
• Sony PlayStation 3 game controller
• Natural Point TrackIR 5
Methodology

• Phases

1. Define the scenario and determine how to measure performance
2. Design and develop the scenario in VBS 2™
3. Design data collection system
4. Conduct simulation interface experiment
   a. Pilot Study
   b. Defense Language Institute (DLI) Study
5. Evaluate results of the simulation interface experiment
Methodology

• Phase 1 - Define the scenario and determine how to measure performance
  – What is important?
  – Move, Shoot, & Communicate
  – Mounted, dismounted, or both?
  – Metrics
    • Time
    • Accuracy
Methodology

• Phase 2 - Design and develop the scenario in VBS 2™
1. Start point
2. Serpentine
3. Battle Position 1
4. Urban Driving
5. Battle Position 2
6. Dismount Point
7. Shoot / No Shoot Lane
8. Ramps and Mazes
9. Small Arms (M4) Range
Methodology

• Phase 3 - Design data collection system
  – Automated Scoring System
    • JAVA Jar application written to capture VBS 2\textsuperscript{TM} DIS data packets over network
    • Time
      – Crossing trigger lines times
      – Target hit times
    • Accuracy
      – Number of rounds fired
  – After Action Review Scoring System
    • Accuracy
      – Running off road, crashing vehicle, falling off ramps
Methodology

• Phase 4a - Conduct Pilot Study
  – 16 MOVES students conducted two session
    • First session with keyboard and mouse
    • Second session with PS3 game controller
    • TrackIR 5 was excluded
  – Lessons learned
    • Fine tuning of surveys, briefs, and evaluation courses
    • Keyboard and game controller function mapping
    • AAR recording and VBS2 Version Control
    • Automated scoring application
Methodology

• Phase 4b - Defense Language Institute Study
  – 53 total participants, 31 for PS3 Study, 22 for TrackIR Study
  – All participants were Army Soldiers (E-1 thru E-6) enrolled in language training at DLI
  – The average age was 24.4
  – 6 of the 53 were female
  – 34 of the 53 (64%) identified themselves as “Gamers”
Results

- Phase 5 - Evaluate results of the simulation interface experiment
  - The PS3 game controller outperformed the standard keyboard and mouse.
  - The PS3 improved overall performance, mounted shooting, dismounted shooting, and shoot house event scores.

![Normalized performance Scores (lower is better)]
t-Test: Paired two sample for Means (Matched)

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<tr>
<th>Event</th>
<th>PS3 Game Controller (Mean)</th>
<th>PS3 Game Control (Variance)</th>
<th>Keyboard and Mouse (Mean)</th>
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Results

• The NaturalPoint TrackIR 5 did not effect training performance.

• Preferences:
  • 56% preferred using the PS3 game controller
  • 54% preferred using the TrackIR 5 head tracker
  • 76% preferred using imagery over maps for navigation.
Methodology - Regression

### ANOVA

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Methodology - Regression

### ANOVA for Years on PC Games

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### ANOVA for Years on CS Games

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Methodology - Regression

Age and Performance Line Fit Plot

ANOVA

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Recommendations

• Commander and BCTC Directors consider adding PS3 game controllers as an additional user input device.
• Commander and BCTC Directors do not consider adding TrackIR 5 as an additional user input device.
Questions?
Results

• Gamer stats
  – 34 of the 53 (64%) identified themselves as “Gamers”
  – The “non gamers” averaged 4.6 years of experience playing video games at 2.1 hours per week
  – The “Gamers” averaged 10.4 years of experience playing PC Games at 8.4 hours per week
  – The “Gamers” averaged 12.2 years of experience playing console video games at 9.7 hours per week
  – Many commented they would play more if not for learning a second language