An Empirical Investigation of Usability Measurement in Canvas Educational Applications: A Case Study at the University of North Texas

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Presenter's Overview

- Ph.D. student at the University of North Texas
- Specializing in Computer Science, HCI
- Focus on the usability of educational smartphone applications
- Current research: Measuring the usability of Canvas and Blackboard mobile applications using Jakob Nielsen's Heuristics.

Outlines

- Introduction
- Background
- Methodology
- Results
- Discussion
- Conclusion

Overview

- The COVID-19 pandemic prompted a rapid evolution in Learning Management Systems (LMS) as they became central to remote education. Canvas is a noteworthy example of how LMS adapted to support both students and instructors during this challenging period.

- Canvas LMS boasts a wide array of features designed to enhance the educational experience. These features cover diverse aspects such as content distribution, assignment management, collaboration tools, and grading systems.

- In the context of LMS, user-friendliness is paramount. Canvas's intuitive user interface and manageable learning curve make it a preferred choice, ensuring that educators and students can use it efficiently.

Overview

- COVID-19 emphasized the critical role of Learning Management Systems (LMS) in sustaining education during crises, with Canvas and similar platforms facilitating course management, content distribution, and assessment in remote learning scenarios.

- Research indicates that Canvas outperforms other educational apps in terms of navigation ease and user-friendly layout. Students using Canvas report higher satisfaction levels, affirming its utility for educators and learners.

- Mobile learning holds great potential, but it comes with unique challenges due to device limitations. Canvas's performance in mobile usability is a key factor for success in modern educational environments.

Mobile Application Usability

- **Usability Models**: Usability in mobile apps is assessed using models such as Shackel's and Nielsen's, with Nielsen's five-attribute framework (Learnability, Memorability, Errors, Efficiency, Satisfaction) gaining recognition for its user-centric approach.

- **ISO's Usability Definition**: ISO defines usability as the extent to which users can achieve specific goals accurately, efficiently, and with satisfaction in each context, guiding usability studies to enhance software products and user understanding.

- **Complex Usability Challenges**: Usability in mobile applications is multifaceted, involving numerous factors impacting user engagement and learning, thus demanding comprehensive perspectives and models to improve user experiences.

Jakob Nielsen's Heuristics:

- Visibility of system status
- Match between the system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation.

Education Apps Usability

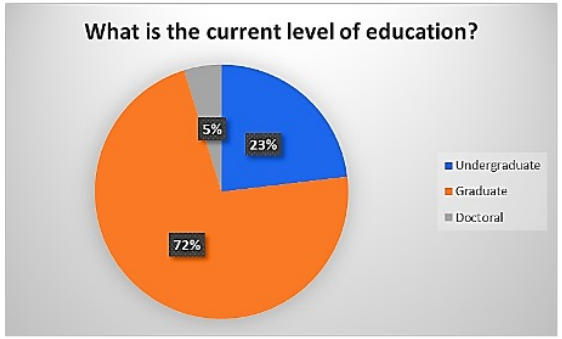
- **Educational App Research**: Various academic studies assess the effectiveness of educational applications, concentrating on how app functionality and design influence student learning outcomes.

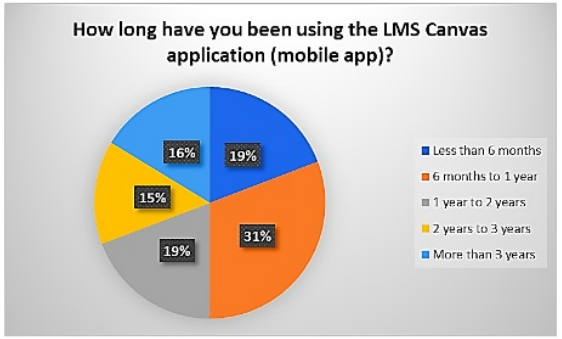
- **Mobile Learning Flexibility**: Mobile learning breaks free from traditional spatial and temporal constraints, offering pedagogical engagement across diverse settings and times. Key factors include user interface quality, ease of navigation, and personalized learning approaches affecting engagement and motivation.

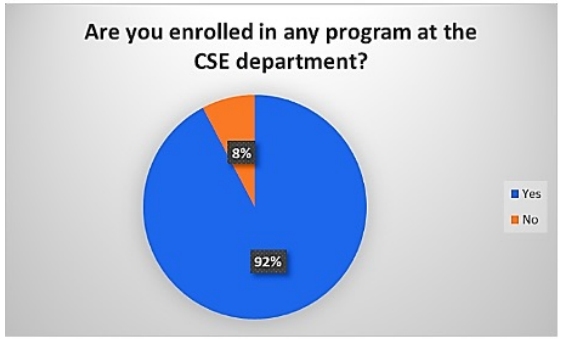
- **Enhancing Educational App Usability**: Developing educational apps requires a holistic approach that integrates design, functionality, and personalization attributes to elevate usability and the quality of the student learning experience.

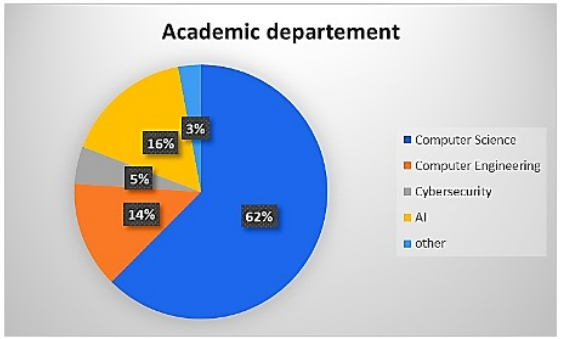
Information Background and General Challenge

- **Demographic Insights**: Table 1 shows that most Canvas users are Graduate students at 72.1%, with Undergraduates at 23.1% and Doctoral students at 4.8%.
- **App Usage Duration**: Canvas mobile app usage duration is evenly distributed, with 30.8% using it for 6 months to 1 year and 19.2% for 1 to 2 years, suggesting moderate familiarity. Fewer long-term users could affect interpretation.
- **Department Diversity**: In the Computer Science Engineering (CSE) department, 92.3% of respondents are in various programs, with Computer Science (62.5%) as the dominant department. Representation from other departments highlights Canvas's adaptability.









Reliability and Validity Analysis

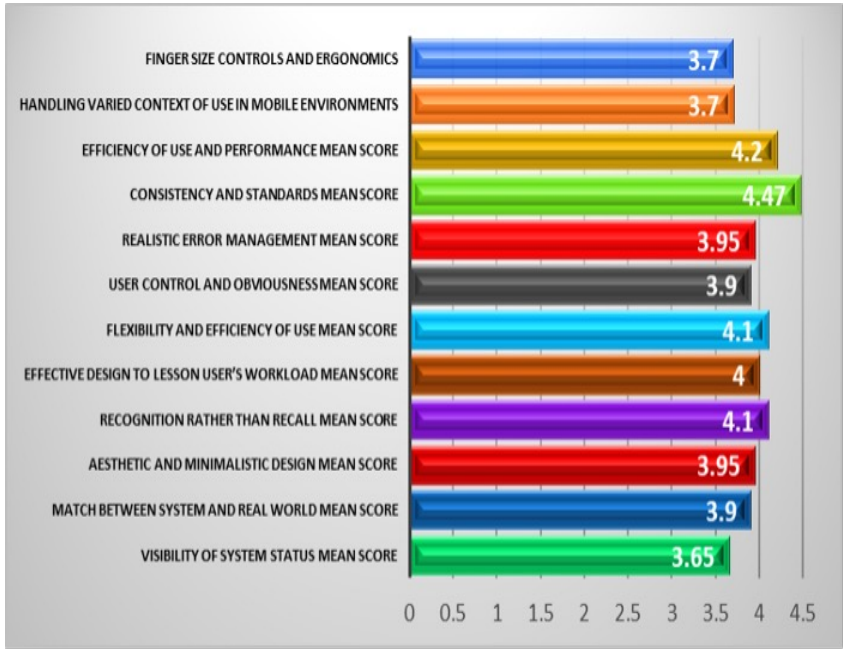
- **Cronbach Alpha Levels**: Table 2 displays Cronbach alpha levels for Canvas user study variables. High alpha values, e.g., Visibility of System Status (0.920) and User Control and Intuitiveness (0.911), indicate robust reliability and interconnection of these aspects.

- **Reliability Assurance**: Some variables exhibit lower Cronbach's alpha values, e.g., Recognition Over Recall (0.737), but still imply reasonable reliability. Overall scale reliability is high (0.958), ensuring the questionnaire's excellent reliability.

- **Validity Analysis**: All items demonstrated significant positive correlations with their respective scales, validating the factors' construct and their importance in Canvas user assessment.

Results

- **User Agreement on Visibility**: Canvas users indicate a positive sentiment towards "Visibility of System Status," with high agreement on clearly indicated icons (M=4.36) and menus for deselection (M=4.11), leading to a high overall mean score of 4.23.
- **Alignment Between System and Real World**: Users find that selected colors align with common expectations (M=4.22) and function keys are distinctly labeled (M=4.06), resulting in a high overall mean score of 4.14.
- **Aesthetic and Minimalistic Design**: Users appreciate brief, familiar, and descriptive field labels (M=4.32) and bold design elements for distinguishing icons (M=4.32), leading to a high overall mean score of 4.32.

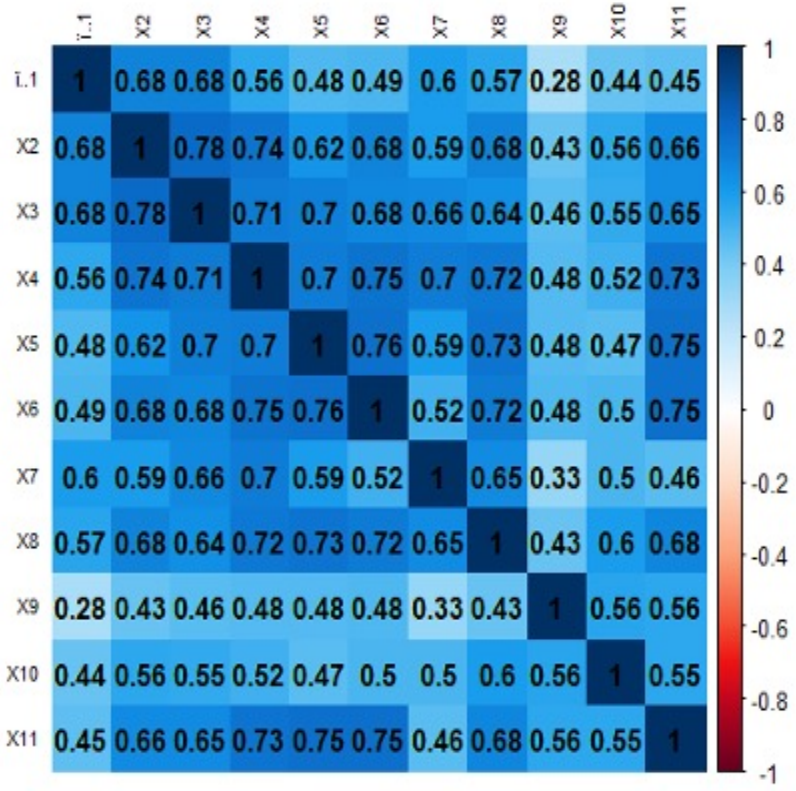


Results - Descriptive Statistics Analysis

- **Recognition Rather than Recall**: Users recognize the presence of mapping between controls and actions (M=4.19) and appreciate good color and brightness contrast (M=4.32), resulting in a high overall mean score of 4.26.
- **Effective Design to Lessen User's Workload**: Users agree that a simple design reduces cognitive load (M=4.40) and find feedback and error messages helpful (M=4.27), with a high overall mean score of 4.34.
- **Flexibility and Efficiency of Use**: Canvas supports both beginner and expert users (M=4.34) but receives slightly lower agreement on "find next" and "find previous" shortcuts (M=3.99), resulting in a high overall mean score of 4.16.

Findings

- **Positive User Sentiment**: The results demonstrate a generally positive perception of Canvas among users. High agreement levels across various usability factors, such as visibility, alignment with the real world, and effective design, indicate a user-friendly experience.
- **Efficiency and Workload Reduction**: Users appreciate Canvas's efficient design, which lessens cognitive workload and streamlines tasks. The positive reception of flexibility and efficiency suggests the platform's suitability for users.
- **Opportunities for Improvement**: While Canvas performs well in various usability aspects, there are areas where user agreement is slightly lower, such as the recognition of certain shortcuts.



Conclusions

- **Construct Validity Confirmed**: The validity analysis of Canvas user division factors was conducted using Pearson correlation, affirming construct validity. All items exhibited a strong positive correlation with their respective scales, demonstrating their competence in representing the factors.

- **Actionable Insights**: The findings provide actionable insights for enhancing Canvas's usability and addressing specific areas of improvement. Users perceive the platform positively, with notable strengths in efficiency and user-friendliness.

- **Comparative Examinations**: These results pave the way for further comparative studies between Canvas and other LMS applications, such as Blackboard, to gain a deeper understanding of user experiences and preferences.

Recommendations for Future Work

- **Comparative Research**: Explore user perceptions and usability in Canvas vs. other LMS software.
- **Longitudinal Studies**: Track changes in user experiences over time for evolving usability features.
- **Tailoring Departments**: Customize Canvas features to address specific department needs and continuously collect and integrate user feedback for usability improvement.

Any Questions..??