User Experience of iCAL4LA: A Helpful Interactive Computer Assisted Learning Courseware for Low Achieving Children

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INTRODUCTION
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Children with learning difficulties especially from the lower level of primary school require specific attention from the early stage of their education. Recent report of primary school assessment test and PISA, which highlighted the higher percentage of low achievement begin in the early primary school level. Incompetency in literacy and numeracy as one of factors for low achievement in academic performance. Could affect the basic learning skill. Helpful features is expected to enhance user learnability and usability in manipulating the content especially for children with learning difficulties. CAL offers a beneficial assistance to all learners within their learning environment with various approaches in satisfying the requirement of learning process.
LA CHILDREN LEARNING REQUIREMENT

- Helpful learning assistance
- Contains specific features of instruction and interaction in exploring the learning content.
- Interactive CAL

AIM OF STUDY

To proposes interactive computer assisted learning for low achieving children (iCAL4LA) known as “iCAL4LA - Bijak Matematik” by emphasizing on positive interaction that cultivate the helpful aspect of user experience.
Low achievers, underachievers, and low academic achievement represent those who do not perform based on their academic assessment and evaluation.

Children require special attention and different learning approach.

User experience focuses on the consequence of users’ perception in interacting with any product, system, service or object such as interactive software.

It occurs based on the consequences of the behaviour in the interaction process between users and interactive products.

Users are supported with assistance features that facilitate their activities in using any product.

In order to evaluate whether the developed product such as interactive software is beneficial to the users or not, it is important to measure its helpfulness.
Methodology

Stage 1
Design
- Determine components and elements
- Design storyboard

Stage 2
Development
Prototyping

Stage 3
Testing
Pilot testing
User experience testing for helpful aspect
Analysis and Finding
## Stage 1: Determine Component and Elements of Bijak Matematik and Design Storyboard

### General Design
- **Interface layout**
  - Consistent screen area for data display
  - Minimal memory load for users
  - Design for full screen without scrolling
  - Avoid multiple screen segments for learning content

- **Typography**
  - Use consistent font style
  - Use sans serif type face
  - Use not more than two different sizes

- **Color**
  - Use colors with special intention
  - Provide text & background with good color contrast
  - Include adequate type of colors for each screen

### Multimedia Design
- **Text**
  - Avoid the use of text highlighting
  - Avoid animated & decorative text for instructions
  - Use specific limit number of texts
  - Text placement at easy-to-find area
  - Use of capital and small letters appropriately.

- **Graphics**
  - Provide clear graphics
  - Provide attractive graphics
  - Use graphics with specific intention

- **Video**
  - Avoid crawling captions in video presentation
  - Background audio or music is unnecessary
  - Users have full control over execution of the video
  - Ample video content length

- **Animation**
  - Use animation to highlight important concepts
  - Provide suitable timing for animation
  - Include audio narrations for animation
  - Use simple animation representation
  - Single direction of text and graphic transition

- **Audio**
  - Audio must be clear but not too loud
  - Avoid overlapping audio
  - Provide a short pleasing audio
  - Use cheerful voice over intonation
  - Use friendly narrator’s voice

### Navigational Design
- **Navigation Structure**
  - Choose hybrid navigation structure
  - Provide consistent navigation layout
  - Simplify navigation structure
  - Provide easy to access navigational panel

- **Navigation Tool**
  - Provide graphical navigation button
  - Provide suitable text as an alternative
  - Use similar graphical button for similar function
  - Follow interaction cues principles for navigation tool
  - Use familiar graphics for buttons and icons

- **Navigation Instruction**
  - Pronunciation of the instruction must clear
  - Provide a synchronize instruction using graphics
  - Provide short and precise explicit instructions
  - Use familiar language and terms

### Object Interaction Design
- **Interaction Manipulation Behavior**
  - Strive for consistency for similar behavior
  - Provide explicit cues for interactive objects
  - Provide text in button for mouse over interaction
  - Provide only single click for object selection
  - Provide alternatives for interactive action
  - Avoid use of double clicks for interactivity actions
  - Disable right click for mouse interaction
  - Provide sufficient active area for click/drop

- **Feedback**
  - Provide easy to understand interaction’s feedbacks
  - Provide alert using visual and audio effects
  - Provide positive effects as interaction complement
  - Avoid use provocative elements of feedbacks
  - Minimize modal feedbacks

- **Cue/Hint**
  - Provide short audio cues
  - Enlarge button/icon size
  - Change button/icon color
  - Change button/icon graphics
  - Change button/icon shape
  - Insert graphical interaction cues
  - Consider fun feature character

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## Result

- Stage 1: Determine Component and Elements of Bijak Matematik and Design Storyboard
Stage 2: The Prototype of iCAL4LA-Bijak Matematik

**Interface layout** – The learning information is displayed at the consistent screen area using plain green color. Full screen working area with only a single segment is provided at a time.

**Theme** – An alluring metaphor theme with an eye-catching scenery of clean field is applied without other unnecessary decorative elements.

**Typography** – The text is formatted using a regular sans serif font face, the Comic Sans. The font size is provided in a similar size for each area of content and consistent for the whole scenes.

**Color** – Soft colors are used to represent the scenery theme. Information displayed is in plain green, metaphor of a blackboard in traditional classrooms. The contrast text color with the background is applied. The types of color is chosen within the same group to minimize the number of colors.

**Navigation structure** – The navigation is simplified by presenting limited number of menu item and easy to access menu panel.

**Navigation tool** – Menu item is represented using screenshot of related module and buttons are designed with familiar graphics that represent the function. Text menu replaces the graphics menu or button when the mouse rolls over. Each menu item is embedded with interaction cues. No voice over instruction is presented for menu or button to avoid audio overlapping that could distract the LA children.

**Navigation instruction** – Step-by-step instruction is given for menu and lesson navigation. Instruction is short and precise. The voice of Cikgu One is presented for the navigation instruction to maintain the familiarity.

**User control** – Video is provided with navigation control to stop, play and resume the content. LA children have full control to: i) exit from the application at any time, ii) replay the content using replay button or iii) learn any example at their own preference.

**Interaction behavior** – Only apply single click with drag-drop interaction in the activity module. LA children are given a sufficient area to accomplish the drag-drop interaction.

**Cues** – Audio and graphical cues are applied for mouse hover/move interaction. Cues apply graphics and navigation tool principles. Button size and color changed alert LA children for clickable object.

**Feedback** – Audio and visual effect is provided to alert the occurrence of mouse interaction. Only familiar responses are embedded in order to ease LA children’s understanding.
Stage 3: User Experience of iCAL4LA

Participants
- 30 subjects for 5 primary schools

Instruments
- Two versions of Q-iCalH, designed for:
  (i) facilitator who conduct the testing
  (ii) LA children who answer the questionnaires.

Actual testing
- Actual user experience testing in five sessions
This study proposed iCAL4LA-Bijak Matematik as an alternative digital learning material to empowering basic mathematical skill among the low achievers in primary school.

The iCAL4LA-Bijak Matematik that has been designed using suitable components, elements and principles that cater five main segments, which are general design, navigational design, multimedia design and object interaction design.

The design principles focus on the positive interaction learning approach that specifically extracted for LA children, which emphasize the on the helpful aspect of user experience.

The applicability of these features have been supported by specifying in the interaction concept of CAL and provide cueing concept in considering the helpful aspect of iCAL4LA-Bijak Matematik.

The inclusion of this feature in the “object interaction design” and “navigational design” of design segment amplifies the overall design guideline in designing the user interface and interaction, as they are crucial elements for a CAL
THANK YOU

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