Localized Iterative Design for Language Learning in Underdeveloped Regions: The PACE Framework

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Paper Overview

- Aim – explore game-like language learning on cell phones
- PACE Framework
- Design and Implementation
- Experiences in Usability and Learning
- Questions

"Language divide"

- Originally motivated by concerns about a "digital divide"
- 90% of the indigenous web content in India is in English
- Desire among low income population to improve command of a "world language"
- Fluency opens outsourced job opportunities, access to govt. health and legal services

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Challenges with English as a Second Language (ESL) learning

- Irregular school attendance
- Disinterest – perceived opportunity costs, lack of benefits
- Local ESL teachers

Image: CIA World Factbook

Computer-assisted (cell phone) learning interventions

- "... how can we co-design applications with community partners that meet their local language learning needs, without incurring content development costs that are beyond the budgets of community development projects?"

- Accurate understanding of user's baseline education
- Take into account limited computing experience
- Stakeholders and designers may not share common cultural backgrounds

Iterative design

- Step 1 : Field studies (July 2004-05)
  - Interaction with rural school children
  - Assess usability problems
  - Personas of the children, everyday life scenarios
- Step 2 : Design based on PACE framework
  - PACE process streamlines the cost of repurposing existing learning resources for new audiences
  - Review curriculum
  - Design modifications based on user study results

- **Pattern**

Pattern name: Written Word->Semantics Association

Problem: vocabulary building, word recognition

Solution:

Suppose X=4:

1. Displays a word and also displays its meaning pictorially. As an optional step, the meaning of the word can also be conveyed orally and/or textually in the learner's native language

2. Repeat step 1 for X-1 more times

Receptive Phase

3. Displays one of the X words that was previously displayed during steps 1-2

4. Presents the learner with at least X pictures to choose from, and provide learner with feedback on whether or not his choice was correct or incorrect

Activation Phase

5. Repeat steps 3 and 4 for X-1 more times

To reduce level of difficulty:

- read aloud the word in step 3 to the learner, so as to help him learn to decode it

To increase level of difficulty:

- steps 1 and 2 can be omitted
- X can take on a higher value
- the sequence of the X pictures presented in step 4 can be randomized each time step 4 is repeated
- limit amount of time learner is given in step 4
- replace the word in step 1 with a phrase or sentence

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PACE

- Activity

Image removed due to copyright restrictions.

Four-step sequence of cell phone screen photos, demonstrating the "Written Word → Semantics Association" design pattern. See Fig.2 in Kam, M. et al. (2007) "Localized iterative design for language learning in underdeveloped regions: the PACE framework."

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Design and Implementation

- Patterns
  - Balance of listening, reading, speaking, writing skills
  - Derived from common ESL teaching methods

- Activities
  - Prototyped on the .NET CF platform, high end phones
  - Aimed at facilitating user-interface learnability
  - Avoid overwhelming the player with too much material at once
  - Situated in fantasy settings

Cultural context driven activity

Image removed due to copyright restrictions.

Two-step sequence of cell phone screen photos, demonstrating the "phoneme → grapheme association" design pattern. See Fig. 3 in Kam, M. et al. (2007) "Localized iterative design for language learning in underdeveloped regions: the PACE framework."

- Player was assumed to have learned an item only if she was tested on it until she was correct thrice

Design and Implementation

- Curriculum & Exercise
  - culturally appropriate words
  - covered English alphabet, numbers, dates & times, social situations, shopping, traveling
  - Hindi voiceovers

  Feedback

  Word-picture matching not always effective in practice

  Using the native language to teach a second language is a controversial point among language instructors

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User Studies : Usability and Learning

- Overall very engaging
- Initial problems using the joystick button
- Modified based on suggestions from NGO partner/ native informant
- Games were appealing until the atmosphere became competitive

Challenges with localization

- Not easy to think of graphics that intuitively conveyed what their corresponding words meant (particularly in the local context)

- The team quickly incorporated changes based on feedback during testing

- How quickly can children in an underdeveloped region who have never used cell phones learn to use them?

Hole-in-the-Wall Project
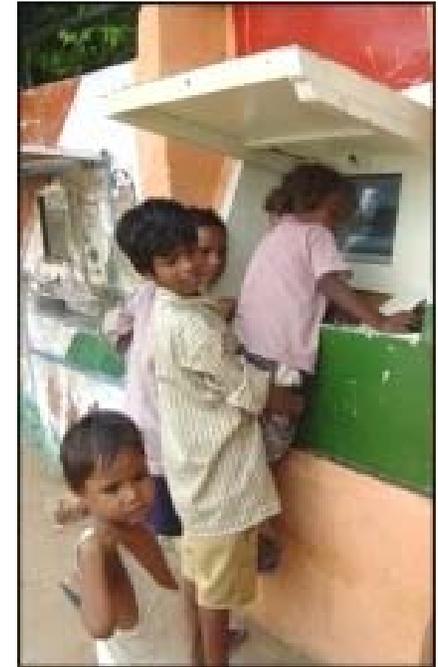
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Issues with localization?

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