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SpellWell

Game-based Accessible e-Learning to improve English Spelling

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People with disabilities want to improve their quality of life themselves



Financial independence is the key



A good job with good career prospects leads to financial independence

Need to Address the Skill Gap

In agrarian and manufacturing economies senses were very important

Today's knowledge intensive economy, especially in Indian context, offers many new employment avenues to urban, visually disabled youth

- From back-office jobs like call-center / data-entry operators, tele-marketers, medical transcribers
- To software programmers and management professionals...

But most do not have the requisite skills to tap these opportunities

WHAT IS REQUIRED IS TRAINING TO FILL THE SKILL GAPS

Essential Skills for New Economy

- Common skill-baskets that are required across emerging employment avenues
 - Basic IT Skills
 - English language and communication skills
 - Inter-personal and soft-skills...
- Our initial focus is on English as it is a fundamental skill that improves job prospects across many employment categories
 - From traditional jobs like teaching and government service to new avenues like IT enabled services
 - Most VI appear for competitive exams where English is a key subject

VIs Face Natural Challenges in Learning Spellings

- English is not the native tongue
- Learning is mostly through auditory means like audiocassettes or other human readers reading aloud - rely more on phonetic occurrence of words than their orthographical representation
 - Homophones like sight/site/cite or arms/alms sound alike and hence are often misspelled
- They are dependent on transcribers to do their writing thus limiting their exposure and practice
- Most do not know Braille thus eliminating the tactile mode of lexicon association

India: National Association of the Blind (NAB)

Singapore Association of the Visually Handicapped (SAVH)

Malaysian Association of the Blind (MAB)

USA: National Federation of the Blind (NFB),
Baltimore

How Spellings Have Been Taught & Learnt

- English orthography lacks a precise one-to-one correspondence between phoneme (sounds) and grapheme (letter)
 - E.g. phoneme /s/ may be spelled as **c (city); s (sit); sc (scene); ss (toss)**, confusing the learner
- There is a pattern and system in the way words are created and this morphological knowledge contributes to development of a power to spell

How Spellings Have Been Taught & Learnt

- Rote memorisation through oral / visual / tactile (hand learning) mode
- Dictation and relearning of misspelled words by writing them over and over until supposedly fixed in memory
- Teach words relevant to Learners
- Present words in an attractive package like '**stories**'; followed by exercises

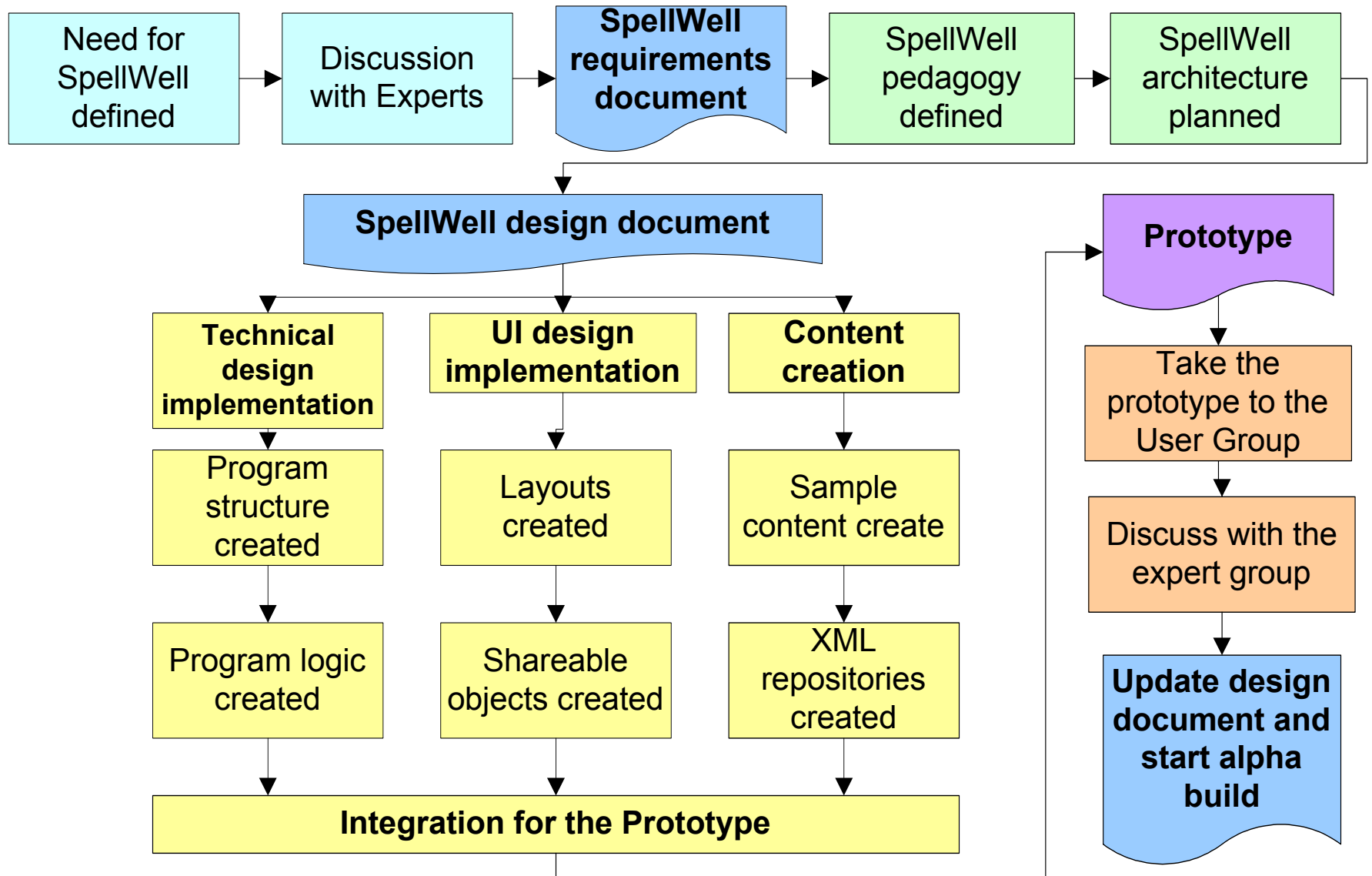
Our Take Away

While learning spellings the learners, “develop a ‘cognitive map’ of spelling, a map that in its construction involves the use of sense impressions stored in the brain: memories of sounds and ‘feel’ of the words as they are written”

- *“Spelling: Structure and Strategies”* by Hanna, Hodges & Hanna

- Can TYPING replace visual and haptic recall
- Can drill & practice be embedded in a game to reduce monotony
- Spelling rules are important but confusing! Teach only those most required
- Choose relevant wordlists
- Let the backend take care of the pedagogy and let the learner JUST PLAY A GAME!

Development Process



Co-creating SpellWell with End Users

- Analysed written material like CVs and e-mails
- Prepared list of most repeated spelling mistakes
- Co-related mistakes with spelling rules to create 10 Pedagogical Units (PU)
 - Prefix 'dis': disarray, disapprobation
 - Suffix 'ous': mischief - mischievous
 - Double Consonants: commit - committed
 - Plurals: knife - knives
- Homophones wordlist – 72 sets/150 words + 50 words in Unit Test
- 10 Themes - Business, Entertainment, Politics, IT, Literature

Is Learning Effective?

- Wordlist are relevant, easy or difficult?
- How to enhance learner motivation?
- Simplicity of language used?
- How will it be used, regular short sessions?
- Is product useful, overall improvement in spelling?

Is Learning Engaging?

- Accessibility and Usability
 - Voice-over (vs screen-reader)
 - Music (audio cues)
 - Ease of input (typing) and navigation
 - Overall user-experience

First Prototype: Story-based Approach



Contextual meaning of words is embedded in the story to show contextual usage of the words



A clue is given and the learner has to type the correct spelling of the word



Reference Book gives the correct spelling of the word; its meaning and examples of contextual usage of the word

#Key User Feedback

Tackles only a few words over long seat time

Feedback is too long and learner loses interest and concentration

Backend engine has to do a better mistake analysis and provide appropriate feedback

For advance learners, tackling simple words makes the product boring

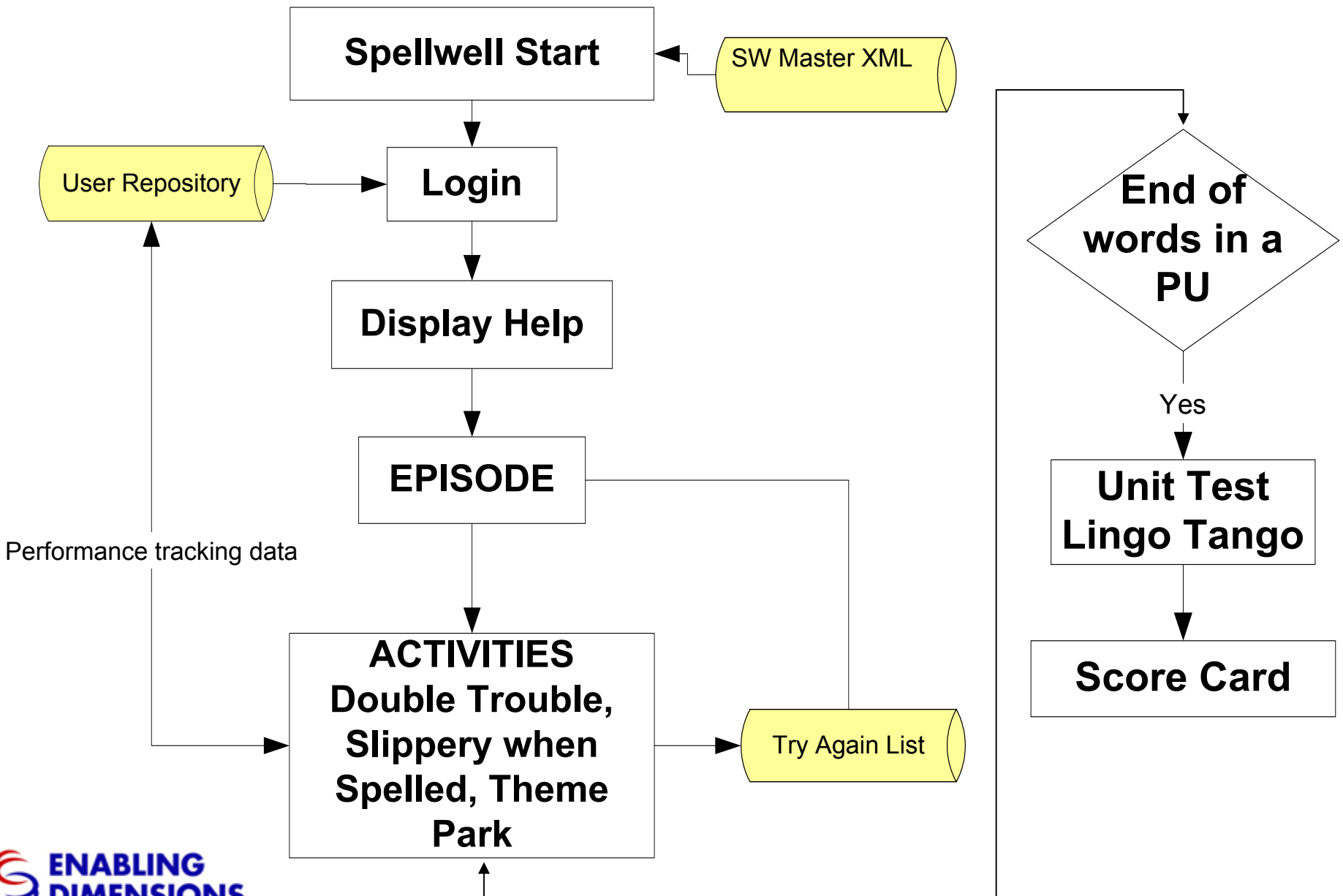
Second Prototype: Role Play

#Key User Feedback

- Virtual characters a little difficult to comprehend for learners who were new to computers
- Scoring and overall performance feedback would enhance learner motivation

- Learner as a rookie in a Spelling Team
- Coach takes the learner through various "Spelling Exercises"
- Coach provides feedback based on spelling rules, meaning, contextual usage and correct spelling
- A "Genie" is at hand to give clues to learners

SpellWell - Top Level View






SpellWell – Final Version



TIP



Necessary: 1 collar, 2 socks

Occasion: 2 collar, 1 sock

- **'Radio game-show'** metaphor
 - Words are divided into Pedagogical Units based on Spelling Rules – 'Double Trouble', 'Slippery when Spelled'
- **Drill & Practice:**
 - Words wrongly spelt reappear later
- **Mistake-based Feedback:**
 - Associated spelling rule 
 - Meaning of the word 
 - Correct spelling 
 - Example of contextual usage
 - Tips & Mnemonics for 'demon' words
- **Scoring and Learner Tracking**
- **Relevant Wordlists**
 - Words learners frequently use, for high learner motivation



Accessibility & Engagement Aspect

- **Large fonts and high contrasting colours** for low vision users
- **Audio-based interface** that is fully accessible to visually disabled learners
 - Obviates expensive screen-readers
- **Music and Human voiceover** instead of synthesized voice to ensure engagement through drama 
 - Indian accent
- **Audio cues** as equivalent of visual navigation elements 
- **Keyboard-based navigation**

- Create more wordlists
- Integrate with online learning community – www.enableall.org for
 - Technical support
 - Downloading additional wordlists
 - Peer-to-peer interaction
 - Other services
- Reuse the engine for other learning products

**“You see things: and you say, Why?
But I dream things that never were and I say,
Why not?”**

- George Bernard Shaw