

Proposing a web-based tutorial system to teach Malay language braille code to the sighted

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ABSTRACT

The *e-KodBrailleBM Tutorial System* is a web-based tutorial system which is specially designed to teach, facilitate and support the learning of Malay Language Braille Code to individuals who are sighted. The targeted group includes special education teachers, pre-service teachers, and parents. Learning Braille code involves memorisation and repeated practice for mastery; hence an automated tutorial system would be a suitable medium of instruction. Instruction in *e-KodBrailleBM* consists of three phases: Modelling, Guided Practice and Independent Practice. In addition, an Extended Activity phase provides additional practice. Reusable learning objects such as Self-Learning Tutorials, Braille Simulator, Braille Exercises, Summative Self-Assessments and Braille Games will be developed to support the instructional phases. These learning materials are designed to be interactive, progressive and cumulative. The development of this tutorial system requires expertise from various fields, thus a multi-disciplinary team approach is employed in this project. It is hoped that the use of computer and Internet technology would bring greater advancement and convenience towards the teaching and learning of Malay Braille code to the sighted.

BACKGROUND

Braille is a tactile writing system used by people who are blind. Each Braille character or cell consists of six dot positions, arranged in two columns of three dots each, which allows for sixty-four possible pattern combinations. The Malay Braille system is the main writing system used by visually impaired students in Malaysian schools. This means that special education teachers, and pre-service teachers, need to learn Braille in order to support students who are visually impaired. Learning of Braille code takes practice and patience as it involves memorisation of a large amount of static codes based on fixed rules. Pre-service special education teachers who have learned the Malay Language Braille Code described this process as tedious and monotonous.

NEEDS ANALYSIS

A needs analysis was conducted to identify the best possible instructional method to learn Braille by sight. As Braille codes are static and structured in nature which requires repeated practice till mastery, it makes sense to automate Braille instruction using an e-learning tutorial system. An e-learning tutorial system would be able to support sequential learning of content in a cumulative manner and allow for repeated practice till mastery using various activities which could take away the tediousness and the monotony of learning. In addition, a web-based system is suggested so that it can reach more people throughout Malaysia. The use of multimedia within this e-learning tutorial system will also help to increase motivation.

Based on needs analysis, the goals of this research are to:

- Design an instructional sequence for learning Malay Braille Code
- Design a web-based e-learning tutorial system for learning Malay Braille Code
- Develop learning activities and materials for the e-learning tutorial system

- Develop a web-based portal to manage the e-learning tutorial system
- Evaluate the web-based e-learning tutorial system

The e-learning tutorial system is given the acronym e-KodBrailleBM.

MULTI-DISCIPLINARY TEAM APPROACH

A multi-disciplinary team approach is employed in the design and development of e-KodBrailleBM as the production of this web-based tutorial system requires expertise from various fields of knowledge. This multi-disciplinary team consists of Braille experts, multimedia instructional design experts, programmers, web developers and education researchers.

DESIGN

Curriculum Design

Initial design involves structuring of the Malay Braille Code curriculum content. The objective of structuring the curriculum is to reduce the cognitive load of learners. The content is chunked into five manageable learning chapters with sub-units.

Instructional Design

An instructional methodology is identified to teach this content. Direct instruction and mastery learning is chosen as instructional methods for e-KodBrailleBM because of the sequential and cumulative nature of the curriculum content, which requires mastery of prior content before learning of new content. Four main phases of instruction are identified, which are: modelling, guided practice, independent practice, and extended activity. For each of these instructional phases, e-learning modules in the form of reusable learning objects will be developed.

Modelling Phase

The modelling phase will involve a Self-Learning Tutorial Module. This module will have worked-examples and practice with corrective feedback to allow users to learn the concepts and rules of each Braille code.

Guided Practice Phase

Next, the guided practice phase will have a Braille Exercise Module to allow learners to practice the codes learnt during the Self-Learning Tutorial Module. During this phase, learners will have access to help menus and prompts to guide and support their learning. The Braille Exercises will involve brailing exercises (Print to Braille) and transcription exercises (Braille to Print). Corrective feedbacks are provided to the learners based on their responses towards the exercise questions. When learners have completed the exercises in the Braille Exercise Module, learners will be allowed to go to the next Self-Learning Tutorial Module in the same chapter. This next cycle will include Braille codes learnt from the previous cycle as learning of Braille codes requires cumulative knowledge and practice.

Independent Practice Phase

When learners have completed all the Self-Learning Tutorial Modules and the Braille Exercise Modules in that particular chapter, learners will be allowed into the independent practice phase. The independent practice phase will consist of a Summative Self-Assessment Module which is provided at the end of every chapter in the tutorial system. In this module, no prompts or help menus will be provided as it is to assess the learner's level of understanding towards the content in the respective chapter. When learners have achieved 90% mastery of content in this module, learners will be allowed to continue to the next chapter. Otherwise, learners will be required to repeat the current chapter.

Extended Activity

Several Braille Games, such as typing games and crossword puzzles, are incorporated into the tutorial system to provide an interactive learning environment. This is to enhance the retention and motivation effect of the learning from the tutorials.

Braille Simulator

In addition to the above instructional modules, another learning object, the Braille Simulator will be developed to provide simulation of an actual Braille. This Braille Simulator will be used throughout the Braille Modules described above.

Learning Management System (LMS) Design

The LMS system will include administration of the e-learning tutorial system and a performance tracking system. In addition, this portal will have a certification system for learners who have completed the whole programme.

FORMATIVE EVALUATION

The tutorial system will be evaluated by experts as well as novice learners. The results of pilot testing will be used for revision and refinement of the tutorial system. Consumer-oriented evaluation using checklist and rating scales will be used.

SUMMATIVE EVALUATION

Summative evaluation will involve usability and effectiveness studies. Final revision and refinement for enhancing e-KodBrailleBM will complete the research process.

CONCLUSION

The e-KodBrailleBM Tutorial System is currently in the process of development. Formative evaluation of the design has been carried out. The results from this formative evaluation have been used to refine and to enhance the development of the tutorial system. It is hoped that the use of computer and Internet technology would bring about greater advancement and convenience towards the teaching and learning of Braille codes to the sighted.

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