

Contents lists available at ScienceDirect



Journal of King Saud University – Computer and Information Sciences

journal homepage: www.sciencedirect.com

Personalized assessment model for alphabets learning with learning objects in e-learning environment for dyslexia

Bhavana Srivastava*, Md. Tanwir Uddin Haider

Department of Computer Science and Engineering, National Institute of Technology Patna, India

ARTICLE INFO

Article history:

Received 11 July 2017

Revised 11 November 2017

Accepted 21 November 2017

Available online xxxx

Keywords:

Dyslexia

Cognitive

E-learning systems

Semantic web

ABSTRACT

Internet has been source of knowledge for decades. The pool of information cannot be sustained in absence of the network of networks. Internet has many useful applications in commercial, social and educational areas. In today's scenario, e-learning is also one of the useful applications in the world of Internet. The medium of e-learning has achieved advancement in various fields such as adaptive e-learning systems. The branch of computer science with psycholinguistics has done tremendous job in providing technical solutions to learners. However, learning disorders on the platform of e-learning still require lots of research. Therefore, this paper provides a personalized assessment model for alphabet learning with learning objects for children's who face dyslexia. The cognitive inclination of dyslexic learner has been determined using assessment model. This paper studies the cognitive potential of dyslexic learner and has built a personalized e-learning platform to alleviate their alphabetical problems.

© 2017 The Authors. Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The medium of acquiring knowledge through the web has been an essential mechanism of learning for long years, but, nowadays it has been designated a vital source of information. E-learning not only helps in overcoming geographical boundaries but also it helps in minimization of linguistic boundaries. Personalized e-learning has become even more advantageous. When the system presents the learning content as per learner preferences, then a personalization has been added to e-learning platform. For example, for the same content, there is a video lecture and audio lecture based on learner's choice. One student learns through video and other through audio. There are various possible ways for the machine to learn what learner prefers for acquiring knowledge. These are:

- Learning Style: There is various learning style model such as Felder-Silverman learning style model (FDSM), Dunn and Dunn model, Honey and Mumford model, etc. These models

describe different ways of learning like visual, verbal, etc. The famous learning style model is FDSM in which a learner has been categorized in four dimensions, i.e., active-reflective, visual-verbal, sensing-intuition and sequential-global (Graf et al., 2009).

- Cognitive Traits: These cognitive traits describe how a learner perceives knowledge. They include reasoning ability of learner, their decision-making approach and learning skills (Graff, 2003).

1.1. Semantic-based educational systems

Educational system provides learning contents to the learner to acquire knowledge. A recent trend in e-learning system is personalization. A web-based learning system can be made personalized by using the Semantic web. The term "semantic" denotes "meaning." The Semantic web-based educational system consists of Ontology, rules and software agents (Bittencourt et al., 2009).

- Ontology: It is defined as a "formal specification of a shared conceptualization." The Concept is a real world "thing." It can be a person, or object or any theory which exists in the real world (Editors et al., 2007). The Ontology contains classes, properties, and relationships that exist among different resources. The ontology consists of the following definitions:

* Corresponding author.

E-mail addresses: bhavana.srivastava.research@outlook.com (B. Srivastava), tanwir@nitp.ac.in (Md. T. U. Haider).

Peer review under responsibility of King Saud University.



Production and hosting by Elsevier

<https://doi.org/10.1016/j.jksuci.2017.11.005>

1319-1578/© 2017 The Authors. Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article in press as: Srivastava, B., Haider, Md.T.U. Personalized assessment model for alphabets learning with learning objects in e-learning environment for dyslexia. Journal of King Saud University – Computer and Information Sciences (2017), <https://doi.org/10.1016/j.jksuci.2017.11.005>

- 1) Domain: A view of the world which the particular ontology represents. This paper considers two ontologies, dyslearner ontology, and Learning_Resource ontology. The domain of dyslearner ontology is the person facing dyslexic troubles in elementary school, and the domain of Learning Resource ontology is the learning content for dyslexia.
 - 2) Resources: They are entities which exist in the real world. It can be anything which represents knowledge about the specific field. The dyslearner class and Learning Resource class is a resource which describes learner with dyslexia and Learning contents for a dyslexic learner, respectively.
 - 3) Object properties: It shows the relationship that exists among two different resources.
 - 4) Data properties: It associates the resource to some literal values.
- b) Semantic Rules: Semantic Web Rule Language (SWRL) is developed using description logic (DL) and HORN logic (Bittencourt et al., 2009). SWRL is a combination of work from DARPA agent markup language and RuleML (Rani et al., 2015). A rule expresses if-then clause. It consists a body and a head. The body is a conjunction of atoms where atoms are semantic statements, and a head is a consequence depending on the truth value of atoms (Bittencourt et al., 2009).
- c) Software Agents: The term “intelligent” in personalized e-learning systems refers to the ability of a machine to make a decision. Software agents are intelligent programs that take action on other’s behalf over a decision (Bittencourt et al., 2009). Foundation of Intelligent Physical Agents (FIPA) provides standards for agent-based systems. An agent may execute different behavior depending on system requirements. These behavior are cyclic, one shot or sequential.

1.2. Related works

According to dyslexia association of India, “Dyslexia is a neurological condition that affects the ability of a child to read, write and spell. Dyslexic’s find it difficult to visualize an alphabet properly. The alphabets appear to them in a swirled or distorted format (Davis, n.d.). Hence, it is difficult for them to visualize the letters correctly. Nganji et al. (2016) give an e-learning architecture based on ontology for various disabilities which includes learning disorders. A multimedia model has been defined to teach dyslexics with the help of computer science (Gross and Voegeli, 2007). There are two frameworks for adaptive e-learning system for dyslexia. The first framework uses various dimensions and attributes. The framework has been validated using empirical approach (Alsobhi et al., 2015a) Dyslexics can use e-learning systems using assistive technology (Alsobhi et al., 2015b). The second framework is an open agent-based framework based on various models such as the model of teaching, the model of contextualization, authoring model and cognitive model. It has used reuse strategy (Ivanova et al., 2010). Assistive technology has been used such as audio, video and speech recognition to aid dyslexic learning (Alsobhi et al., 2014). The course materials for dyslexia can be made using hardware and software (Alsobhi et al., 2015c). The Semantic web-based educational system includes software agents, ontology and learning objects (Rani et al., 2015). Also, research has proved that E-learning systems have high-quality resources as well as quality learning methods due to determinants like IT-infrastructure (Younis et al., 2016). collaborative e-learning systems can share resources between two institutes to provide better learning facilities (Masud, 2016). Network dynamics for dyslexics has proved that remedial action for dyslexia should not focus on

single processing methods instead it should be dynamic (Kershner, 2016). M-learning tools using customized multi-model method for dyslexics were made using cloud computing (Alghabban et al., 2017). Based on research conducted in Dyslexia Association of Malaysia, It concludes that computer-based approach is more helpful for dyslexic students than paper-based approach. Also, result has shown that color and fonts for teaching a dyslexic is an important parameter (Suhaila et al., 2017). This Paper gives a cognitive approach to help dyslexics in recognizing English alphabets based on their cognitive traits. The rest of the paper is as follows Section 2 contains the method to develop e-learning environment for dyslexia which includes Subsection 2.1 which define Assessment model for dyslexic’s, and Subsection 2.2 gives architecture for personalized e-learning systems for dyslexia. Section 3 offers results and conclusion.

2. Methods

The method for developing a personalized e-learning system for dyslexia includes a) assessment model for dyslexic’s b) developing ontologies and architecture c) preparing knowledge-base and Learning object. The assessment determines the inclination of learner towards one cognitive at the present state by using the multiple choice question. The assessment has been customized to deal with ambiguous nature of dyslexic cognitive. Ontologies in e-learning system have been used to model pedagogical and learner environment. They are required for automation and information retrieval. They act as building blocks of systems that use the semantic web. The knowledge base in e-learning systems serves as a repository for learning objects (LO) and Semantic rules. LO is a small reusable group of contents to provide tutorials to the learner.

2.1. Assessment model for dyslexic’s

There are three different cognitive dimensions for dyslexic (Srivastava and Haider, 2017):

- a) Multidimensional
- b) Inferential
- c) Hierarchal

The characteristics for multidimensional cognitive includes inclination towards complex structure and designing. Characteristics of inferential cognitive include determining similarities and

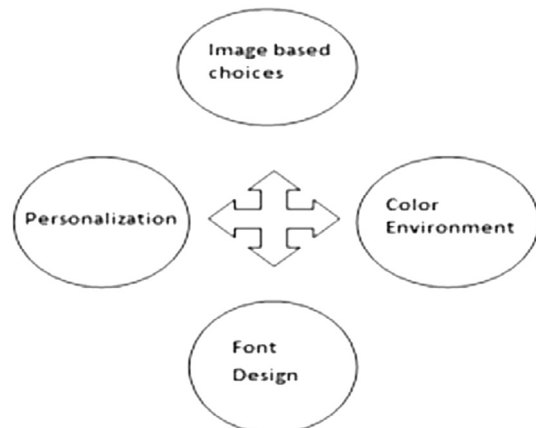


Fig. 1. Personalized Assessment Model for the dyslexic.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات