Development of Cognitive Competence Among Students with Cognitive Disability Through Multimedia Agent

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***Abstract*—Students with Cognitive Disability remain unreached in terms of web accessibility with respect to e-learning tools. Usage of technology is limited while making them to adapt to standardized education. A person with Cognitive Disability has greater difficulty to learn with peer group than the "average" person and needs special education where individual attention proves significant. With the invent of many e-learning tools around, now there is an opportunity for such underserved category of people to enhance their cognitive competence. This paper presents a multimedia agent which can be used for developing e-learning tool. The paper also discusses the need for such tools to assist learning among student with Cognitive Disability. Various web technologies which can be used for content development are also discussed. The system relies on animated audio-visual material for imparting education to such students.**

Keywords*—Cognitive Disability, Multimedia Agent, Profile Manager, Profile Evaluator, Audio-visual e-learning material, External Web services.

I. INTRODUCTION

Today most of the e-learning tools provide individual learning irrespective of pace and place. Most of these tools are designed for normal people, that is, the people with normal intellectual functioning. There is a need for e-learning tools to ease learning process for students with Cognitive Disability. Such tools are expected to assist students with Cognitive Disability to learn new skills such as analytical or problem solving skills, social skills, memory skills, self-care skills, language learning skills, decision making skills and so on. Such students cannot go to normal schools for learning and should depend upon special educational schools which often situated remotely requiring lot of effort to reach both in terms of money and time.

Students with Cognitive Disability learn more slowly than normal students [1]. They require more repetition and the learning material need to be specially designed to their level. Among peer group of Cognitive Disability students, each student learns at his/her own pace and their learning ability differs from student to student. This is because; they will have varied degree of disability which does not make learning process to be constant for all [1]. So the e-learning material should be both customizable and scalable so as to accommodate every student need.

The Multimedia Agent proposed here is specially designed keeping the needs of students with Cognitive Disability and overcomes the lack of such design in the architecture proposed by Silvia Mirri, Daniele Pantieri, Marco Roccetti and Paola Salomoni for students with general disability [2]. The following some points are what this paper intends to address:

- To design a learning tool for cognitively disabled students that helps them to grasp the contents easily.
- To set up a flexible learning framework.
- To allow student to actively participate in the learning process.
- To provide an agent to the student in order to motivate his/her learning ability.

- THE DESIGN ISSUES

Fig.1 shows the architecture of Multimedia Agent that is used for developing e-learning materials for students with Cognitive Disability.

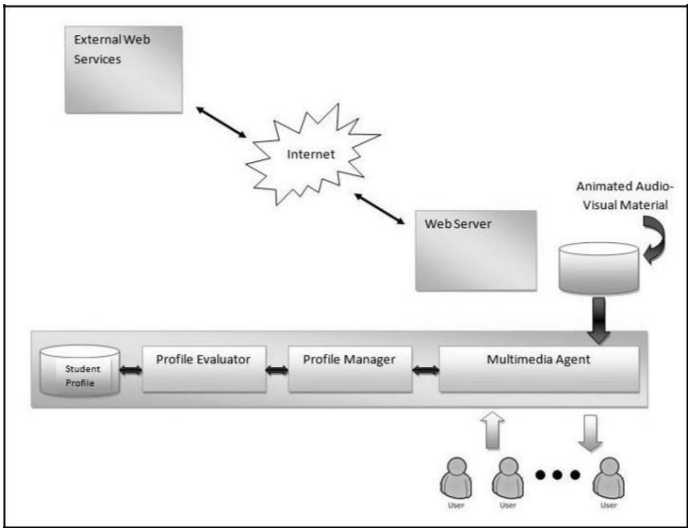

Fig. 1: Multimedia Agent architecture.

The figure contains a Multimedia Agent which acts as an interface thus providing the e-learning material to the user, a profile evaluator for evaluating user details and a profile manager for keeping track of the status of the user. The user may be given links for external web services that are available over the Internet and links may be provided only when Multimedia Agent identifies the need for a particular skill which is not offered by the current web services.

A. Multimedia Agent

The Multimedia Agent responsible for evaluating username and password and authenticating the user. The agent works on a repository of animated audio-visual e-learning materials and lists up a set of materials to work-on based on the profile status of the student.

B. Profile Evaluator

Initially, the user is required to submit personal details to the profile evaluator. These details are used to learn about the cognitive status of the student. The details to be collected include the skill set the student is possessing such as analytical or problem solving skills, social skills, memory skills, self-care skills, language learning skills, decision making skills and so on.

Providing the profile details may need adult supervision – which depends upon the cognitive status of the student – as the student does not know the details himself/herself. In the future works, what details are needed to be collected from the student and how profile evaluator evaluates the details will be shown. Based on the evaluation made by the profile evaluator, the multimedia agent selects the materials to be listed to the student.

C. Profile Manager

Student profiling helps multimedia agent to keep track of the progress made by the student. Each time the student learns the things, the profile manager updates the profile of the student.

Cognitive Disability people often suffer from lack of memory skills [3]. They forget the things very early than others. So the profile manager must take care about the number of repetitions to be made in order to master the skill set for the student. It depends upon how fast the student completes learning the skills. If the time taken is under desirable limits, the profile manager updates the profile of the student and concludes that the student has learnt that particular skill.

III. TECHNOLOGIES USED FOR DESIGNING

Considering the strict syntactical nature, it would be ideal to use XHTML as the markup language for creating web pages. Each web page lists links to a set of materials to work-on. For animated learning materials design, Flash would be an ideal choice. It has lots of feature and makes easy to design animated materials. The customization and scalability can be achieved when there is a interaction between the tool and the user. For providing interactions, php would be an ideal choice. As XML allows both transfer of information and custom made tags, we may require XML also.

IV. CONCLUSIONS AND FUTURE WORK

Initially to learn to use the tool, the user may need adult supervision. Once the user learns to operate the tool, he/she can learn new things on own effort. Thus reducing the effort needed to visit special schools and thereby saving money and time.

In the future works, it will be shown how animated audio-visual materials can be developed. These materials will be tested against a group of students to know the outcome of the research. Based on the outcome, charts are drawn to show the progress in students. Also the guidelines related to web accessibility will be followed for providing enhanced interaction in the tool [4].

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REFERENCES

[1] en.wikipedia.org/wiki/General_learning_disability.

[2] A Multimedia Broker for Accessible Learning Objects Transcoding-Silvia Mirri, Daniele Pantieri, Marco Roccetti, Paola Salomoni, IEEE 2006.

[3] United Nations World Report on Disability – World Health Organization, 2011.

[4] M. Friedman and D. Bryen, "Web Accessibility Design Recommendations for People with Cognitive Disabilities", Technology and Disability, vol. 19(4), IOS Press, 2007, pp. 205–212.