GURU: An Experimental Interactive Environment for Teachers/Learners

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Abstract—The significance of technology in today’s education is inevitable for teachers to design interactive environments based on learning methodologies and for learners to interact, explore and create personal animations, stories and games to learn a topic. Even with rapid advances in the field of end-user programming and software engineering, teachers/learners often spend considerable effort for using technology to support their activities. While there are many end-user environments like Scratch, Alice and so on, their focus is on programming but our need is to design these kinds of environments to support adult literacy in India, which is our target group.

In this paper, we present GURU, a prototype environment for both teachers/learners alike to enrich their teaching/learning experience. GURU has two unique aspects: It is designed for teachers with minimal technical expertise and it strongly aligns with learning methodologies. It is based on IDont framework that uses ontologies for capturing different aspects of adult literacy instructional design. In this short paper, we present the design of GURU as a teachers’ environment. GURU is essentially a web based authoring environment for creating adult literacy eLearning content but points to the need for such kinds of environments for subjects other than programming.

Keywords-end user authoring; interactive environments; learning technologies; visual design; adult literacy

I. INTRODUCTION & MOTIVATION

Despite advances in authoring tools for instructional design (ID) [1], educational content authoring process is still complex for teachers [2]. One interesting direction that attracted large sections of teachers/learners is authoring tools for teaching and learning programming like MIT Scratch [3]. Scratch from MIT is an interactive visual environment that allows everyone to learn programming by creating stories, games and so on [3]. During our analysis of Scratch and its extensions like Bingo and Panther, we have observed that their focus is on extending Scratch to support more aspects of programming. However, our goal is to design a Scratch-like interactive environment for teachers and learners in the context of adult literacy in India. Can we make the authoring process easier such that even non-technical teachers can author content? We ventured into two directions of research to address this challenge. One direction is the design of an authoring tool called EasyAuthor that supports teachers with wizard driven interfaces [4]. The second direction is the design of GURU as an experiment towards a block based visual environment for adult literacy teachers and learners. While both of them thrive to achieve similar purposes,

EasyAuthor uses wizard driven interfaces unlike GURU which uses block structured drag-n-drop interface design.

In this paper, we present GURU, a preliminary prototype environment that supports teachers to design adult literacy instructional design and for adult learners to explore, interact and learn in a systematic way. We restrict our discussion to GURU as a teachers’ environment due to space constraints.

II. END USERS AND INPUTS FOR GURU

GURU is mainly designed as an authoring environment for teachers with minimal technical expertise. There is a need for these teachers to customize the educational content of eLearning systems based on local context. This motivated us to think of an authoring environment that allows these teachers to author content using visual navigation and drag-n-drop interfaces. Additionally, the environment should also be aligned with ID to maintain good quality of instruction.

GURU uses IPCL learning methodology from National Literacy Mission that is suitable for teaching adult illiterates across India [5] and instructional material developed based on that methodology. Most importantly, GURU relies on IDont, an ontology for systematically capturing different aspects of adult literacy instructional design [6]. While GURU is conceptually based on MIT Scratch, it technically uses Snap, a java script based extension of Scratch [7].

III. DESIGN OF GURU INTERFACE AS AN INTERACTIVE AUTHORIZING ENVIRONMENT

GURU is mainly designed as an authoring environment for inexperienced teachers in technology. We have set few major goals for GURU (i) It must have the backbone of a learning methodology, which in this case is IPCL [5] and IDont [6] (ii) It should integrate expert teacher’s experience into the environment (iii) It should be easily adaptable to different contexts and even non-technical teachers should be able to experiment with it. Based on these goals, we have decided to extend Scratch as it offers an interactive environment for non-technical users. GURU essentially relies on IDont framework for learning methodology as it captures various aspects of adult literacy instructional design using ontologies [6]. Specifically, the instructional material is modeled in the form of facts, cases, rules and models and the learner is taken from familiar to the unfamiliar world [5] [6]. To accommodate these aspects, we have extended Snap by adding 6 new categories of blocks that represent different aspects that are relevant to adult
literacy instructional design (Figure 2 (A), Figure 3). Each of these palettes will have blocks to create, modify, add/remove metadata, add/remove sprites (images), sounds (Figure 2 (B)). A teacher will use these available blocks and create a course by using drag-n-drop interface of GURU. Figure 2 shows a screenshot of a typical environment of GURU. On the top left hand side, there are 6 different categories that are relevant to ID (process, context, goals, content, evaluation, environment). Each of these categories has domain specific blocks that help the teacher to assemble related information. Figure 2 (C) shows an example of a learning context. It indicates that context is associated with goals, process, content along with other aspects as defined in IDont framework. The content category has specific blocks to capture content in the form of facts, cases, rules and models. Figure 2 (D) also shows how the teaching process can be assembled from process blocks and goal blocks. A lesson is modeled as a play with each play consisting of several acts (e.g. MotivationAct, SyllableAct, ExerciseAct and so on) and each act consisting of several scenes that execute specific instructions (activities) by using instructional material modeled using content blocks.

With GURU as a learning environment, the learners start with the facts they know (words in the case of adult literacy) and play with the interface of GURU to solve the problem-in-hand in a goal-oriented and problem-centered project. During this journey, they intuitively go through the cases, understand and apply rules and models accordingly. The main advantage of this approach is that a reasoning attitude can be taken till learners understand and apply the problem solving approach. Technically, a few blocks that are specific to the topic are added in the palette area of GURU such that learners can drag the blocks and build solutions on the stage. Initially, teachers setup the interface with required blocks and then learners use it to learn and solve the exercises.

On the other hand, we faced several technical glitches during the design of GURU. The main difficulty arose from Smalltalk underpinnings of Scratch and the need to integrate ID concepts into it. This has motivated us towards the design of EasyAuthor using wizard driven interfaces [4]. However, the spirit of creating block based interfaces for modeling content based on ID is a potential future direction for supporting teachers/learners with intuitive interfaces.

IV. CONCLUSIONS & FUTURE WORK

We presented GURU as an interactive environment for non-technical teachers to enrich their experience. We then presented the interface of GURU in the backdrop of learning methodologies and IDont framework. We then explained the six categories of new blocks introduced in GURU to capture various aspects of ID. We also briefly discussed GURU as a learning environment along with its technical glitches. As discussed, GURU is still at an early stage with further scope for extensive research and technical development. Finally, we hope that this work motivates researchers in TEL, SE and HCI to think and design block based interactive interfaces for both teachers/learners to support subjects beyond programming like Mathematics, Science and so on.

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REFERENCES