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Kahaniyan - Designing for Acquisition of Urdu as a Second Language

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Abstract. This paper describes the design of Mobile Assisted Second Language Learning Application (MASLL) - Kahaniyan - created to assist non-native primary school children in learning Urdu. We explore the use of gamification to assist language learning within the context of interactive storytelling. The final design presented in this paper demonstrates how psychological and linguistic aspects coupled with contextual task analysis can be used to create a second language learning tool. The study also reports the results of the user study and the evaluation of the application which was conducted with 32 primary school students. Our results show a positive influence on learning outcomes, with findings that hold great significance for future work on designing MASLL for languages written in Arabic or Persian script.

Keywords: second language learning · book app · mobile learning · mobile technologies · MASLL · MALL · Urdu · psycholinguistics.

1 INTRODUCTION

Second language learners often face problems in the acquisition of writing skills in the concerned language. The problems are particularly relevant in languages written in Arabic or Persian scripts due to convoluted spellings and complex writing rules. Urdu writing system is one of the systems that borrow from these scripts. Students who learn Urdu as a second language often face multiple difficulties due to its writing style. In Pakistan, Urdu is the most common medium of instruction at primary schools despite the fact that only 8 % of the total population speaks it as their first language [1]. Another common cause of difficulties particularly in the Pakistani context, therefore, is language transfer which arises due to the prevalence of a plethora of other first languages similar to Urdu. Linguistic interference of these first languages often results in negative transfer: the tendency of non-native speakers to transfer linguistic structures that are not the same in both languages [19]. Efforts to devise classroom-based solutions to remedy this situation have largely been unsuccessful. Moreover, students in traditional classroom settings often become self-conscious and refrain from participation in activities that promote their skills in the second language due to fear of making mistakes in front of their teachers and peers [5, 6, 12]. This raises

the question, how to make the acquisition of Urdu as a second language easier for primary school students by developing a learner-centred framework [2].

In recent years, MASLL has become a popular mean for teaching a second language. It provides advantages over traditional methods such as mobility of learning, the ability to function in both classroom and informal settings, improvement of both individual and networked learning, and transformation from teacher-centred instruction into learner-centre learning [11]. Furthermore, these tools can help in creating personalized pedagogical approaches towards language learning which allow teachers to act as a facilitator and enhance the students participation in learning activities beyond school timings [14]. However, to the best of our knowledge, no games or interactive storybooks to date have been designed to facilitate Urdu language learning specifically for non-native speakers and although 65% of research studies on designing MASLL have been conducted in Asia, none pertain to Pakistan [11]. These studies also have several limitations. They a) have mostly been conducted on Chinese or English language, b) prioritize higher or secondary school education over primary education and c) rarely strive to make a comparison of their learning outcomes with classroom-based learning. Furthermore, while MASLL tools documented in these studies have been extensively used for learning within formal education where they are incorporated in language course curricula or class activities, their scope for independent learning has not been widely explored [11].

In this work, we discuss an approach that combines storytelling and gamification to address the problems in the acquisition of Urdu as a second language. The major learning outcome of most MASLL tools has been vocabulary building and rarely have efforts been made to address linguistic concerns specific to a language. Through a user study among 32 primary school children, we identified specific linguistic problems that primary school children face in identifying glyphs and creating meaningful Urdu sentences. We document how these problems in these two areas, along with psycho-social aspects of second language acquisition informed the design of our application Kahaniyaan. Our two research questions are 1) what effect does the usage of a MASLL based on learning through storytelling with incorporated elements of gamification have on the acquisition of Urdu as a second language? 2) how do psycho-social aspects such as language transfer and nonverbal communication inform the design of MASLL?

2 LITERATURE REVIEW

Psycho-social Aspects of Second Language Learning The nature of exposure to the second language impacts the learning process. Inadequate auditory perception and visual exposure to a language in informal settings at an early age slows the learning process which necessitates early language learning[20]. The linguistic and communicative competencies in the second language are partially a function of competencies in the first language before a child gets exposed to a second language [21]. The transfer of knowledge is dependant on the phonological contrast and correspondence of glyphs (smallest possible contrastive sub-unit

of a writing system) between the two languages and may be positive (promotes learning ability) or negative (impedes the learning process) [18]. While creating a MASLL tool for Urdu, one has to account the language transfer from common first languages of non-native Urdu learners. A linguistic method that can be used to facilitate designers in this is contrastive analysis: the identification of structural differences and similarities between a pair of languages [3].

Initially, language learning is not about learning the writing system and grammar and the learner has to rely more on their social skills to master the language. According to social theorists such as Vygotsky, language originates from social activity and then becomes constructed as a cognitive and individual phenomenon [16]. A communicative act is only effective if the people involved, understand the intentional state of a partner [15]. The intentional state can be understood from contextual cues as well as the emotional display of the agent. While current MASLL tools are useful in improving verbal communication, they often fail to account for non-verbal components.

Tools for Language Learning MASLLs in the form of Language learning games (LLG) have emerged as a popular tool for fostering language skills in young learners. LLG have the potential to engage students deeply with a particular topic because they allow children to actively participate in the learning process rather than just being passive observers [17]. Similarly, interactive storybooks have become another popular MASLL tool for language acquisition. Learning to read has a crucial impact on students overall achievement and using computers to teach reading has been a goal of many educators since the technology was first introduced into schools [10]. Research shows that eBook features such as the pronunciation of words, narration, sound effects, and animations, that support the written text, allow children to focus on meaning, thus opening the way for high-level reading comprehension [4].

Based on the literature review, we incorporated contrastive analysis between Urdu words and words from native languages of migrant students into our study to account for linguistic transfer. While designing our contextual inquiry, we situated our tasks in a variety of familiar social contexts for children to best account for aspects of non-verbal communication. Lastly, based on the suitability of story-telling and gamification for MASLLs that we gauged from literature, we chose it as our design framework.

3 RESEARCH METHOD

The study was conducted in two primary community schools, Qadam Community School and Punjab Public School, with total of 32 students from 2^{nd} and 3^{rd}, aged 7-9 years. These schools were selected because of the diversity of students enrolled, i.e. both native and non-native students. Both schools are located in the outskirts of Lahore, Pakistan. The medium of instruction in these schools is Urdu which is similarly also used by students for interpersonal communication. By 2^{nd} and 3^{rd} grade, students are assumed to have a basic understanding of

written Urdu, the ability to comprehend instructions given in the language as well as the ability to communicate in it efficiently. Our four team members were proficient in writing and reading Urdu and had studied Urdu as their first or second language till 11^{th} grade.

We employed a mixed-method approach and; (i) performed contextual inquiry through classroom observations and semi structured interviews with teachers of 2^{nd} and 3^{rd} grades from both the schools, (ii) conducted a survey to inquire students background and (iii) administered a test accompanied by an activity to assess the students language skills. Four teachers were interviewed about the teaching methods, the most common mistakes made by students in written assignments, and hindrances faced in speaking Urdu. We also inquired how these mistakes and hindrances varied across local and migrant students and whether there were any pronounced differences in their abilities and ease of acquisition. One person from our team sat through both classes in both the schools for a day each and noted the nature of mistakes made by the students while responding to the questions asked by the teacher and in communication with their peers.

A survey was administered to the students that asked about their demographic background and availability of and engagement with technological devices such as mobile phones/laptops in their home. A brief test, based on common mistakes in Urdu writing, was designed and administered to the students to gather quantitative data which was complemented by an activity. Four tables were set up, each with a different category of item (books, sweets, toys and stationary) and each student was given a paper with instructions (in Urdu or English) that required them to retrieve a specific item from a particular table. This activity was designed to assess the students ability to understand instructions given in the language and their ability to employ the language in a social context. Before the activity, students were encouraged to ask the two present members from our team if they faced any difficulties in reading the prompts. For each student, we noted the number of times they asked for help, the nature of help acquired (e.g pronouncing a particular word, comprehending the instruction etc.), and the time taken to both read the instruction and complete the task.



Fig. 1. To avoid cognitive overload that can impact the self-efficacy of a learner, user exposed to a storyline through disintegration into scenes.



Fig. 2. Tracing feature in early storylines of the game whereby user has to identify alphabets and different shapes they take across a variety of words.



Fig. 3. Identify the correct action or emotion word being exhibited by the character and its correct form that renders the sentence meaningful.



Fig. 4. Everyday scenarios employed to enhance social communication skills, developed using familiar characters from earlier storylines.

4 DESIGN AND IMPLEMENTATION

All the students except one were allowed to use a smartphone for thirty minutes or less at home. The restricted usage of smartphones among primary school students necessitated using a framework to sustain the interest of the children over multiple sessions such as stories. This was complemented by the use of certain elements of gamification such as scores and unlocking of game features to allow learners to self-explain and self-evaluate their learning. Through contextual task analysis of the current method of teaching the Urdu language to primary school children, we identified common causes of error in Urdu writing. In Urdu language, alphabets take different shapes in different words depending on where they are occurring in a sentence - beginning, middle or end and with an increase in the length of a word, errors became more pronounced.

In Urdu script, digraphic combinations of characters represent vowels and non-native speakers lack the intuition of using the appropriate combination of characters to render vowel sounds in different words [13]. We observed that they often resorted to rules learnt in first languages to inform their choice of alphabets in the second language. This language transfer is often negative and results in mistakes in spellings. To further explore this, we performed a contrastive analysis of words that are commonly misspelt in Urdu, with their counterparts in the most prevalent first languages among non-native Urdu speakers and obtained a list of such words. This informed one of the in-game activity identify where students had to select the correct word form from common erroneous versions.

The proposed game design consists of three main components. The first part consists of adaptations of popular childrens stories in Urdu Literature. The children periodically look at different scenes that constitute a story. After they view a scene and read the corresponding sentence, they are prompted to complete two-three tasks before progressing to the next scene. Based on the level the user is on, the task may consist of one of these: tracing alphabets on to word silhouettes, selecting correct word forms, identifying characters action and identifying the right emotion the character is exhibiting. In the second part of the application, the users have to make decisions based on information provided in the scene and the corresponding sentence. These scenes are not adaptations from stories but are rather stories crafted to embody routine interactions that require communication in Urdu. However, the characters and their actions and emotions are similar to those encountered by the children in the first part of the application. These characters are unlocked after completion of different storylines from the first part of the game. The third part of the application allows the users to create their own stories by incorporating the collections of characters. Paper-based low fidelity prototype of different plots and their subsequent scenes were created to test understanding and assign difficulty levels to the different stories. The final application was implemented using Unity for the Android as well as iOS platforms. Three stories for part one and two stories for part two were used for testing.

5 EVALUATION

32 students were divided into four equal groups for evaluation: non-native and no application group, non-native and application group, native and non-application group, native and application group. Pre-tests, consisting of 5 questions each, based on the major learning outcomes of the application was administered. The testing spanned across five days, where children from the application groups, sat with one of the members from our team for 15-20 minutes each day as they navigated through the application and completed a storyline. Students from the non-application group were engaged in a 15-20-minute session where the children were given a short story similar to the one in the application, accompanied by questions which they had to complete under the supervision of one of the members of our group. The members of our team rotated to eliminate any biases due to members influence. Students were encouraged to ask questions and think out loud. Performance measures and lower level interaction issues were recorded for all the sessions conducted with each student. After each days session, students from the application groups were asked among other things, to rate their levels of enjoyability, ease of navigation, motivation to engage with the application and identify the tasks they liked and disliked the most.

Following the five sessions, a sixth visit was performed to administer a post-test with all the students, similar to the pre-test. We also conducted an activity to test another aspect of learning that we aspired to achieve through the element of interactive storytelling in our design. It was hypothesized that interacting with the application would enhance the childrens ability to extract meaning from a scene using non-verbal cues. We presented all four groups with the illustration of a scene from a new story and asked the children to describe it in their own words. We then counted the instances of correct usage of action and emotion terms in the students' description of the scene. We also showed the teachers from both the schools our final application and asked for their feedback.

6 RESULTS

All our four groups showed an improvement in the post-test. An average of scores on pre-test and post-test out of 5, consisting of questions testing the major learning outcomes, was calculated. The post-test scores of children from the non-native and no application group, non-native and application group, native and non-application group, native and application group were on average +1.30, +0.70, +0.70 and +0.40 more than the pre-test scores. The most useful feature of the application was observed to be tracing the elements where 12 out of the 16 children who used the application, showed improvement in glyph identification compared to 5 out of the 16 children from the non-application group. The four students from the application group who showed no improvement were native Urdu speakers. Responses to questions on the post-test revealed that around 69 % of the children using the application were able to entirely understand the plots as opposed to 37.5% from the non-application group. Moreover, the application group demonstrated a higher ability to extend the acquired skills of glyph

identification to a wider range of structurally dissimilar words. Analysis of the students description of the scenes from the activity showed that those who had used the application were more than twice as likely to include the description of the characters actions and emotions in their account. The number of times children in the application group asked for help decreased over the sessions with session 1 having the highest average of 4.2 times and session 5 having the lowest average of 1.1 times. Furthermore, although difficulty increased from plot 1 to plot 3, the game scores for each plot remained similar or showed a minor decrease. On average children rated the ease of use, feedback, enjoyability, the likelihood of recommending to others and learning to be 4.00, 3.42, 4.28, 4.00, 4.90 out of 5. These scores were calculated using the response to a 5point Likert-type scale ranging from "Strongly Disagree" on one end (0) to "Strongly Agree" on the other (5). On average, students made 6 errors out of 42 clicks per plot. Observations made during the testing sessions showed that children were mostly able to read the storyline sentences independently. Non-native speakers enjoyed reading smaller sentences more while native speakers showed little or no preference for a particular type. While reading out a loud, the non-native speakers often pronounced words with vowels incorrectly but after completing several tasks to identify the correct version of similar words, these errors were reduced. Native Urdu speakers found some of the features such as tracing of the word to be uninteresting and showed a higher preference for features like identifying emotion and action words. However, both native and non-native students often faced difficulty in selecting between similar sounding alphabets such as Hay. Many children suggested they should be allowed to start more than one plot at one time. The unlocking feature was almost always able to incentivize the children to complete the plot. We observed several children comparing scores among themselves and rejoicing at having unlocked a particular character. Based on their experience from non-educational games, some students reported that they expected to be able to move at least one character around the screen. A teacher from one of the schools, who viewed our final application recommended that we add a feature into our design which should allow teachers to create plots and incorporate them into the game. Another teacher remarked, "Students dont always do their homework but were very excited to play the game when your team would come."

7 DISCUSSION AND CONCLUSION

All MASLL projects previously studied show that mobile devices are beneficial in enhancing the second language (L2) learning process by either enhancing the proficiency in the concerned language, improving the learning motivation of the user, or both of them [11]. Many of these employ gamification and interactive elements to engage young learners. EBooks have also gained popularity to support the learning process as complements to their paper-based counterparts. In this study, we explored the use of stories with certain game elements for language learning. We applied this approach to teaching the Urdu language which has

several unique properties in comparison to languages like English and presents its own design challenges.

Prior research has also shown that through developing a model that converges mobile technology, human learning capacity, and social interaction aspects, we can implement a solution that can be effectively used for formal and informal learning [7]. However, conscious learning that stresses on learning lexicon, formal rules, and grammar is often unsuccessful and there is a strong influence of the first language (L1) on second language learning (L2) that manifests through linguistic interference [8]. Therefore, while designing any learning pedagogy, psychological aspects of the human processing information system should be focused on [9]. While designing for non-native speakers, we accounted for psychological factors such as language transfer and social aspects by exploring their particular relevance in Urdu language acquisition. Our research explored whether a story-based game design, after accounting for aforementioned aspects, can inculcate an intuition in second language learners of Urdu similar to one in native learner. Nevertheless, the same design process can be replicated to create other second language learning tools for children for languages that follow writing systems similar to Arabic or Persian. Our evaluation showed that the game has a high potential to support second language acquisition of Urdu, particularly for non-native speakers. Findings also confirmed that without acquiring basic skills such as identifying different glyphs in a word, a child cannot understand whole words or create meaningful sentences using them. Results also affirmed that negative language transfer is a major challenge in Urdu language learning among non-native children but it can be overcome by repeated exposure. Learning is enhanced when broken down across several sessions as is done through the use of multiple storylines as it allows students to critically examine the structure of each sentence and hence develop a better intuition for what constitutes a proper sentence. Tasks following each scene ensured that they place focus on the more important components of the sentence such as action words. Progressing through a single storyline, keeps the child engaged with the learning process and sustains interest as opposed to games where a single skill is repetitively taught across a single level. Furthermore, the engagement is twofold; the student is kept engaged by the storyline and the gamified features such as scores and unlocking story characters. In future work, this design can be extended to allow teachers to design storylines and accompanying tasks based on stories that are part of the curriculum. In this way, teachers can facilitate the language learning process of non-native children and reduce the gap of proficiency between the native and non-native speakers in class. We hope that, with this paper, we have taken the first step towards exploring a framework for teaching Urdu to the non-native speaker in areas where it is used as the primary medium of instruction in primary schools. In this way, we want to motivate discussions in the INTERACT community on novel assistive applications for solving language acquisition problems in children.

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