

# An Interactive Story-based Mobile Application with Personal Recommendation and Notification for Sexual Health Education in Ethnic Adolescents

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**Abstract:** In mountainous border areas, most hill tribe and ethnic adolescents encounter poverty and limited access to good quality of education and healthcare services. They are confronting the severity and high rate of Unplanned Pregnancy (UP) and Sexually Transmitted Diseases (STDs) population due to their sexual misconception, risky behaviors, contextual belief, and negative attitudes, and improper pedagogical instructions and materials. In this study, the Akha ethnic group in Thailand was considered as they are facing the highest number of UP and STDs among other hill tribes in the northern region of Thailand. Therefore, the authors aim to address these critical issues by proposing a mobile learning application for enhancing their understanding of Sexual Health Education (SHE), STDs and UP prevention through a designed interactive learning story with context-based storytelling. The students can get personal recommendation of first-aid instruction and nearby contact points based on their search queries of symptom, conditions, or keywords. Moreover, the application can analyze their responses during learning for giving personal notifications based on their sexual behaviors, and remind the users regularly for having safe sex. Before this application is successfully developed, this study firstly carried out the contextual analysis of their needs and requirement in order to design the associated content for interactive learning story, to propose a system structure and design and to present a mechanism for personal recommendation and notification. The evaluation was later conducted with similar groups of samples and experts towards the proposed interactive learning story and application prototyping. The findings show that the proposed mobile application received satisfied attitudes and perceptions on both learning content and story, and mobile learning experience. The investigations of learning effects on students in formal and informal learning environments are to be studied.

**Keywords:** Mobile web application, recommendation and notification, interactive learning story, sexual health education, ethnic adolescents

## 1. Introduction

In the past decades, Sexual Health Education (SHE) has provided young people to sexually healthy, increased student's knowledge, skills and behaviors associated with the reduction of unplanned/intended pregnancy, Sexually Transmitted Diseases (STDs) and HIV. SHE has a positive impact on safer sexual behavior, could delay initiation of sexual intercourse, decreased frequency of sexual intercourse, decreased number of sexual partners, and increased use of condom and contraception (UNESCO, 2018). Those who have a good understanding of SHE, they tend to pursue and accomplish study in school and college. In the workplace, they can work with different gender with empathy. In family, SHE can help improve parent-child communication about sex-related information and perceptions and knowledge of parents, they could guide their children and protect themselves from sexual risk (Dinaj-Koci et al., 2015). In the broad scale, more population with SHE can help reduce risk of unplanned pregnancy (UP), abortion, and STDs.

Most adolescents in Thailand have limited knowledge and misconception of birth control and unsafe sex (UNICEF Thailand, 2016). Those who have STDs have dramatically shifted twice in the past decade, mostly found in adolescents (Bureau of Reproductive Health, 2019). In Thailand, most

adolescents in hill tribes and ethnicity groups encounter several limitations and problems due to the limited use of Thai national language; meanwhile, they have uncomfortable discussion/consultation with parents. Therefore, it gives this significant burden to the teachers at schools. There are a really limited number of teachers who are ready to teach the sexual topics; in the meantime, only limited hours are provided, while the students have weak intention to learn due to the non-engaging learning materials and all materials are not in their local language. Eventually, they tend to ask friends and look for information on the Internet, which result in improper understanding or misconceptions of sexual health understanding (Ministry of Education, 2016).

Based on this perspective, therefore, this study aims to address the above-mentioned issues of SHE, STDs and UP prevention, especially in an ethnicity group of Thailand, by employing a number of mobile learning advantages. In particular, a mobile learning application is proposed for Akha adolescents in Thailand with a careful design of interactive learning story. An overall framework of the application and the personal features are highlighted. The findings of this paper aim to gain insights and a more in-depth understanding of the proposed mobile application for further development.

## **2. Sexual Health Education and Mobile Learning**

Sexual Health Education (SHE) plays an essential role in enabling quality of personal life, career, family, and society. It is mandatory to have a basic understanding of sexual changes, development, and hygiene; also, how to delay first sexual intercourse at an early age, how to have safe sex, how to not addict to sex and how to prevent unplanned pregnancy with proper methods.

In Thailand educational system, many reports have shown that SHE is merely involved by students' interaction or discussion. Students are not encouraged to learn this essential content; consequently, they hold a misconception, do not have sufficient knowledge and understanding, and cannot apply in their daily life. These are risky to UP and STDs. Moreover, most classrooms arrange to learn SHE in a mixed gender environment in which most students are not willing to ask and discuss, where the assessment is often operated in the form of paper-based examination which may not reflect their skills (Ministry of Education, 2016).

In the past decade, mobile learning has become more important as it enables more effective personal learning anytime anywhere (Hwang & Wu, 2014). It has been widely proved to be one of the technology-enhanced learning approaches that enhance the learning possibilities and performance; in the meantime, it elevates self-efficacy of learning. With the advancement of mobile technology, the device supports several output and input interactions. Besides, mobile learning has increasingly developed in various platforms, ranging from application, website, game, augmented reality, virtual reality and recent mixed reality (Guse et al., 2012; Liu & Tsai, 2013).

Mobile learning is even more powerful when it comes with personal features in order to tailored provide the accurate, timely, useful experience according to the individual differences of conditions, background, and status (Hwang, Yang, & Wang, 2013). Personal notification can alert, notify or give caution promptly at a certain time regarding the conditions or situation. Besides that, recommendation can analyze the previous/ongoing profile and status and provide a tailored guideline or instruction to address or enhance the success with a clear message. With personal features, mobile learning is more impactful that can individually address the differences of individual users.

## **3. Learning Design and System Architecture**

In this study, the context of Akha was considered as it is the most density among other Ethnic groups in Thailand. From research studies, Akha adolescents have a high risk of UP and STDs due to two main reasons. First, their risky behavior with alcoholic drink and drug addiction which lead to unconsciousness; moreover, it is found that over 40% of adolescents have sex before 16 years old. Second, most Akha family are in poverty and low-educated. Furthermore, Akha adolescents most infect STDs, e.g., HIV/AIDs than other ethnic or hill tribe groups (Apidechkul, 2016).

In order to understand the actual context of teenagers in Akha group, the authors went to visit them in the community in order to assess their understanding and attitudes. Both one-on-one and group

interviews with voice recordings have been used by following a series of open-ended and close-ended questions. Note that each student with the parents' permission agreed to participate in this research willingly, while their data is kept anonymously. In addition, all Akha adolescents can access to the Internet over their own smart phones.

### 3.1 Interactive Learning Story Design

There are three learning topics in this application. First, sexual health (SH), gives an understanding of how changes happen to the body physically and mentally. Second, unplanned pregnancy (UP) and prevention, including the contraceptive pill, condom. Third, sexually transmitted diseases (STDs), e.g., Gonorrhea, Syphilis, Vaginitis, Genital Herpes, and HIV. Each learning topic is associated with certain literacy, as shown in Figure 1 with color indication. After the content association is done, it proceeds to make interactive learning story by considering three components: character design, storytelling and scenarios, and situations. The learning story is designed to be an interactive motion graphic with the characters in a local outfit and local sound option for Akha-preferred language. With context-simulated atmosphere design, it brings the storytelling more relevant to the students' real context with surrounding scenarios and situations. With this design, the students can learn interactively by interacting with the ongoing story, prompts, and responses in order to gain more sexual health literacy.

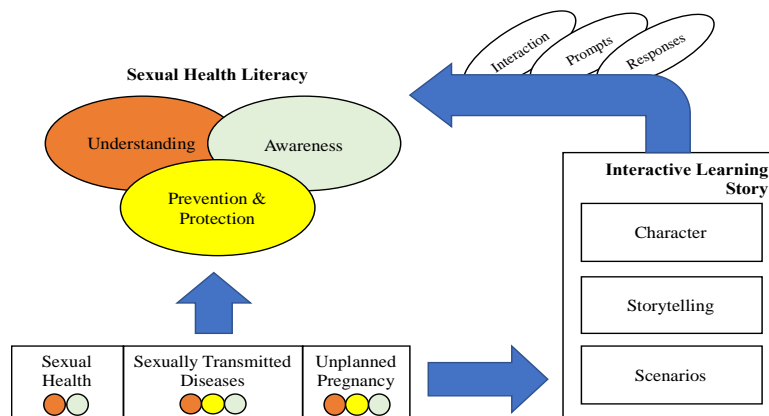


Figure 1. Learning Design and Interactive Story Association.

### 3.2 Personal Recommendation and Notification

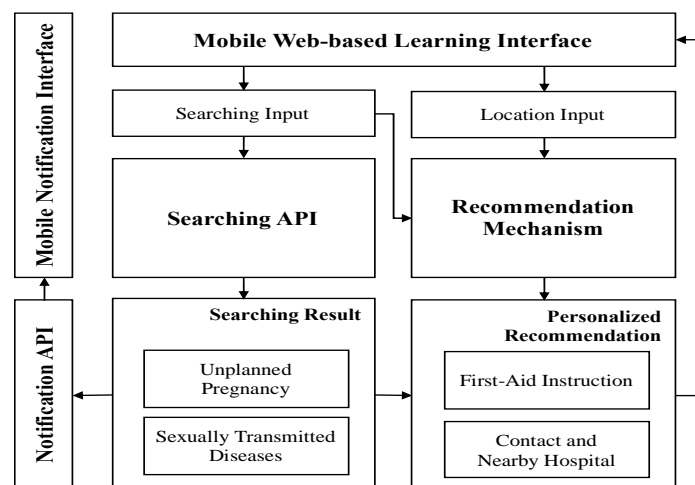


Figure 2. Personal Recommendation and Notification Agent.

In this application, there is a personal feature of recommendation and notification that can help support the learning more straightforward but powerful, see Figure 2. The students can give the query of keywords or symptoms relevant to STDs or UP as a search input. The searching API can then analyze and look for the results showing practices and examples with visual graphics and a brief explanation for

better understanding; in the meantime, this input runs to the recommendation mechanism for generating the basic first-aid instruction with nearby contact and hospital for further consultation. Nevertheless, based on the search, the system triggers the notification API and can send the notifications to students based on conditions provided via a mobile notification interface, while the recommendation is presented on the learning interface.

## 4. Evaluation and Results

### 4.1 Interactive Learning Story

In this section, a simple evaluation of interactive learning story design was conducted with ten similar participants (students) and five professionals on learning innovation.

All participants were given a complete story design with full interaction embedded on the mobile application, sample screenshots shown in Figure 3 with a brief description. After evaluating the learning story, the participants rated their satisfaction on twenty items of 5-point Likert Scale questionnaire.



Figure 3. Screenshots of Interactive Learning Story.

Table 1

Evaluation Results of Interactive Learning Story

Dimensions	Similar participants (N = 10)		Professionals (N = 5)		t
	M ± SD	Interpretation	M ± SD	Interpretation	
MTA	4.78 ± 1.23	Very satisfied	4.32 ± 0.32	Satisfied	0.808**
STL	4.84 ± 0.89	Very satisfied	4.71 ± 0.54	Very satisfied	0.297
AnR	4.21 ± 0.35	Satisfied	3.86 ± 0.61	Neutral	1.431*
LFP	4.40 ± 1.73	Satisfied	4.54 ± 0.45	Very satisfied	0.175

\*  $p < 0.05$ , \*\*  $p < 0.01$

As shown in Table 1, it was found that the design of interactive learning story is accepted for using with the students to enhance their understanding of SHE, STDs and UP prevention.

### 4.2 System Prototyping

Besides, a user testing of the mobile application was conducted with 27 similar participants (male= 12, female = 15) to understand their user experience.

All participations were experienced with a proposed mobile application on the interactive prototyping, sample screenshots shown in Figure 4 with a brief description. After evaluating the mobile application, the participants rated their satisfaction on 16 items of 5-point Likert Scale questionnaire.

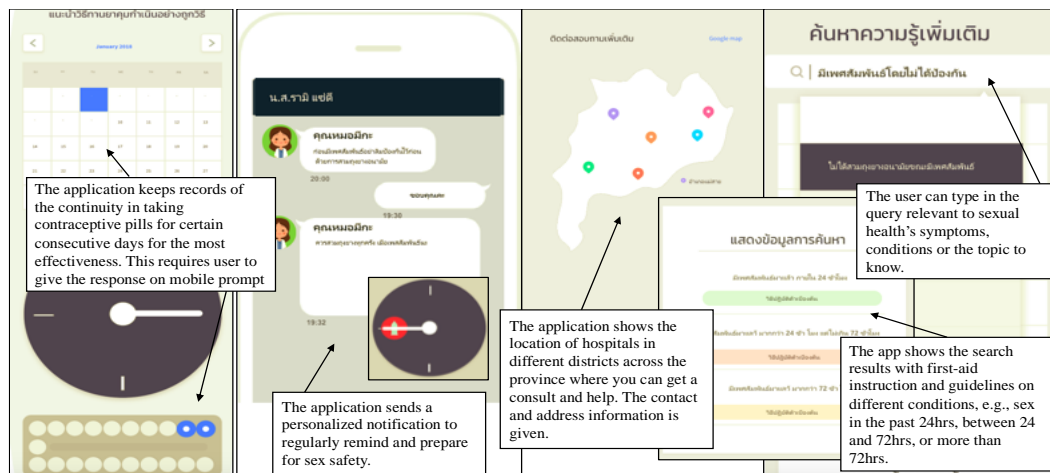


Figure 4. Screenshots of Mobile Application Prototyping.

As shown in Table 2, it was found that the mobile application can help students to learn with good learning experience on the proposed application.

Table 2

*User Testing Results on the Interactive Prototyping of Mobile Application*

Dimensions	Similar participants [Male] (N = 12)		Similar participants [Female] (N = 15)		t
	M ± SD	Interpretation	M ± SD	Interpretation	
Mobile navigation	4.73 ± 0.62	Very satisfied	4.68 ± 0.44	Very satisfied	0.245
Transition and motion	4.26 ± 0.39	Satisfied	4.43 ± 0.52	Satisfied	0.939
Consistency in theme and pattern	4.35 ± 0.44	Satisfied	4.49 ± 0.63	Satisfied	0.652
Elements and composition	4.60 ± 0.57	Very satisfied	4.74 ± 0.12	Very satisfied	0.930

## 5. Conclusion and Discussion

In this study, the authors have designed an interactive learning story to be localized with their context based on storytelling and interactive learning to enabling them more understanding of the SHE, UP and STDs. Moreover, the users can look for nearby contact information and first-aid instruction based on their search query. They can also receive personal reminders for safe sex based on their responses and sexual behavior, which are silently collected during the learning process. The findings of this study enable this proposed mobile application to be developed for real use in a distant target. Hence, this research aims to increase awareness of strengthening sexual health literacy for a better quality of lives in ethnicity.

In this study, the evaluation results reveal several interesting points to be discussed. First, sound perception and attitude towards an interactive learning story. It is due to the design of considering user's interaction, and chunking information into smaller portions to be learned and absorbed. More importantly, the local context of ethnicity has been employed in making learning more relevant to the users' environment. This makes learning more authentic and helps reduce the learning gap between the newly proposed learning and learners (Lombardi & Oblinger, 2007). Regarding the evaluation of mobile application on the prototyping platform, the results could not entirely reflect the actual learning experience due to the limitation of presentations with visuals, motions, and interactions, found no difference results between males and females. This may affect the mobile user experience while giving

an evaluation. Although this study has conducted a significant step of this research, it still needs more improvements and further investigations.

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