REPORT OF RESEARCH RESULTS

Title: Bringing Persuasive Design into the Development of Mobile Interactive Media for Road Safety Education in Young Children

Primary Researcher: Assistant Professor Dr. Manasawee Kaenampornpan, Faculty of Informatics, Mahasarakham University
Co-researcher(s): Dr. Pornpan Kaenampornpan, Faculty of Fine and Applied Arts, Khon Kaen University

Summary

Road Safety is an essential topic to teach children in order to let them do day to day routine. The road safety topic is a small part in the school curriculum due to a time limited in the academic year. Therefore parents become an important part in giving knowledge about road safety to their children. However, teaching young children is not easy. They get distracted and get bored very easily. Moreover, not all parents have an experience in teaching. Even though young children learn better through examples. But the road safety topic can be dangerous to show by example. Apart from the attractiveness that the interactive media provides to the children, the animation is a powerful tool to demonstrate a graphical scene to the children for them to understand the impact of their behavior. Furthermore, mobile technology is widely used by parents. They have access to the mobile device seamlessly. The Google play store and Apple store are the key apps marketplaces that distribute digital content to people around the world. The content on the marketplaces reaches many people very quickly compare to the old resources such as TV, newspaper, website, book and radio. Therefore, in this research we propose the mobile interactive media that reaches as many people around the world. It is also a tool for parents to teach their young children about the road safety topic at anytime and anywhere.

In order to develop an educational and pleasurable media, the persuasive design is an important concept that we adopted during design process. The aim of the persuasive design is to develop an application that enrich user experience while using this application to motivate, facilitate and support individuals through the behaviour change. In this definition, there are three potential successful outcomes for a persuasive system: the voluntary reinforcement, change or shaping of attitudes and/or behaviors. Based on 2 chosen categories of the persuasive system principles and our analysis of the characteristics of young children and parents in the context of teaching road safety topic, we design the application to support the user's primary tasks of tailoring and simulation. This will give the children conceptual idea about road safety and they can see the effect of each road safety scenario that related to their everyday life. In the dialog support category, we choose praise and liking principles in our design as they are simple for the children to understand and related to.

The mobile interactive media is developed by adopting a participatory design technique where the users become an important part of our design and developing process. According to our design decision based on the persuasive system principles and our analysis of the characteristics of our context of use, paper prototype is used to get the feedback from the users at the early stage including character design, interaction GUI design and scenes design. This stage gives us the clarification about our design before doing the long and expensive process of programming.

We have tested our final product with the nursery school students. From our pre-test and post-test, we found that students have a better understanding about the road safety after interacting with our application. Moreover, they are eager to use the application and find it very attractive. The final interactive media products are in both Thai and English languages. They are ready to be uploaded from Apple store and Google play store for people around the world.

Aim of Research

Teaching tools have been used in teaching children in the past decade. As teaching young children in class room might not be enough, teacher and parents have to work together to solve the learning difficulty in young children. Teaching them about the road safety is not easy task either because the lack of experience, awareness and consciousness in young children. Interactive media seems to be a valuable tool in teaching children. Moreover, nowadays children get access to mobile technology so easily. Mobile application or media helps parents to teach their children with their homework. However, the media for children is not easily designed to be effective. In our work, we want to increase the effectiveness of the media by introducing the persuasive design technique into the development process. The persuasive design technique focuses on the design, research and analysis of computing products that are being developed to change people's attitudes or behaviours. Therefore, the aim of this work is develop a mobile interactive media for road safety education in your children in order to increase the exposure of the road safety education to the children in the fun and persuasive manner. As a result, the children should improve their understanding about the road safety and have better awareness and consciousness in their everyday life. This hopefully reduces the risk of children on the road.

Method of Research & Progression

The research process is divided into 6 parts.

The first part is the important part of literature review about the related works. This includes the researching about the school road safety course syllabus and road safety situations that are related to young Thai children everyday life.

The second part is done in order to understand about young children and road safety education in the context of teaching by parents and teachers. It took around 3 months to finalize the road safety situations that are used in the application development. As this work is design based on the participatory design technique, users including teachers, parents and children are included in the focus group to analyze and finalize the situations. Moreover, the requirements from the children, teachers and parents are gathered at this stage too. The situations were finalized at this stage. This included drafting the script of the scene in each situation.

In our third part, we applied the persuasive design into our application. From the requirements and the analysis of the characteristics of users, we setup the usability goals for our application. Then the persuasive system principles were analyzed and selected to apply in our design. As a result, paper prototypes were developed. The paper prototypes were used in the focus groups with parents, teachers and children in order to evaluate the interface design and usability goals. This stage took longer than we expected as we had many version of paper prototypes. Also the high level prototypes were used to evaluate the animation for each scenario in the situation too.

The fourth part is to develop the final product based on the result of the evaluation of the prototypes from the previous section. The third and fourth parts are done simultaneously in order to make sure that the product meet users' requirement. It is an iterative design process in order to build a closed understanding with the users. The finalized products for both platforms were developed. The sound team created the sound for each scene to complete the final products.

The fifth part is an overall evaluation of the final products. The final product was used to test with young children at the nursery school. The evaluation was done later than we expected in our research schedule as we have done an iterative design and evaluated with many more prototypes in the earlier steps. As we believe it is cheaper and save more time to get it right the first time than wait to get users' feedback at the end of the development process after the final product is done where the complex and time consuming coding is already done. This helps our overall evaluation to get satisfaction from the users with minimal changes.

After our user testing, the final products are launch on the Apple store and Google play store. The final report is generated and publication is being developed. At the moment the publication is being finalized and waiting to be submitted to the international conference.

Results of Research

From our method of research, the results divided into two main parts the result of the iterative design using prototypes and result of user testing.

In first part, the result is concentrated on the design based on the users' requirements and persuasive system principle. There are 4 categories for the persuasive system principles including primary task, dialogue, system credibility, and social support. The design principles in the primary task category support the carrying out of the user's primary task. Any interactive system provides

some degree of system feedback to its users, potentially via verbal information or other kinds of summaries. There are several design principles related to implementing computer-human dialogue support in a manner that helps users keep moving towards their goal or target behavior. The design principles in the system credibility category describe how to design a system so that it is more credible and thus more persuasive. The design principles in the social support category describe how to design the system so that it motivates users by leveraging social influence. Based on the context of teaching young children about road safety, only 2 categories are directly related to our project – the primary task and dialogue. The system credibility and the social support categories are explicitly related so we just applied by making sure there is no error in the application. However, based on the persuasive system principles and our analysis of the characteristics of young children and parents in the context of teaching road safety topic, we design the application to support the user's primary tasks of tailoring and simulation. Our characters and situations in the application are tailoring to children interests or relevant to them. It seemed to be more persuasive as they can relate themselves to the characters and situations. Animations in the application provide simulations to enable children to immediately link between cause and effect in each situation. This will give the children conceptual idea about road safety and see the effect of each scenario of the road safety situation that related to their everyday life. According to the dialogue support category, based on the characteristics of young children, they like being praise as they are simple for the young children to understand and related to. Therefore our application offers praise by giving children applauses when they select the right answer. Moreover, the main objective of the application is to provide visually attractive animation as children are likely to be more persuasive. The paper prototypes were used to get feedback from users during focus group in order to change the design before actually doing the coding. Figure 1 shows some sample of our prototypes.

Figure 1 Example of our prototypes.

In the second part, our final product is being test with the real children in order to evaluate the application. Figure 2 demonstrates our experiment with children. Apart from the persuasive design principle, the application design also takes consideration of interaction design for children too such as larger and longer feedback, larger buttons and balancing between the visual stimulus and desired reaction speed. Results of the road safety knowledge pretest and posttest questionnaires demonstrate that the average of the pretest results is equal to 3.5 and the average score of the posttest results is 5.6 out of 6. It indicates that the children gain a higher score after interacting with the application. This shows that education about road safety through interactive media creates awareness to children about how to behave appropriately and safely on the road. Moreover, from our observation and interview with the children, it is notable that the application is an excellent medium that can draw children's attention. The children like the characters and can related to the characters. The animation used bright colors. The sound effect complements the animation that is enjoyable for children. Apart from gaining the knowledge about the road safety, the application allows the children to manually choose the situation that they are interested to see the

outcome of their choice. The animation demonstrates the result of carefulness or negligence of the road usage in different situations. As evidenced, the teachers and parents found the application easy to use and easy to learn how to use as they can use without any explanations before usage.

Figure 2 Example of our experiment with children.

Future Areas to Take Note of, and Going Forward

For further studies of our design, the application will be tested with more children, teachers and parents in order to understand further impacts in children behavior. The real situation setup will be used instead of questionnaire in order to understand the knowledge transfer of the application in children. Furthermore, the understanding about the joint engagement between parents and children will be studied in order to come up with the design guideline for application that will increase the efficiently in the joint engagement between caregivers and young children.

Means of Official Announcement of Research Results

Both iOS and Android application of "Road Safety for Kids" are published on Apple Store and Google Play Store with acknowledgements of the MSIWF research grant on both applications.

Waiting for reviewers result to publish at the international conference "The Asian Conference on Technology in the Classroom 2017 at Art Center Kobe, Kobe, Japan on Thursday, May 11 - Sunday, May 14, 2017"