ROCKET NINJA: NEW APPROACHES TO THE DESIGN OF DIABETIC HEALTH GAMES FOR THAI CHILDREN

VEERAPONG KLANGPREMJIT

Volume Two: Appendices

A thesis submitted in partial fulfilment of the requirements of the University of Brighton for the degree of Doctor of Philosophy

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Research Information Sheet

Project Title: Designing for better patient experience: Designing gamification in order to improve clinical adherence of children with type-1 diabetes

(Linking the gamification strategy with medical products to tackle the practical problems with product use that patients experience.)

Data Controller: Veerapong Klangpremjit Supervisors: Dr. Camille Baker, Dr. Sue Perks Collaborators: No

Nature/ Purpose/ use of Data:

This research aims to determine how meaningful play through gamification can encourage children with type-1 diabetes to take more responsibility for their condition by making the process of monitoring blood glucose levels more engaging and thus encourage them to manage this disease more effectively.

Gamification is a tool which has already been used for health management. As Heather Browning states, “Games are a successful pedagogical tool to change attitudes and behaviour” (Browning, H in Novak et al, 2015. Pp.105). In this study the researcher aims to use the notion of entertainment to engage and promote health care management and patient behaviour change through the use of gamification.

Type-1 diabetes is a difficult disease for children to manage due to a constant need to monitor blood sugar levels. Failure to monitor the condition can lead to tiredness and fatigue, blurred vision, sudden weight loss and numbness in the feet. In extreme cases this can lead to serious illness including kidney, eye and nerve damage.

The issues of managing type-1 diabetes for children includes the changing environments of home and school and socialising in other children’s homes both of which lead to parents having less control over their child’s monitoring of blood sugar levels and intake of food. For this reason, children from age 5-6 have been targeted. Children with type-1 diabetes also need to have a good working knowledge of their basic symptoms such as hypoglycaemia and hyperglycaemia (high and low blood sugar).

As a Thai national, the researcher has observed that the condition is better managed in the UK than it is in Thailand. In Thailand there are few facilities dedicated to type-1 diabetes and the services that are available are expensive, which is unlike the UK where children receive support from the National Health Service.

The purpose of this research is to look at how to use gamification strategies to improve the experience of young children with type-1 diabetes. Research outcomes include:

Ethics Committee
• Medical product and system design for promoting type-1 diabetes management by engagement with information technology.

• Use of gamification to improve adherence to clinical treatment, to increase self-management, and to teach young patients to deal with the chronic conditions of diabetes-type1.

• Creation of a prototype using gamification as a vehicle for increased engagement. The data will be collected by means of in-depth interviews which will be analyzed to identify the process and problems that children with type-1 diabetes experience. The results of this research will be used in the final design concept for a medical product which is aimed to improve the experience of participants to cope more efficiently with type-1 diabetes.

**The use or potential benefits of the study:**
There will be no direct benefit for children and parents in this research. The researcher cannot promise that this research could help the participants directly but knowledge gained from this study would help to increase the understanding of using gamification to help children with type-1 diabetes manage their condition. Research findings will help develop the concept of medical devices which could be used by children with type-1 diabetes to optimize their clinical adherence (coping with their diabetes) and their use of medical products, such as blood glucose monitors, insulin pumps, lancets, etc. Designers may use gamification to create effective tools for children with type-1 diabetes. Other evidence has shown that using gamification as a tool for health promotion could improve patient experience.

**Likely duration of the project and Location:**
The research will be conducted in Thailand, and will take one hour for interview and questionnaire with each participant. Moreover, the parents will be asked for the permission to observe their child in the classroom at their school which will take three hours (from 9 am to lunchtime) in order to gain an insight into how children manage type-1 diabetes management at school.

**Obligations and commitments of the participant (child and parent/guardian?) during the study:**
In order to understand the problems that patient with type-1 diabetes experience, the method of interview, observation and questionnaire has been chosen. The aim is to study a group of children with type1-diabetes and compare the different approaches of health management in their daily life. The research includes interviews, observations and questionnaires. Information will be collected by an interview investigating the individual patient’s background, their clinical adherence, school activities, shopping, eating, hospital visit, social life, use of electronic devices and any problems experienced when using medical data and managing their daily medical routine. The interviews also focus on how patient’s solve problems related to medical devices or clinical adherence. The information collected in this study will be explained and the participants will be given oppor...
opportunities to ask questions about the procedures used in this studies.

1.) Method to be used to conduct the research

The researcher has chosen to recruit participants in the age group of 5-6 with type-1 diabetes. According to this, participants (parents and child) will be recruited from a clinic from where they receive their healthcare services. They will be informed that their decision whether or not to participate in this study will not adversely affect any relationship or treatments they receive from the clinic. The researcher creates three documents, one for parental permission, one for their teacher's permission and an information sheet which will be translated into Thai language. Children are not required to sign the assent form, but the gatekeepers are required to document in the research record that child assent is obtained. The child has to talk with their parents before they decide whether or not to participate. In this study, the participants will be asked fill in a questionnaire, an interview and their child will be observed as I explain as follow.

1.1) Questionnaire. In this research, the questionnaire will be sent to the participants (parents) directly to their home. The questionnaire is divided into 4 parts in order to study the area of game use to help their child manage their type-1 diabetes as follows: The basic information of their conditions, confidence of complete tasks, their child's past experience of playing game and using the game to help them manage their child's diabetes.

• 1.2) Interview (with parents and child): the individuals interview will be record on audio tape. The parent's and child's voices about their aspect of gamification and how could it be a part of their child diabetes management will be recorded. Before making the interview the participants will be given the list of questions which would be asked by the researcher (as attached). Parents will take a total of about one hour during which time they will be asked to fill in a questionnaire about the child's medical regime, a general behaviour and their aspect of gamification. There will also be a short (one hour) interview with parents and child to discuss how their child manages diabetes condition, in a location which is convenient to the participants.

• 1.3) Observation: The researcher will ask for the parent's permission and school officers' permission to observe their child at school in order to study on how their child manage their conditions at school. The observation will be taking place in their school which will take 3 hours, during their class from 9 am to lunchtime. Furthermore, the researcher has to inform teacher of the class that the observation will not disturb and intrude on the other students while they studying. The observation will be in harmony with the classroom environment and calmly. Their child will be informed in such the way that they understand their own right to decide whether they willing to participate in. The participants will be requested to photograph or film of their treatments regime at school which are the effective way to collect observational data. The photograph and video
recorded allow the researcher to get the insight of children experience with type-1 diabetes management. Picture and video censorship will be taken to protect their anonymity. The research will ensure that the observation does not contribute to increase surveillance or monitoring of children.

2.) After conducting the research.

2.1) Transcribe the interview: The audio-recorded of the interview will be transcribed and reviewed manually by the researcher. The researcher will remove all of the identified information such as name of the participants and their child, name of the clinic, name of the child's school. A pseudonym will be used in order to replace the identified words which have been avoided.

2.2) Keeping the data: The researcher will devise a storage system which will be divided into two parts, "paper-based data" and "audio-based data". The paper-based data will be collected, kept and locked away in the safe place while the audio data will be kept in a personal computer and will be protected by the password which is accessible for the researcher only. The data will be kept in the safe place until the researcher has published this research.

2.3) Accessing of data: Only the researcher and researcher's team (supervisors) will have access the audio or video tape and questionnaire papers which will be used for educational purpose.

2.4) Disposal of records data: When all of the data have been analysed, some part of data about the problems of children with type-1 diabetes experience with every day medical treatments will still be retained because the researcher might need the information to use as the basis further of publication but the information about the participants still be anonymised. This is to make sure that the researcher still retains the information in case of the researcher can not find the participants again. The rest of recorded data will be destroyed by shredding documents, formatting hard-drive about this research and erasing the audio tape.

2.5) Analysing data: The collected data will be analysed manually by the researchers.

The rights of the participants:

The research includes interviews, observations and questionnaires. The participants (the child or their parent/guardian) have the right to refuse to answer any question that they do not want to answer and also have the right to review, edit and erase the research tape. Participants are free to withdraw from the study at any time without needing to justify their decision and without prejudice. In case of withdrawal of consent, no further data regarding their participation should be added to the project, and all records of their participation will be destroyed.

1.) During conduct the research.
The researcher will create three documents, one for parental permission, one for their teacher's permission and an information sheet which will be translated into Thai. Children are not required to sign the assent form but gatekeepers are required to document in the research record that child assent is obtained.

1.1) The parents and children have the right to refuse to answer any question that they don't want to answer.

1.2) The participants are not required to write their name or any identifiable information on the questionnaire, tape recording or any part of this studies.

2.) After conducting the research.

2.1) The participant's data name and personal details will remain completely anonymous. Information will be released to other researchers for the educational purpose only.

2.2) The parents and children have the right to review the recorded research tape to determine whether they should be edited or erased in the whole or in the part.

Confidentiality:

The collected data (research data) will not contain the participant's personal information. All personal data relating to participants is held and processed in the strictest confidence. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. The research data which refers to participants will be anonymised, the data will be made available to the researchers via accessible data repositories and possibly used for educational purpose. In consideration for the research nature of the study participants shall not receive any payment or rewards.

Information for further concerns or complaints:

Any concerns or complaint about any aspects of the way participants have been dealt with during the course of the research will be addressed; please contact The Research Office, University for the Creative Arts, Falkner Road, Farnham, Surrey GU9 7DE Tel: 01252 892922 Email: roffice@ucreative.ac.uk
UNIVERSITY FOR THE CREATIVE ARTS

ASSENT FOR PARENT AND PARENTAL PERMISSION FOR MINOR TO PARTICIPATE IN RESEARCH

Designing for better patient experience: Designing gamification in order to improve clinical adherence of children with type-1 diabetes

(Linked the gamification strategy with medical products to tackle the practical problems with product use that patients experience.)

1. My name is Veerapong Klangpremjit, I am a doctoral candidate at University for the Creative Arts at Epsom. Your diabetic clinic is sending this letter out on my behalf. I am asking if you would be willing to take part in a study for my doctoral research. My aim is to learn more about how I can design the gamification of medical data and create an engaging experience for the users and determine how meaningful play can be created via gamification for children with type-1 diabetes in order to improve their management of the condition. It is well known that games can be used as a tool to engage people in a task. Game-based applications have led to vast opportunities for health communication and health behavior change. Health applications on electronic devices delivered through the Internet and online medical data strategies have become a crucial part of medical service and the modern therapeutic arsenal. However, the question arising here is why are some design experiences successful, and others lacking in interest. This research argues that the gamification strategy could be used as a tool to provide a better patient experience.

2. If you agree to take part in this study, it will be necessary to participate in interviews, observations, and questionnaires that would study type-1 diabetes children's backgrounds, daily medical management routines and general activities. The information required will include details of clinical adherence, school activities, shopping, eating, hospital visits, social life, and play using electronics devices. I am focusing on the problems experienced in managing daily medical routines. The interview also focuses on how diabetic clinicians and parents solve the problems relating to the use of medical devices for clinical adherence. Your
views will be recorded without any personal details.

3. Participation will take a total of about two hours, during which time you will be asked to fill in a questionnaire about your child's medical regime and daily life. There will also be a short (one hour) interview with you and your child to discuss how your child manages their condition, in a location which is convenient to you. I would also ask for your permission to observe how your child manages their condition at school.

Parents will need to ask the child if they participate in this study. The child has to talk with you before they decide whether or not to participate. In this study, You will be asked to fill in a questionnaire, an interview and your child will be observed as I explain as follow.

1.1) Questionnaire. In this research, the questionnaire will be sent directly to you. The questionnaire is divided into 4 parts in order to study how game help their child manage their type-1 diabetes including basics information about their condition, confidence in doing things, their child's past experience of playing games and using the game to help them manage their child diabetes.

1.2) Interview (with you and your child): Interview will be recorded on audio-tape and will concern which aspect of gamification would be relevant as a part of your child diabetes management. Before the interview you will be given a list of questions which would be asked by me (as attached). Participation will take a total of about one hour during which time you will be asked to fill in a questionnaire about your child's medical regime general behaviour and your aspects of gamification. There will also be a short (one hour) interview with you and your child to discuss how your child manages their diabetes condition, in a location which is convenient to you.

1.3) Observation: I will ask for your permission to observe your child at school in order to study on how your child manage their conditions in a school environment. The observation in the school will take 3 hours, during their class from 9 am to lunchtime. Your child will be informed in such the way that they understand their own right to decide whether they are willing to participate in. Your child will be requested to photograph or film of their treatments regime at school which are the effective way to collect observational data. The photograph and video recorded allow me to get the insight of children experience with type-1 diabetes management. Picture and video censorship will be taken to protect their anonymity. The research will ensure that the observation does not contribute to
increase surveillance or monitoring of children.

4. I cannot promise that this research will help the participants directly but knowledge of this study will help to increase the understanding of using gamification to help children with type-1 diabetes manage their condition. The findings of this research will help develop the design of medical devices which could be useful for children with type-1 diabetes to optimise their clinical adherence (coping with their diabetes) and using medical products such as a blood glucose monitor, insulin pump, lancet, etc. Your participation will contribute to a better understanding of the condition that children experience. You will be invited to the final exhibition and given full access to the final design solutions. There will be no direct benefit for participating in this research, but this study will help researchers learn more about the links between gamification and medical objects to help children with type-1 diabetes to cope with their condition.

5. If you would rather not participate in this study or change your mind at a later date, I fully understand. Your decision whether or not to participate in this studies will not adversely affect to any relationship or treatments with the clinic. but it is confidential and only requires responses to questionnaires and is not intrusive in anyway. You can ask any questions by calling me (077-691-53376) or mail to me at vpklangpremjit@gmail.com.

6. I would be grateful if you would sign your name here if you agree to be part of this study.

You will be given a copy of this information to keep for your records.

SIGNATURE OF PARENT OR LEGAL GUARDIAN

Name of Child
Name of Parent or Legal Guardian
Signature of Parent or Legal Guardian Date

SIGNATURE OF PERSON OBTAINING CONSENT AND PARENTAL PERMISSION

_________________________ _________________________
_________________________ _________________________
_________________________ _________________________

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Name of Person Obtaining Consent and Parental Permission

Signature of Person Obtaining Consent and Parental Permission

Contact Number

Date

________________________________________________________________________

Date of Preparation:
Dear Veerapong,

Re: Research Ethics Application

Thank you for submitting your updated application for your project Designing for better patient experience: Designing gamification in order to improve clinical adherence of children with type-1 diabetes for research ethics approval.

I can now confirm that your application for research ethics approval has been considered and approved.

The Research Ethics Committee members considered your ethical self-evaluation for your proposed project and confirmed that the rationale and informed consent of the participants are well detailed and meet the criteria for approval.

Overall attention to the Code of Practice has been carried out with due care and attention and does not, in itself, raise any substantive concerns.

The Committee advises that as your project involves the handling of personal data it is essential that you familiarise yourself with the 8 Principles of the Data Protection Act.

Please study the information at the following link which sets out the key definitions in the Act, and explains what they mean, and shows how they often relate to each other. http://www.ico.gov.uk/for_organisations/data_protection/the_guide/principle_1.aspx

You should discuss with your supervisor the logistics of securely generating, storing and processing data both electronically and in hardcopy to ensure there is no breach of the Data Protection Act.

If you require any further information please don’t hesitate to contact me.

Yours sincerely,

Nino Nizharadze
Research + Enterprise Manager (Staff Research)
Direct telephone: 01622 620026
Email: nnizharadze@ucreative.ac.uk
Appendix B
Interview data with diabetic children and their caregivers

B-1) Participant 1_XX: Child (five years old)

Researcher: Could you tell me about yourself?
Participant: My name is XX. My nickname is XX. I am five years old, studying at ep.3 XX school.

Researcher: Could you tell me about your condition?
Participant: I don't know. When I was two years old, I got high fever and my parents sent me to the hospital.

Researcher: Is there anything frightening about being in the diabetic hospital?
Participant: No... I'm not scared at all... [shaking his head and trying to scratch some stickers on the table]. But sometimes it's hard to be left in the room alone with the doctor and nurse without my mom and dad. It was bad when the men came out with the needle. Then they made me take the bum medicine. When sometimes I got scared of being at the hospital, I cried.

Researcher: Is there anything worrying about being a diabetic child?
Participant: No, but sometimes I want to go camping with the school and I am not allowed to go. This makes me not able to see my friends and I feel lonely. One day, I went on a trip with my family. I was playing with my dog and I fell and rolled down. Because of that I got a wound on my leg and my parents wouldn't allow me to swim with my sister. The wound took a long time to heal due to my illness. That was horrible. That trip wasn't fun at all.

Researcher: Is that because you had to be careful of your scratch?
Participant: Yes [nodding].

Researcher: Is there anything worrying about the interaction between you and your parents?
Participant: Sometimes I want to go and play with my friends without my mom worrying about me too much. It's becoming boring having to do activities that I don’t want to do because they are forcing me to or eating what I don't want to eat.
Researcher: Is there anything worrying related to performing glucose tests and administering insulin regularly?

Participant: No, I'm not worried at all. It's pretty easy. My mom just pricks my finger and that's it [shaking his head]. My parents have taught me when my sugar level is getting high I need to increase the amount of insulin I take. They also taught me to use self-discipline. I know everything, but they don't allow me to do that by myself.

Researcher: Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?

Participant: I have never used that by myself. It’s all done by my mom. My teacher doesn’t even trust me to do it.

Researcher: Are there any problems related to performing glucose tests and administering insulin regularly?

Participant: It seems like I cannot eat everything. I don't know exactly what I can and cannot eat. There is nothing difficult with that. My mom just pricks my finger to test the sugar levels and then injects the insulin based on the sugar levels. I am frustrated with the frequency of administering the insulin injection. I don't know how long it's going to be before this will end and I won't need to inject anymore. I hope that someday my condition will be gone.

Researcher: Are there any problems related to the amount of information given to help you cope with type-1 diabetes?

Participant: I feel like there are so many things that are prohibited. All of these things make me frustrated.

Researcher: What would help you to learn how to cope with your condition?

Participant: I have to learn more about living with my condition on every Saturday at Sirirach Hospital. The nurse taught me about what I can and cannot eat and how to calculate the carbohydrates in what I eat each day. I also have an exam about that at the hospital. This makes me feel dizzy.

Researcher: What can you do when your blood glucose is getting low or high?
Participant: I was taught by my parents that when my sugar level is getting high I should increase my inulin intakes and when it is getting low I should eat something sweet [he seems to have no confidence in this sentence].

Researcher: Could someone help if you experienced these symptoms?
Participant: When my glucose is getting high or low, my mom or my dad will check my sugar level first and they do it for me. They explain everything to me while they are doing it, but they don’t trust me to do it by myself as they told me I’m too young. They don't let me do anything. But I can, it's easy [puts his hands up in the air while speaking].

Researcher: What could you do if you got scared about your diabetes?
Participant: I'm not scared about diabetes. It doesn’t scare me at all. I have to take care of myself and be careful about what I eat and my sugar levels.

Participant 1: XX parent (37 years old)

Researcher: Is there anything worrying about having a diabetic child?
Participant: When my child was newly diagnosed as type-1 diabetes, one thing that I worried about was the continual need to look after him when he was getting older, when I wouldn't be able to be with him all day long. Of course, It's not easy to have to accept that your family is going to have to deal with this condition for a lifetime. I've heard so many stories from other parents of diabetic children about complications that might occur when your child is diabetic, and they haven't coped with their condition well enough.

Researcher: Is there anything worrying relating to the interaction between your child?
Participant: At their current age, I don't want my child to know everything about their condition. I'm afraid that if they knew the truth they might get frightened and resist doing what is necessary to cope with their condition. I tell them it's just a normal condition and that when they grow up, all of the burden of it will be gone. With
the teachers, there are so many problems when we try to explain about their limitations in terms of what they can do at school. There are so many activities in a school day and few opportunities for my child to have a snack when their glucose level is getting low.

**Researcher:** Is there anything worrying relating to the interaction between teachers and doctor?

**Participant:** Again, when we talk about the problem of insulin injection, it's going to be an issue at school. The teacher seems to know nothing about this condition. They don't even know the difference between type-1 and type-2 diabetes. That makes me a bit worried about what will happen to my son when he goes to school. What I'm concerned about mostly is how they will deal with any unexpected situation, including high and low sugar levels. My child cannot eat the food provided by the school. They have declined to provide the specialised diet he needs due to the risk that might be incurred. So, for the reasons I have mentioned, I don't trust anyone in the school to help me cope with my child's condition.

**Researcher:** Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?

**Participant:** There is nothing worrying about using diabetic equipment. When my son was newly diagnosed as having type-1 diabetes, the doctor taught me exactly how to deal with the condition, including how to use equipment such as an insulin syringe and a blood glucose monitor. The use of the equipment requires rigid discipline. If you learn how to operate it from the beginning, you will never forget. For me, using diabetic equipment is not something to worry about, but I am more concerned about how to deal with unplanned events, such as going to a restaurant where there is no food appropriate for our son, or when he goes camping with the school. I have to deal with all of these problems by myself. I know it's hard, but it's what I have to do.

**Researcher:** Are there any problems related to performing glucose tests and administering insulin regularly?

**Participant:** Yes, this is really problematic for me. I’ve found it's hard to administer insulin at exactly the same time every day, especially when you have a job to do. Every day, I have to leave my office.
at lunchtime and at 3 pm in order to check his sugar levels and administer his insulin injection. I can't imagine what I would do if I had an unexpected task to do immediately at work. What I'm thinking is that I have to teach him how to take care himself as much as I can for now.

Researcher: Are there any problems related to using diabetic equipment?
Participant: Personally, I think it depends on the products you are using. If you have bought cheap equipment, it's going to be hard to operate it. Sometimes cheap equipment can distort the results of the sugar-level tests. In my experience I have never had any problems using quality equipment. It is a little bit boring to note everything down when recording food intakes.

Researcher: Have you ever tried to use the app [diabetes data management app] to help you manage your child’s data?
Participant: I just found that it was too complicated to connect the glucose monitor to the app’s system. Personally, I think noting down the information is much easier [smiling].

Researcher: Are there any problems relating to the amount of information available to help you cope with type-1 diabetes?
Participant: From past experience, I don't have any problem with using diabetic equipment, but I would suggest it should have some functions that might be easier for children to operate by themselves. Maybe that's the reason why I don't allow him to do it by himself, because the equipment seems to be too difficult for a child to operate. Almost all of the parents of children with DM1 are afraid of their child doing something harmful by mistake.

Researcher: What would help you to learn how to cope with your child’s condition?
Participant: I was provided with loads of information about taking care of children with type-1 diabetes when I found out my son is a type-1 diabetic. The doctor's team gave me books about coping strategies for the condition and taught me how to use the equipment. They also tested me to check how much I understood about taking care of a diabetic child. It was like being a student again
There is a diabetic camp each year where we can share our experiences of coping with diabetes in our children. In my opinion, the camp is really useful for us; it is a chance for us to exchange and discuss the issues with other parents. At the camp I have come to know a lot of families dealing with the same condition and I have learned a lot from that.

Researcher: What can you do when your son’s blood glucose is getting low or high?
Participant: It’s a simple question. When my son was diagnosed as diabetic, I did a lot of research, finding as much information as possible. Everything that happened taught me a lot about my role as a mother. Since my son has been diabetic, my life has changed, and the only thing I can do is move on and help him. If I feel depressed at any time, I just look at the marks of the insulin injections on his body. I see that he still smiling. This gives me the strength to move on. What I'm trying to say is that dealing with his sugar levels is very simple compared to everything else I've done for him. All I do is to adjust his insulin intakes depending on his sugar levels. When his sugar is getting high, I increase the amount of insulin intake. When it is low, I have to find something sweet, such as two pieces of biscuit or some fruit juice, for him to eat or drink.

Researcher: Could anyone help if you experienced any problems with his symptoms?
Participant: Yeah, there are so many people who are a part of our journey. I have to say thank you to all of them. I really appreciate that. Firstly, Siriraj Hospital staff are very helpful, especially the paediatric team. Without any fuss, they provided me with loads of information when my son was newly diagnosed as being type-1 diabetic.

Researcher: What could you do if your child got scared about his diabetes?
Participant: Yeah, that's an interesting question. I don't even know if he gets scared about his diabetes or not [laughing]. Personally, I don’t think he does get scared about the condition. Maybe he is too young to think about it. What he doesn’t like is being prevented
from doing what he wants to do. I think children at his age don't think too much.

Researcher: What would you do if your child got scared?
Participant: Umm [looking to one side]. What could I do if my son got scared? If he did, I would tell him that his condition is not severe. One day it will be gone if you take the right steps. You are an ordinary child.

Researcher: It's very kind of you to be a part of this field research. All of this information will help me have an insight into the coping strategies of children with type-1 diabetes. Thank you so much.
Participant: You're welcome. Thank you.

A-2) Participant 2_XX: Child (five years old)

Researcher: Could you tell me about yourself?
Participant: Hi, my name is XX. I'm studying at year 3 XX school.

Researcher: Could you tell me about your condition?
Participant: I have been ill for two years. My mom has to prick my finger every day and inject some drug every day as well. I get sick very easily. My parents don't allow me to eat any sweets or even school food.

Researcher: Is there anything frightening about being in the diabetic hospital?
Participant: I hate syringes [raising her hand]. Whenever they like, they take my blood and that's the scariest.

Researcher: Is there anything worrying about being a diabetic child?
Participant: There's nothing to worry about. I just don't want to go to the hospital. After I came back from the hospital when I was younger, I found that I could no longer do what I used to be able to do. This upsets me a lot. My mom told me that, if I want to be healthy, I have to follow the rules. Otherwise I'm going to be sick again.

Researcher: Is there anything worrying about the interaction between
you and your parents?
Participant: My parents are very strict about what I've eaten or what I've done in a day. Once they hit me after they found out I ate some sweets without their permission.

Researcher: Is there anything worrying about the interaction between you and your teachers?
Participant: Sometimes I am not allowed to take a part in an activity, such as playing ball or even swimming.

Researcher: Is there anything worrying related to performing glucose tests and administering insulin regularly?
Participant: I hate taking insulin several times a day. It hurts [she seems shy while speaking].

Researcher: Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?
Participant: It looks scary to me. The needle of the syringe is too long and looks like it would hurt if we injected it into our body.

Researcher: Are there any problems related to performing glucose tests and administering insulin regularly?
Participant: It happens too often. My mom said that when I'm older I will have to do insulin injections myself. I don't want to inject myself.

Researcher: Are there any problems related to the amount of information given to help you cope with type-1 diabetes?
Participant: I don't have any problem remembering all of those things. I know a lot. I also know how to use the equipment in my medical bag [pointing to her bag].

Researcher: What would help you to learn how to cope with your condition?
Participant: I usually go to see the doctor every month. He taught me about my illness, what I should and should not do.

Researcher: What can you do when your blood glucose is getting low or high?
Participant: I tell my parents. If I was at school, I would tell my teacher.
Researcher: Could someone help if you experienced these symptoms?
Participant: My auntie.

Researcher: What could you do if you got scared about your diabetes?
Participant: I don't know because I never get scared.

Researcher: Thank you so much for this interview, that's brilliant.

Participant 2_XX: Caregiver (42 years old)

Researcher: Could you tell me a little bit about yourself and your child's diabetes?
Participant: Hello, I'm a nurse and I’m 42 years old. At the beginning, my daughter was two years and nine months old when her temperature became really high and I took her to Rajviti Hospital for children. All the staff told me she might be a diabetic. At first, I didn't believe them, until I found that her sugar level was 1.260 mg%, which is really, really high. I also learned that her blood is too acid [DKA]. I cried a great deal and could not imagine how I could ever accept it.

Researcher: Is there anything worrying about having a diabetic child?
Participant: I'm worried about how she will cope by herself while she is growing up when I am not there. But right now I'm concerned about the mistake I made last week when administering insulin. I should have given my daughter 28 units of Lantus [name of insulin brand], but I injected 28 units of Novo instead. Novo is the insulin that has the rapid reaction. Because of that I had to keep vigil over a sick child all night and intermittently give her insulin until it stopped working.

Researcher: Is there anything worrying related to the interaction between your child? Is there anything worrying about the interaction between you and your child?
Participant: It's hard to deal with my daughter. She always cries when I prick her and inject the insulin into her body, almost every time.
Researcher: Is there anything worrying relating to the interaction between your child, their teachers and their doctor?

Participant: When my daughter started school, I gave her teacher the diabetic manual to give her an insight into coping with diabetes. I have to provide the wonderful magic bag for my daughter every day. I encountered problems when my child was studying in year 3. In any one day, there are a lot of activities in school, which makes it hard for her to eat a snack to keep her sugar levels balanced. On this occasion, she fainted, and the teacher found that her sugar level was too low. As a result, we learned to be more careful and not to blame others for not understanding the condition. We have to make them understand how serious type-1 diabetes can be.

Researcher: Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?

Participant: In my family, my mom looks after my daughter’s diabetes because both my husband and I work every day and we don’t have time to look after her ourselves. The diabetic equipment was hard for her to operate at first. The doctor had to show her how to operate all of them several times [smiling]. There are so many problems for her, such as the size of the lettering on the screen being hard to read, and not knowing the function of all of the buttons, for example. But the design of the equipment is getting better these days, compared to the past.

Researcher: Are there any problems related to performing glucose tests and administering insulin regularly?

Participant: Definitely, there are. For me, my daughter always refuses to have her insulin injection and cries a lot when she knows we are going to prick her finger and do the injection. I just hope that this only needs to happen to her at this age.

Researcher: Are there any problems related to the use of the diabetic equipment?

Participant: As I said, some of the products aren’t designed to be used by the elderly.

Researcher: Are there any problems relating to the amount of information
available to help you cope with type-1 diabetes?

Participant: There was a lot of information that the doctor didn't tell me at the beginning. I mean, we never knew this until we were faced with an unexpected situation. For example, once my child's hand was shaking as if her glucose level was getting low, but the glucose level was actually high. We learned this was a false sense of hypoglycaemia. There are so many diabetic children who cannot distinguish between true and false senses of low blood sugar levels. Some told me that they felt their sugar level was low, but it was high. Being able to know the truth depended on each child’s level of experience. On this point, I think this is a problem for me because there is no concrete strategy to help us to cope with this condition. As I said, we have to apply the knowledge we have to unexpected situations. This means we have to immerse ourselves in loads of data to get a thorough insight into the condition.

Researcher: What would help you to learn how to cope with your child’s condition?

Participant: The doctor gave me an instructional book on taking care of my child’s diabetes condition, all of which I need to read. In my case, all of my family looks after our child so we all have to do this. On every topic, we have to test our insight into taking care of someone with this condition. I also learn from the internet. We have the Thai Diabetes Organisation to advise us. If we have problems, we contact our doctor and nurse first. I suggest that parents with newly diagnosed children get involved and register at the children’s hospital as soon as possible.

Researcher: What can you do when your daughter’s blood glucose is getting low or high?

Participant: I give her the insulin intake when her glucose level is low and give her something sweet when her glucose level is getting high [smiling].

Researcher: Could anyone help if you experienced any problems with her symptoms?

Participant: I contact a doctor if there is any problem.
Researcher: What could you do if your child got scared about her diabetes?
Participant: I think my daughter might be too young to realise that she has to have the insulin administered every day. The only thing she is scared of is the insulin injection and having her finger pricked. I'm afraid that when she gets older she will be more scared than she is now [laughing].

Researcher: What would you do if your child got scared?
Participant: I'm finding tricks to help me administer her insulin injection easily, for example telling her a story while I do it.

Researcher: OK, that question is the last one. I have to say thank you for being a part of this field research. You gave me such useful answers. All of this information will help me have an insight into the coping strategies of children with type-1 diabetes. Thank you so much.
Participant: Thank you.

A-3) Participant 3_XX: Boy (six years old)

Researcher: Could you tell me about yourself?
Participant: I’m [XX] and I’m six years old. I’m studying at XX school in grade 5. I am a good athlete. I play a lot of sports, swimming, running, playing basketball and volleyball. I also want to be a famous soccer player, so I can show everyone that I am a good player and a smart person. I love drawing as well. In my free time, I love to spend a whole day with my younger brother, playing soccer together and enjoying playing outside.

Researcher: Could you tell me about your condition?
Participant: I was too young to remember how I felt when I was diagnosed as a diabetic patient. I am pretty used to the condition, seeing my mom preparing food for me in the early morning and doing the insulin intake things. I didn’t like the way they injected the insulin dosage and pricked my finger for glucose monitoring at the beginning but I’m getting used to it. It does not hurt me too much [laughing and giggling]. I had to see the doctor almost every week when I was young. He taught me how to balance my sugar levels and make appropriate food choices. I also think that I get thirsty more easily than normal kids. I do not know why.
Researcher: Is there anything frightening about being in the diabetic hospital?

Participant: That does not frighten me at all, but it frustrated me when I realised that I will have to go there quite often forever. Every time you see a doctor it’s like you have to report your health status and condition to him. I don’t think I have a problem with going to see my doctor at the diabetic hospital. I just think it is too often and I am getting bored of it [the participant dropped his voice down low when he mentioned getting bored of seeing the doctor].

Researcher: Is there anything worrying about being a diabetic child?

Participant: Yeah, sometimes it feels like being a diabetic patient limits my ability to do the things that I really want to enjoy. During the school day, the teacher seems to worry too much about my chronic [diabetes]. This makes her always prohibit me from playing with my peers, especially outdoors. My parents are the same; they worry too much to allow me to do anything they think might be dangerous.

Researcher: Why do you think that they worry too much about you?

Participant: I think they think I am different. I am fragile, and they do not want to take any risks. My mom said that I have to be well aware of any situations that might hurt me. They just want to make sure that I am safe.

Researcher: Is there anything worrying about the interaction between you and your parents?

Participant: Yeah, again, I think they worry about me too much. That sometimes makes me feel annoyed. I just want to be like an ordinary person and being a type-1 diabetic patient is nothing special at all.

Researcher: Is there anything worrying related to performing glucose tests and administering insulin regularly?

Participant: I’m getting used to it. I do it every day, in the morning, afternoon, evening and before going to bed. I feel like doing these type-1
activities is a part of my life. My mom said that I cannot live without it [smiling]. One thing that is pretty annoying is that it means relying on other people every time [he means that when coping with type-1 diabetes he has to get help from his teacher and parents to do, for instance, insulin injections, adjust insulin dosages and prepare food choices]. If I could do these things on my own, it would help me get better in terms of being like an average and normal kid.

Researcher: Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?
Participant: Yeah, I think some of them are too difficult to understand and look scary to me, especially the syringe for the insulin dosage and blood glucose monitor. It feels like I should run away from them. I have never used an insulin pump anyway. What is it? I never heard about that thing before. So I cannot tell you about that one. But I think most of the medical stuff that helps me manage my diabetes condition looks complex and not for me at all.

Researcher: Are there any problems related to performing glucose tests and administering insulin regularly?
Participant: No, I do not have any problems. The only problem is that it has to be performed quite often.

Researcher: Are there any problems related to the complexity of the information given to help you cope with type-1 diabetes?
Participant: I think some of it is too hard to understand and some of it is not. I think that choosing the appropriate food is the easiest one, while dealing with the levels of insulin is too hard to understand. What I do know is the appropriate amount of sugar levels, that’s it.

Researcher: What would help you to learn how to cope with your condition?
Participant: I think it would be great if you could do it with games. This would help me a lot in term of persuading me to learn more about coping with type-1 diabetes. I think it is pretty hard to find any books teaching us how to cope with this condition [he means young children]. I’ve found most of the instructional books are designed for adults only with a large amount of text. That is not for me at all. I hate reading books.
Researcher: What can you do when your blood glucose is getting low or high?
Participant: I would tell my teacher, if I were at school. And I’d tell my mom, if I were at home.

Researcher: Could someone help if you experienced these symptoms?
Participant: Mostly my mom [smiling].

Researcher: What could you do if you got scared about your diabetes?
Participant: Yeah, it’s happened sometimes, when they told me that my sugar levels were not that good. Because I am afraid of what will happen if my health condition is not good. Am I going to get sick again? I do not want to have any pain.

Participant 3: XX parent (42 years old)

Researcher: Is there anything worrying about having a diabetic child?
Participant: There are so many issues to be concerned about if your child has a diabetic condition. It is like you have to be aware all the time of everything that might affect your child. I think mostly I get concerned about the insulin levels in their bloods that directly impact their health condition. I pretty much worried the most when my child first had to go to school. When I mentioned his condition to the school, they said taking him was a tough decision, as the teacher had no experience with this kind of child. They were afraid that this [the decision to accept her child] might affect his health condition. I was so worried because I was afraid that my child would not be accepted by the school. Just after his diagnosis, I used to go to the school myself to deal with this diabetes regimen. After doing that for nearly a year the teacher told me she would help me with this. Since then, I have felt such relief that I do not have to come to school anymore and can focus on my work, you know – making money.

Researcher: Is there anything worrying related to the interaction between you and your child?
Participant: Sometimes he wants to do things by himself and seemed to be
embarrassed when I came to his school to do the insulin injection and glucose monitoring. He said, ‘I do not want to be a patient anymore’, which was funny. I think treating him like he was a patient was an annoying issue for him. I always say that if he constantly manages his condition he will get better soon. What makes me anxious is whether he will be able to cope with this diabetes condition in the future. OK, in this moment, we can manage and can help him deal with it. But what about the future, when he is at senior high school? In the meantime, I have been trying my best to teach him as much basic knowledge as I can about coping strategies and living with type-1 diabetes, as well as making him feel proud to be himself and to live with diabetes in the future. I do pretty much have most concern about his future.

**Researcher:** Is there anything worrying relating to the interaction between your child, their teachers and their doctor?

**Participant:** I am so lucky, because the teacher helps me to do his regimen and this helps me a lot. In the beginning it was hard to explain the condition to people because they had no knowledge of it. The teacher did not seem to know how to deal with it. It sounds like a massive issue when you first tell people about it. The school did not want to take any risks and I understood that. I think I have shown them that it is not that hard to deal with, and I take care of all the rest in terms of coping with diabetes [laughing]. If anyone asks for advice in dealing with treatment regimens when a child is at school, I would recommend them to go to the school first and show them the process of looking after diabetic kids. It’s easy. As far as the doctor goes, there are no problems regarding communication issues. We have been working together for so long [she means the experience of dealing with her son’s type-1 diabetes condition].

**Researcher:** Is there anything worrying about using diabetic equipment such as a blood monitor or insulin pump?

**Participant:** Yes, I know about the insulin pump. I just think it is too expensive and that it is not common in Thailand, I think. I have never seen it before, but it is interesting. Using the glucose monitors and insulin syringe is not too difficult. Yeah, sometimes it might seem hard at the beginning, but it is actually not.
Researcher: Are there any problems related to performing glucose tests and administering insulin regularly?

Participant: That’s boring sometimes; it depends on my mood. Sometimes I am so tired of this coping regimen, preparing good food, counting carbs, and administering insulin.

Researcher: Are there any problems related to using diabetic equipment?

Participant: Personally I think it depends on the products you are using. If you buy the cheap equipment it's going to be hard to operate it. Sometimes cheap equipment can distort the sugar level results. In my experience I have never had any problems with quality equipment.

Researcher: Are there any problems relating to the amount of information available to help you cope with type-1 diabetes?

Participant: From past experience, I have found no difficulty in using diabetic equipment, but I would suggest it should have some functions to make it easy for children to operate by themselves. Maybe that's the reason I don't allow him to do it himself, because the equipment seems to be too difficult for the child to operate. Almost all of the parents of children with DM1 are afraid their child might make a mistake when operating it.

Researcher: What would help you to learn how to cope with your child’s condition?

Participant: I was provided with loads of information on taking care of children with type-1 diabetes when I first found out my son is type-1 diabetic. The doctor's team gave me a number of books about coping strategies for type-1 diabetes. He taught me how to use the equipment. They also tested me on how much understanding I had about taking care of someone with diabetes. It was like being a student again [laughing]. There is a diabetic camp each year where we can share our experiences of coping with our child’s diabetes. In my opinion, the camp is really helpful for us because we have the chance to exchange and discuss ideas about the issues. Through the camp I have come to know many families who are dealing with the same condition. I have learned a lot from that.
Researcher: What can you do when your son’s blood glucose is getting low or high?

Participant: It’s a simple question. When my son was diagnosed as diabetic, I did a lot of research, finding as much information as possible. Everything that happened taught me a lot about my role as a mother. Since my son has been diabetic, my life has changed, and the only thing I can do is move on and help him. If I feel depressed at any time, I just look at the marks of the insulin injections on his body. I see that he still smiling. This gives me the strength to move on. What I'm trying to say is that dealing with his sugar levels is very simple compared to everything else I've done for him. All I do is to adjust his insulin intakes depending on his sugar levels. When his sugar is getting high, I increase the amount of insulin intake. When it is low, I have to find something sweet, such as two pieces of biscuit or some fruit juice, for him to eat or drink.

Researcher: Could anyone help if you experienced any problems with his symptoms?

Participant: Yeah, there are so many people who are a part of our journey. I have to say thank you to all of them. I really appreciate that. Firstly, Siriraj Hospital staff are very helpful, especially the paediatric team. Without any fuss, they provided me with loads of information when my son was newly diagnosed as being type-1 diabetic.

Researcher: What could you do if your child got scared about his diabetes?

Participant: Yeah, that's an interesting question. I don't even know if he gets scared about his diabetes or not [laughing]. Personally, I don’t think he does get scared about the condition. Maybe he is too young to think about it. What he doesn’t like is being prevented from doing what he wants to do. I think children at his age don't think too much.

Researcher: What would you do if your child got scared?

Participant: Umm [looking to one side]. What could I do if my son got scared? If he did, I would tell him that his condition is not severe. One day it will be gone if you take the right steps. You are an or-
dinary child.

Researcher: It’s very kind of you to be a part of this field research. All of this information will help me have an insight into the coping strategies of children with type-1 diabetes. Thank you so much.

Participant: You’re welcome. Thank you.
Appendix B-2

B-2) Focus Group: Group 1
Children of five years old

The group of participants gathered in a private room provided by school staff. Participating children were observed while they responded to the interview questions. The table below shows the transcripts of the interview data of each single of group of children including any of their actions.

<table>
<thead>
<tr>
<th>Location: Chokchai Rangsit School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interview Questions</strong></td>
</tr>
<tr>
<td>Researcher: ‘Hello everyone. My name is Veerapong Klangpremjit. I am a games designer and I am going to talk about an interesting thing. I want to know more about what kinds of things you guys are interested in, what games you are playing, and what is the most enjoyable content for you.’</td>
</tr>
<tr>
<td>Teacher:</td>
</tr>
<tr>
<td>'How are you guys doing today?'</td>
</tr>
<tr>
<td>'What did you do last weekend?'</td>
</tr>
</tbody>
</table>
| 'What kinds of activities are you obsessed with these days?' | P1: ‘I love playing with friends, I usually role play with them and pretend I am the mom of their family.’ [she means her friend's family]  
P4: ‘I love to draw sometimes and sometimes I play games on my mom’s tablet.’  
P3: ‘I am always watching cartoons, like Pokemon and Benten. Cartoons are fun, and I do not want to do anything else.’  
P4: ‘I play Lego and love playing soccer at the same time. Oh! Swimming as well.’  
P5: ‘These days, I play ‘Pokemon Go!’ and I watched this cartoon as well. This is so much fun, and I want to be like the pocket master.’  
P7: ‘I love to play with my siblings, playing basketball and outdoor activities and also swimming.’  
P8: ‘I watch cartoons as well.’  
P2: ‘I also like reading comics and playing with colouring books as well.’ | When P3 mentioned about watching cartoons, the rest of the participants seemed to agree with her choice and said that they love watching cartoons as well. Some of them stated the names of cartoons that they had recently watched such as Frozen, Pokemon, Conan, Benten and Disney cartoons. In this question P8 seemed to be a little shy and lacking in confidence. In addition, some of the participants answered the questions based on their peers’ answers. In this section, the girl participants made fewer answers. |
| 'What kinds of entertainment media do you frequently watch and use?' | P3: ‘I just watch TV cartoons.’  
P1: ‘I normally watch cartoons on the television as well.’  
P6: ‘So do I.’  
P4: ‘I do play mobile games sometimes and sometimes on my desktop.’  
P2: ‘Yes, I watch them [cartoons] on the television, mostly.’ | Every participant nodded at the mention that watching television cartoons was the most frequent media choice for them. |
| 'What is it about?' | P7: ‘I watch Pokemon because most of my friends do and they told me to do so.’  
P4: ‘The Pokemon is about the fighter finding good monsters to fight with the bad guys. The master has to get the monster as much as he can. I do love the Pikachu, it is so cute.’  
P5: ‘I like Frozen, she is so gorgeous and brave. She has a pretty hair colour and great power. I love her dress as well’  
P8: ‘Yes, I love Frozen, too. But her name is Elsa anyway. I found it charming because of her beauty.’  
P1: ‘I play Minecraft on the mobile phone; that is so much fun that I can create anything that I want inside the game.’  
P2: ‘Yes, I play Minecraft as well’  
P1: ‘My mom allows me to play it sometimes because I have to use her phone. I’m asking her if I can get my own phone.’  
P7: ‘I read the books about Farm. It’s about doing farm. The picture is cute and colourful. I also colour in a colouring book as well; it is a Disney character storyline. I like Mickey Mouse and Donald Duck.’  
P6: ‘I play Cookie Run. It is a cookie running. I have my own cookie and I let it run further in order to compete with my friends. I like it. I play it on the tablet and mobile phone, sometimes.’ | The girl participants seemed to have more confidence here, compared to the previous questions, especially when they talked about the cartoon characters that they preferred.  
P2 interrupted P1 and raised his hand to show his interest in the Minecraft game. |
| ‘Have you ever played digital games before?’ | P1, P2, P4 and P6: ‘Yes, I’ve played them.’  
P8: ‘I don’t really play digital games because it is prohibited in my family. They say it might affect my studies.’  
P4: ‘I mostly play it on my parents’ devices, I don’t have my own.’ | Most of the participants nodded to indicate that they had played digital games before. |
### 'What is it about?'

| P7 | ‘Pokemon is a really cool game. I love the way I collect monsters and compete with my friends. I feel like I am a master when I can conquer them.’ |
| P1 | ‘Minecraft is a game that makes me design my own world. I can create my garden, house, space, characters and even world. This is fun. I also created a waterfall like a big one in front of my house and there is a cliff at the back of my house as well.’ |
| P2 | ‘The Pokemon is a pet. We have to look after it very well to be able to fight with the other monsters. I have to explore the real world to see where the monster is located.’ |
| P6 | ‘I play with a colouring book on the mobile phone. It is the Disney characters’ colouring book. It is so cute, and I also want to show my parents what artistic skills I have.’ [her abilities] |
| P4 | ‘I’m playing ‘Cooking Mama’. It’s about cooking. I can cook the new recipes. I love to see when the game unlocks new ingredients and also new recipes. It has a cute graphic. I like it!’ |
| P5 | ‘Pokemon Go! is fun. It’s about collecting as many monsters as I can. I have reached level 47 and I have a lot of monsters in my gym. All of them are great.’ |
| P1 | ‘I have great monsters as well. They have great power; some of them can shoot the other monsters.’ |
| P4 | ‘I play the Frozen game as well.’ |
| P3 | ‘There is no Frozen game, I never seen it.’ |
| P4 | ‘Yes, there is. I’m playing it.’ |
| P3 | ‘Sometimes I play ROV because my brother plays it. And I’ve found it is interesting. That is fun.’ |

### 'If you could do anything you wanted, what would it be?'

| P7 | ‘Pokemon is a really cool game. I love the way I collect monsters and compete with my friends. I feel like I am a master when I can conquer them.’ |
| P8 | ‘If you could do anything you wanted, what would it be?’ |
| P4 | ‘I would want to show my parents that I had worked really hard and got a really good grade in maths.’ |
| P1 | ‘I wish I could help my mom to manage the housework.’ |
| P6 | ‘I want to be top of the class.’ |
| P7 | ‘I want to show everyone that I’m a smart person. I’m good enough to do something for this world. And I also want to be rich.’ |

### Notes

- When he was speaking, the other students seemed to agree with him about the Pokemon game being their favourite.
- While the participant was talking about Pokemon Go! some of the girls laughed at him.
- When she speaks, and her voice shakes while speaking.
- He uses his body language to support his statements.
Children of six years old

The group of participants gathered in a private room provided by school staff. Participating children were observed while they responded to the interview questions. The table below shows the transcripts of the interview data of each single of group of children including any of their actions.

<table>
<thead>
<tr>
<th>Location: Chaiyapreuke Primary School</th>
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</thead>
<tbody>
<tr>
<td><strong>Interview Questions</strong></td>
</tr>
<tr>
<td>Teacher: ‘Hello! Everyone, today I’m going to introduce you to a guy who is a games designer. He’s come to see you in order to find out something from you to help him design a game.’</td>
</tr>
<tr>
<td>Researcher: ‘Hello everyone. My name is Veerapong Klangpremjit. I am a game designer and today I want to discuss with you what has interested you recently, to find out what kinds of things you enjoy. This is going to be fun for you guys. OK! Let’s do it.’</td>
</tr>
<tr>
<td>‘How are you guys doing today?’</td>
</tr>
</tbody>
</table>
‘What did you do last weekend?’

‘Oh, do you have a mobile phone?’

Does anyone have a mobile phone?

The interviewer asked P2 what the book was about.

P1: ‘I played the Pokemon game with my brother. I explored around my village and I found three of the Pokemon gyms located near my house. I just discovered a rare one close to my house as well. I have been trying to get as many as I can because I am competing with my brothers to collect them.’

P1: ‘Yes I have.’

P2: ‘I went to the department store and read some books.’

P2: ‘Oh, it was a Frozen illustration book. I’m collecting it and the Polly Pockets as well [brand of doll’s house]. I like to play it because I find it is cute. And I watched movies and a cartoon. It was a Sakura Jung.’ [Japanese animation that was shown every weekend in 2015]

P3: ‘I did my homework. I was allowed to play with my friends when I had finished my work.’

P4: ‘I did my homework as well. I did maths and English. I found it hard for me.’

P5: ‘I also played games. I played Pokemon as well, but recently I’ve played ROV. It is so addictive. I play it with my peers, who I meet online. In ROV I can play with my friends even though we have never met each other. We met online and have formed a team as well.’

P1: ‘I played ROV once. It is fun.’

P6: ‘I watched cartoons in the morning, did my homework after watching the cartoons and then my mom allowed me to play the games on her iPhone. It was the Pokemon and Candy Crush games. And I also played outside with my friends in my village as well. I like weekends so much.’

P7: ‘I did my homework and played sport with my friends. I played badminton and sometimes I watched cartoons.’

P8: ‘I read books, watched cartoons and did homework as well. I think everyone here had to do our homework because we all had the same assignment from the same teacher [laughing]. But normally, when I finish my homework I watch comic. I watched Pocket Monster.’ [the same storyline as Pokemon Go]

P9: ‘I played a game. It was Candy Crush and I also went to a department store near where I live with my family.’

Seven of the participants showed their phones to the researcher. They raised their hands to show that they had a smartphone.
What kinds of activities are you obsessed with these days?

P9: ‘I play Pokemon Go like most of my friends and I’ve found the game is addictive for us. It makes me want to watch the Pokemon cartoon. I never watched the Pocket Monster before until I played this game. I just like the story where Akai [name of the main character] explores the world to collect monsters. I just want to be like him.’

P2: ‘I love collecting illustrated books. Sometimes I print a paper doll from the internet and dress her up however I want [she means she dresses the doll up]. I like the way in which I can dress and decorate something like interior decoration and dressing up. I also love to see animals as well. My parents let me watch the wildlife animals on the True channel. They are so cute.’ [the animals]

P4: ‘I like watching cartoons and also reading scientific comic books. I watched Conan [Japanese animation about detective child] recently. I just like how smart he is.’

P3: ‘I just went to Dreamworld [Thailand’s largest amusement park located in the north of Bangkok]. I love being there. I liked playing on the rollercoaster; that was fun for me.’

P5: ‘I play games and watch cartoons. I watch Pokemon Go and play ROV as well. I could play it all day if my mom allowed me to. I don’t want to do my homework. My friend told me that I can make money by playing ROV as well [laughing].’

P2: ‘No, you can’t. Who’s gonna pay for you?’ [she is talking to P5]

P2: ‘That is the E-sport job. You can earn a million if you are the world champion [the champion of the ROV competition]. I’ve played ROV as well as Minecraft. I’ve found that most of my friends play ROV, but I also find Minecraft enjoyable.’

P9: ‘I don’t like the way the game looks. The graphics look like blocks of brick.’ [he means Minecraft’s visual design]

P8: ‘I love watching cartoons as well. On the True channel [pay TV], I can watch Cartoon Network, which has so many fun cartoons available for kids. I enjoy watching it a lot. My favourite one is Ben10. I’ve found that the story is similar to Pokemon Go.’

P5: ‘I do enjoy swimming. I like to swim. I’m so happy that every Wednesday I have a swimming class. That is so much fun. I’m also a good swimmer.’

P1: ‘Yes, I like swimming, too.’

P7: ‘I play badminton. I love to run. I run fast. In my free time I also watch cartoons

The participants seemed to be interested in the topic we were discussing. They were happy to share the things they have been interested in recently.

Every participant seemed to agree when P5 mentioned that he liked swimming and said that they also liked swimming.
What kinds of entertainment media do you watch and use frequently?

P6: 'I think we all know Pokemon Go. It is very, very famous for us. Everyone plays it.'

P7: 'Yes, I agree.'

P2: 'I like Disney Princess and all of the Disney characters. They are lovely.'

P3: 'I do like Pikachu. It's cute and powerful at the same time. I don't know why, I just I like it.'

P4: 'Oh, do you know Naruto [Japanese animation and comic book about the story of a ninja adventurer named Naruto]? It is so much fun. I like the way they fight each other.' [He means ninjas in the Naruto storyline]

P5: 'Television, I think. I mostly watch cartoons on the TV, not on the internet. There have been too many fun animations to watch recently.'

P8: 'Yes, I agree.'

P1: 'I think I mostly play games though the mobile phone or maybe on tablets. I guess.'

P1: 'But I still like reading books. I like that I can touch them.'

P9: 'I usually play online games via the internet on the mobile phone, or the computer sometime.'

What is it about?

P2: 'Mostly, it is about creating something. For me I like dressing up, interior and house decoration. Sometimes I play cooking games.'

P6: 'Collecting the monsters. Sometimes fighting the enemies in the game can be fun. I do like it.'

P5: 'It all about fighting with the bad guys, I think. Most cartoons are about the fighting things. We all love to see the bad guys die.'

P4: 'I like to watch documentaries about space and I also want to explore it. I visited the science museum once and it was fun for me to see something like that. I wanna know what is there, outside the world.'

P3: 'Yes, me too.'

P1: 'I was Pokemon Go.'

Have you ever played digital games before?

All participants: 'Yes we have.'

The participants all answered in the same way at the same time.
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘What are they about?’</td>
<td>P2: ‘Most of the games I play are dressing up dolls, cooking and opening restaurants, like Barbie Doll games and Cooking Mama.’ P4: ‘Animals and Zombie games.’ P1: ‘We all play the Pokemon game.’ P6: ‘Yes, it is about collecting monsters and letting them fight each other. You can explore the real world to find a rare one and let them fight your friend’s monster.’ P5: ‘It is mostly about fighting the bad guys with your best friends and collecting good weapons.’ P7: ‘Mostly, it is all about the fighting and upgrading things.’</td>
</tr>
<tr>
<td>‘If you could do anything you wanted, what would you do?’</td>
<td>P2: ‘I would love to go to Disneyland in Hong Kong. My parents keep saying that if I am a good child and get good grades they will take me there. So I work so hard to be top of the class to make them [parents] proud so they will take me to Disneyland.’ P1: ‘I would love to be able to fly and go anywhere that I wanted. I would also love to explore somewhere new, like somewhere that no one has found before.’ P3: ‘If I could do everything that I wanted I would go anywhere that I wanted to go. And I want to be able to fly as well.’ P4: ‘I would love to explore the world, to go anywhere that I wanted to go, and to be a billionaire as well. I would buy anything that I wanted [laughing].’ P5: ‘I want to make my parents proud of me. I want to be a smart kid and grow up to be a doctor. My parents want me to be a doctor.’ P6: ‘Yes, me too. I want to make my mom proud and have good enough grades to get into the best school. They expect me to get into the best schools in the future. It’s very competitive recently.’ P7: ‘I want to be a pilot. I love the idea that everyone wants to explore the world, I would do the same thing as well. It would be fun, if you could travel the world.’ P8: ‘I want to be a superhero [laughing]. I think I would be surrounded by people who loved me. And I would have a lot of friends.’ P9: ‘I want to be rich. I would buy a big house, travel the world, buy anything that I wanted.’</td>
</tr>
</tbody>
</table>

Some of the participants who did not answer the question nodded to say that their views were similar to some of these answers.
Researcher: ‘Wow, this is such great information. I really enjoyed having this discussion with you guys. You are all smart kids, like your teacher said. Thank you so much for this lovely experience. If my game gets designed, I will show it to you.’

Teacher: ‘Yes, you did great. Say thank you to him, everyone, and we will go back to the classroom.’

| Researcher: ‘Wow, this is such great information. I really enjoyed having this discussion with you guys. You are all smart kids, like your teacher said. Thank you so much for this lovely experience. If my game gets designed, I will show it to you.’ | All participants: ‘Thank you so much!’ | - |
Appendix B-3
Play-testing feedback on the Garden Tower game

Focus Group: Group 1
Children of five years old

The objective of this focus group was to determine the persuasive factors and test the feasibility of defined criteria in the initial design stages of the game in order to develop it for actual diabetic participants of this particular age. The demo game was shown to participating children in order to gauge their responses to engaging in elements based on the four strands of its structure: (1) mechanics; (2) aesthetics; (3) interaction activity; and (4) cultural context. The focus group was held in ChokeChai Rangsit School in the north of Bangkok. The participating children were allowed one hour in which to play the game in a room provided with a laptop. While they were playing, the researcher also observed their behaviour relating to each game-playing performance, before asking the interview questions. The table below demonstrates the information gained from the focus group activity.

<table>
<thead>
<tr>
<th>Observation data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timeframe 1: 0.00–8.00 minutes</strong></td>
</tr>
<tr>
<td>The children seemed to be struggling with the flow of the game. They skipped over the title and story pages and continued to the main menu page. Four of them did not know where to go next when they saw this page. They clicked on sub-features randomly and then found that certain pages are not supposed to be played at this stage. For instance, two of the participants clicked into the library and found there is no function there. This feature is designed to display the harvested crop gained from the garden feature in the first menu bar. At this stage, most of the participants guessed and learned how to play the game by themselves without reading the instructions. They explored the game mechanism by randomly selecting features and choosing from the menu.</td>
</tr>
</tbody>
</table>

<p>| <strong>Timeframe 2: 8.00–12.00 minutes</strong> |
| During this timeframe, most of the children started to learn how the game works in terms of gaining scores by planting and harvesting crops. Three of them played the game fluently, while two had problems with the crop-picking and crop-watering icons. One participant did not realise that he had to drag the crop into the soil first. He clicked and then released the mouse to plant and water the crops. |</p>
<table>
<thead>
<tr>
<th>Observation data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timeframe 3: 12.00–30.00 minutes</strong></td>
</tr>
<tr>
<td><strong>Timeframe 4: After 30 minutes</strong></td>
</tr>
</tbody>
</table>
## Interview Questions

<table>
<thead>
<tr>
<th>Researcher: ‘Hello everyone. My name is Veerapong Klangpremjit. I’m here today with my game Garden Tower. This is a game for any of your friends who have diabetes. It will help children of your age to manage their diabetes. Today, I want you guys to play it and tell me whether the game works for you or not. The Garden Tower game will allow you to create your own garden, plant your crop and harvest it. Then you can cook a good recipe that is appropriate for someone with diabetes. The score that you gain from the diabetes management activity will enable you to create a better garden. Let’s play!’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher: ‘Everyone, here is Veerapong. Today, he’s here to show us his game; that is pretty interesting. This is a game to help your friends with diabetes cope with their complex condition. Do you wanna play it? Do you want to see what it is gonna be like?’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All participants: ‘Yes!’</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3: ‘Can I see it now?’</td>
</tr>
</tbody>
</table>

| The participating children were allowed an hour to play the garden game. One participant stopped playing before the hour was up, as they had lost interest in it. For the details of the play-testing focus group, please see the table above. |

### 'Did you guys like the game's storyline?'

<table>
<thead>
<tr>
<th>P3: ‘I think the game was too easy and it’s supposed to be a kids’ game.’</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5: ‘But I think that was cute.’</td>
</tr>
<tr>
<td>P1: ‘I don’t know much about the game’s storytelling. It’s not important. I’ve played a lot of games like this before. It’s quite familiar to me. It’s not something new.’</td>
</tr>
<tr>
<td>P2: ‘The game is cute, too cute [laughing].’</td>
</tr>
<tr>
<td>P4: ‘Yeah, it had like too childish a look for me.’</td>
</tr>
<tr>
<td>P1: ‘I’ve played the garden game before. It was fun, but I think this one did not have a fun storyline.’</td>
</tr>
<tr>
<td>P2: ‘The game was too constraining for my imagination, I don’t know. It was like I was doing homework from school.’</td>
</tr>
</tbody>
</table>

| Some of the participants did not seem confident in their answers, while some of them did. |

### 'What did you think about the game’s visuals?'

<table>
<thead>
<tr>
<th>P2: ‘I do like it. It was cute. Its graphics remind me of Heyday. I like playing Heyday. I like the town in the game. Some of the icons are nice.’</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: ‘The game is like an illustration book that I have drawn in recently.’</td>
</tr>
<tr>
<td>P4: ‘I don’t like it. It is so camp. It would make me look like a girl if I played it.’</td>
</tr>
<tr>
<td>P3: ‘Yes, I think so. It was like playing a kids’ game. It’s too cute but it’s nice though. Anyway I won’t play it.’</td>
</tr>
<tr>
<td>P5: ‘I think it was fine and I like it. But some pages weren’t cute or attractive.’</td>
</tr>
</tbody>
</table>

<p>| At this point, the participating children seemed to lack the confidence to share their thoughts. Some of them kept quiet. After the first answer, they seemed to feel brave enough to give their views. They also looked at each other to see who would speak first. |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Participant Response</th>
<th>Observations</th>
</tr>
</thead>
</table>
| 'Do you think you could identify with the game’s character?' and 'Did it appeal to you?' | P1: 'I did not see the character at all when I played the game. I just saw the garden. That was nice.'  
  P4: ‘Yeah, me neither.’  
  P5: ‘Me too.’  
  P3: ‘You can see it on the front cover, see.’ ([he is talking to the other participants]) | Almost all of the participants nodded their heads to say that they did not notice the main character in the game. |
| 'How about the game’s rules; did you like them?' | Researcher: ‘By “the game’s rules” I mean the way it works with responsive rewards based on your playing action, the playable features, the stages and the levels.’  
  P3: ‘What do you mean by “the game’s rules”?’  
  P3: ‘It was too easy for me to play. I was expecting to see some bad guy in the game, so I could beat him down. But the game was just planting food and cooking food. I think a cooking game is not my ideal type of game. It’s for girls [looking at P4].’  
  P4: ‘Yes, it was fun, some parts. But mostly I think it was too easy to be played. Recently, I’ve been playing Pokemon Go and I’ve found that much more interesting. There are many more features in Pokemon Go.’  
  P5: ‘I play Pokemon Go as well. This game seemed to be a bit boring for me because it was too easy to win. I found that some parts of the game are not finished yet. I tried to find more levels where I could go further in the garden game.’  
  P1: ‘Yes, I think the game features are too limited. I wanted to play more on the game but there was no further function. But I liked the concept of cooking recipes. I would love to collect and create my own recipe.’  
  P2: 'I think the game should provide more options to decorate my garden [she means the visuals of the gardening pages].’ | In this part of the interview, the children seemed eager to say what they thought about the game play, and they did so confidently. The girls seemed to participate much more when talking about the cooking element of the game. |
<table>
<thead>
<tr>
<th>Question</th>
<th>Participant 1</th>
<th>Participant 4</th>
<th>Participant 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Was it easy to play the game in terms of its flow?'</td>
<td>'I think the game seems a little plain for me as I’m looking to see some villains, but there is no villain in there.'</td>
<td>'The game confused me at the beginning. I just didn’t know where to go next. After I saw the front menu page, I just got confused about where I was supposed to play first. I think it’s because it was an English version.'</td>
<td>'I think the same as them. I’ve played many games before and I found that most of them have a tutorial navigation mouse or icon that shows me where to go and what to do within the game.'</td>
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<tr>
<td></td>
<td>'Yes, I agree. Sometimes the game confused me. I still found it hard to access the main page of the game. Why was the library module located on the front page? That was weird.'</td>
<td>'For me, I just struggled with the delay in the game’s repulsive implication, especially when I played the planting module. Sometimes I dragged the crop into the soil and it did not work. I just did not know whether my action was successfully operated by the game’s system or not. I agree with them, as the front page is supposed to guide us as to where to go next.'</td>
<td>'I think the same as them. I’ve played many games before and I found that most of them have a tutorial navigation mouse or icon that shows me where to go and what to do within the game.'</td>
</tr>
<tr>
<td></td>
<td>'For me, I just struggled with the delay in the game’s repulsive implication, especially when I played the planting module. Sometimes I dragged the crop into the soil and it did not work. I just did not know whether my action was successfully operated by the game’s system or not. I agree with them, as the front page is supposed to guide us as to where to go next.'</td>
<td>'Yes, but I did like the graphics. It was cute for me. The images were like those we normally see in comic books and TV cartoons. Have you ever seen the Cartoon Network? I think the game reminded me of the Cartoon Network animations that I have watched recently.'</td>
<td>'I think the same as them. I’ve played many games before and I found that most of them have a tutorial navigation mouse or icon that shows me where to go and what to do within the game.'</td>
</tr>
<tr>
<td>'Was the game’s interface and all the information easy to read?'</td>
<td>'It was English text. I found it hard to translate all of this.'</td>
<td>'I loved the graphic interface. It was cute and attracted me from the start. I loved the colours and the chicken on the cover page.'</td>
<td>'It was hard to read. It is an English game, and I’m not good at English. I also found that some of the text was too hard to read. I think the style of it was too bold and I didn’t know whether it was saying “W” or “M”.'</td>
</tr>
<tr>
<td></td>
<td>'It looks like that one.'</td>
<td>'But I think the game’s text was easy to read. It was very, very easy. Why do you think it was hard to read? [he was asking P5]</td>
<td>'It looks like that one.'</td>
</tr>
<tr>
<td></td>
<td>'Yes, but I did like the graphics. It was cute for me. The images were like those we normally see in comic books and TV cartoons. Have you ever seen the Cartoon Network? I think the game reminded me of the Cartoon Network animations that I have watched recently.'</td>
<td>P1 pointed to a decorated board in the classroom and said that the graphic design within the garden game was close to and looked similar to it. A picture of this board is attached in the next part of this table and can be seen in Images A.1–4. All of the participants seemed to agree with P1 that the graphics looked similar to the board.</td>
<td></td>
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</tbody>
</table>
Focus Group: Group 2
Children of six years old

As with the previous focus group, the researcher was given a room with five participating children aged six. The school is in a central area of Bangkok. The meeting began by introducing the game project. The interview started at 12.30pm and took one hour to complete. The table demonstrates the transcripts of the interview including any observation data that identifies the children’s actions.

<p>| Timeframe 1: 0.00–8.00 minutes | Three of the participants selected the gardening module first, which was the right choice to start the game, while two of them selected the library module to play first. When they found that this feature had no gaming function they clicked back to the main menu on the first page. At the beginning of the game the children also skipped this page to go directly to the main game-playing part, which is the gardening page. Four of them struggled to work out how to earn scores that enabled them to buy and decorate the garden. One participant asked his friend how to get the score and where to buy some seed to plant into the garden. It was clear that the children (N=3) were trying to drag up and down the screen to find more features within the gardening page. |
| Timeframe 2: 8.00–12.00 minutes | In this phase, all of the children seemed to understand the game’s mechanics (ways of playing the game). One participant said that the game was too easy. They tried to drag the seeds into the soil and found that it was not responsive enough. They clicked into the soil twice to speed up the feedback. All of them tried to find another type of seed and explored the shop module. At this stage, they (N=5) seemed to be able to understand the game’s rules and could play it fluently. |</p>
<table>
<thead>
<tr>
<th>Observation data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timeframe 3: 12.00–30.00 minutes</strong></td>
</tr>
<tr>
<td><strong>Timeframe 4: After 30 minutes</strong></td>
</tr>
</tbody>
</table>
### Location: Chokchai Rangsit School

<table>
<thead>
<tr>
<th><strong>Interview Questions</strong></th>
<th><strong>Statement</strong></th>
<th><strong>Action</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher: ‘Everyone, this guy is Veerapong. He is a games researcher and has a study research degree in game design. Today he’s here to conduct an interview with you to find out whether his game is fun or not. I will let him introduce himself.’</td>
<td>All participants: ‘Yes!’</td>
<td>The participating children were allowed an hour in which to play the garden game. One of them stopped playing before the hour was up, as they lost interest in it. For the details of the play-testing activity, please see the table above.</td>
</tr>
<tr>
<td>Researcher: ‘Hello everyone, my name is Veerapong Klangpremjit. Today I’m here with my game Garden Tower. The game is designed for any of your friends who have diabetes. This will help children of your age to manage their diabetes. Today, I want you guys to play it and tell me whether or not you think it is fun. The concept of this game is to create a garden, plant crops and harvest them. Then you can cook great recipes that are appropriate for someone with diabetes. The scores that you gain from the diabetes management activities will enable you to create a better garden. OK! Now I will let you play it.’</td>
<td></td>
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</tbody>
</table>

‘Did you guys like the game’s storyline?’

| | P1: ‘I think the storyline was nice. I think it was a really cute game. The game was similar to Harvest Moon [Japanese farming game].’ | The participants did not seem confident in their answers or did not seem willing to speak openly to the researcher. |
| | P2: ‘I found there was no storyline inside the game.’ | |
| | P3: ‘Yes, I agree. I didn’t see any storyline in the game we just played.’ | |
| | P4: ‘For me, I think it was a typical game. It is the sort of game that can easily be found on the market. I have played so many games like this before. I have played Hay Day and I think that game is much more fun than this one.’ | |
| | P5: ‘I liked the garden content. It didn’t seem like a boy’s game for me. It was suitable for all of us.’ | |
| ‘What did you think about the game’s visuals?’ | P5: ‘I liked it. The style of the graphics was cute and easy to interpret. I liked the colour scheme and mood and tone as well. I thought it was a friendly design for children like us.’ |
| | P3: ‘It was easy to read but I thought it looked generic and not special enough to attract me in the first place. I think we have so many games to play these days and all of them are so attractive.’ |
| | P2: ‘Yes, I agree. The style of the game was similar to a child’s school textbook or colouring books for early-years children.’ |
| | P1: ‘I thought it was nice. It looked cute to me. I just loved the chicken down there.’ |
| | P4: ‘I thought the game wasn’t attractive to me. It seemed to be an easy game designed for children younger than me.’ |
| ‘Did you think you could identify with the character in the game?’ and ‘Did it appeal to you?’ | P2: ‘I didn’t think there was a character in the game.’ |
| | P1: ‘A character was shown on the game’s cover, but not in the game.’ |
| | P3: ‘It was a simulation game so it there was no character [the game’s avatar].’ |
| | P5: ‘Yes I think so.’ |
| | Almost all of the participants nodded their heads to say that they had not noticed the main character in the game.
<table>
<thead>
<tr>
<th>Question</th>
<th>Response 1</th>
<th>Response 2</th>
<th>Response 3</th>
<th>Response 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>How about the game’s rules; did you like them?</td>
<td>P1: ‘I thought the player had to wait too long to get their scores to enable them to grow their seed and buy ingredients. That’s why I sometimes felt the game was boring.’</td>
<td>P3: ‘The game was not difficult for us to play, because we usually expect to play something where it is difficult to win. If a game is too easy, I will just find another game to play.’</td>
<td>P5: ‘I thought sometimes in the game it was too hard to work out how to get tokens and scores. But I liked the idea that I could plant my own ingredients and create new recipes that taught us how to make dishes that are good for your health.’</td>
<td>P4: ‘I expected to see something more that allowed me to decorate my garden. There was such a lack of decorative options to choose, and I also found this part was not responsive. I thought it could be great if I could buy some more stuff to build and decorate the garden. And I thought there were limited food choices.’</td>
</tr>
<tr>
<td>Was it easy to play the game in terms of its flow?</td>
<td>P2: ‘Yes. The game needed to have a navigation tool at the outset or to explain to me how to play it first.’</td>
<td>P1: ‘Yes, I agree. I thought the game confused me sometimes. I just didn’t know how exactly to play it.’</td>
<td>P4: ‘I agree with them that the game should be easier to interpret at the start. After playing the game I still don’t know which the main page of the game was.’</td>
<td>P3: ‘I thought sometimes in the game it was too hard to work out how to get tokens and scores. But I liked the idea that I could plant my own ingredients and create new recipes that taught us how to make dishes that are good for your health.’</td>
</tr>
<tr>
<td>Was the game’s interface and all the information easy to read?</td>
<td>P3: ‘I didn’t think it was hard to read at all.’</td>
<td>P4: ‘It was in English. But I understood all of it. Some of them I just don’t understand the language.’</td>
<td>P2: ‘Yes, I thought it was quite easy to interpret.’</td>
<td>Almost all of the participants nodded their heads to indicate that they did not think the interface was hard to read.</td>
</tr>
<tr>
<td>Researcher: ‘Oh, thank you so much for all your comments. I appreciate you doing this. It is gonna help me a lot to develop a new game for any of your friends with diabetes. The interview was so much fun. I will use your comments to fix my game.’</td>
<td>All participants: ‘Thank you.’</td>
<td>-</td>
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</tr>
</tbody>
</table>
Appendix B-4
Testing the aesthetic design of the game

Focus Group: Group 1
Children of five years old

This focus group was targeted at determining the ideal style and characteristics of visual design for a diabetes health game specifically for early-years children (five to six years old). The researcher showed the participants three images of space games, which represented different styles of game visuals. The images were presented separately and discussed one by one. The first image used simple shapes and forms to convey space objects and elements, such as a rocket, an astronaut and a planet. The style used very simple decorative graphic elements, with a graphic interface that provided only essential information to the player: their life status bar, the avatar (astronaut) and simplified scenes (the planet). The second image had a more complex visual design, which immersed the player in the game as if in an actual simulation experience. This style offered the player a mature aesthetic that promoted a reality-like feeling imitating the actual characteristics of the appearance of space. The third image aimed to combine both styles of visual representation, by striking a balance between the mature and the younger look, between simplicity and complexity, and between imagination and reality.

The children were allowed to comment and give their opinion on each image. In this group, the participating children’s actions were observed as each interview question was put. The table below identifies any of their responses that reflected their preferences in terms of the visual aesthetics to be applied to the final game prototype.
<table>
<thead>
<tr>
<th>Interview Questions</th>
<th>Statement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher: ‘Hello everyone. My name is Veerapong Klangpremjit. I’m a games designer. Some of you guys have met me before. Can you remember me?’</td>
<td>All participants: ‘Yes!’ P1: ‘Yes. You gave me your game last time. Have you finished the new one?’</td>
<td>All of the participating children seemed to be excited. Some of them were eager to see the images.</td>
</tr>
<tr>
<td>Researcher: ‘No, I don’t have a new game with me today. But I just want you to see the images that I have prepared. I really need your comments. It’s about the game’s visuals. I want to know if they look good or not. Are they attractive? Do you like them? and if not, can you tell me your reasons?’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher: ‘Yes, I hope you guys are going to do a good job of advising [laughing].’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researcher: ‘I’m going to show you the first one. What do you think?’ Image one is presented.</td>
<td>P2: ‘Oh, a bit boring. I don’t like it. The image is too bland. I think it should be more colourful. The astronaut seems to be tired [laughing].’ P1: ‘I think we’ve seen these kinds of space games several times. That is not stunning. It looks too serious for me, but I think it is readable. I love the way that it doesn’t have too much text.’ P4: ‘Yes, I agree. It’s too boring. That’s not attractive to me at all. It’s like you can see these images in a science textbook. I hate it.’ P5: ‘Is that supposed to be for boy players? I think that kind of game is more suitable for boys. It looks like a boys’ game to me.’ P3: ‘I don’t know. I just don’t like it.’</td>
<td>All the participants seemed to think the same. None of them liked image one. Some of them nodded their heads while someone else was saying that the visual was not attractive, as if to say they agreed with them.</td>
</tr>
<tr>
<td>Researcher: ‘Why? Which parts of it don’t you like?’ Image one is presented.</td>
<td>P5: ‘I think the style of it makes me think of science textbooks that I have read at school. The colours are too dark. I feel it is too serious for me.’ P3: ‘Almost every part, I guess [smiling]. P1: I think because there is no dimension. That’s why the image is so bland.’ P2: ‘I also think that if the images had more colour it might be more interesting.’</td>
<td>-</td>
</tr>
</tbody>
</table>
Researcher: ‘Do you think the information in there is readable?’

Image one is presented.

P1: ‘I don’t find it hard to read, because there is not much text within the image.’

P2: ‘Yes, I think so. But I like it when there is not much text on the screen. Recently, I have been playing ROV. I think that game has information that is too complicated, but it is fun though.’

P5: ‘Yes, definitely. I think just having the blood levels on the screen is enough for me, I guess.’

P4: ‘I don’t find it hard for me at all [smiling].’

P3: ‘I just found no information in there.’

Researcher: ‘OK! Let’s move to image two! What do you think?’

Image two is presented.

P1: ‘Wow, that is so much better. It seems to be fun for me.’

P4: ‘But I think it looks like a dangerous rocket and some kind of weaponry. Somehow it looks too scary for me.’

P2: ‘It looks like a hard [difficult] game for me and I like it. This reminds me of ROV.’

P1: ‘It doesn’t look like ROV, not at all. That is like a space movie.’

P3: ‘It doesn’t work for girl players, for sure. I did like it at first, but if I look carefully it does not attract me anymore. It looks too complicated. There is too much information in there and it looks like weaponry rather than a spacecraft.’

P3 pointed at the picture to say that for him that did not count as text or any kind of information.

P1 nodded and stood up to say that he disagreed with P2.

Researcher: ‘Why? Which parts of it don’t you like?’

Image two is presented.

‘What game do you think it looks like?’

P3: ‘The game interface is too detailed and hard for me to understand all of the data. I still don’t know what it says, and the type is too small for me as well.’

P1: ‘But I like it. It is beautiful. It looks like a famous game. I’ve watched a movie that has similar visuals to this before.’

P1: ‘Oh, I cannot really tell [smiling].’

P2: ‘I don’t like the interface part on the left-hand side. I think it’s too hard for me to interpret what it is about. I see the spacecraft up there, but I don’t know what it is about exactly. Is it about the pilot’s status?’

P4: ‘That looks too mature. This is definitely an adult game, which I would say is too hard to play.’

Researcher: ‘Do you think the information in there is readable?’

Image two is presented.

P4: ‘It is too hard to read. The size is too small, and I don’t even understand what it is about.’

P3 and P2: ‘Yeah, it is too hard.’

All of the participants looked at each other and seemed to agree with each other. Some of the children looked like they lacked the confidence to say they did not understand the text.
<table>
<thead>
<tr>
<th>Researcher: ‘OK! Now for the final one! What do you think?’</th>
<th>P1: ‘I think this one is the best version.’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image three is presented.</td>
<td>P4: ‘But it still has too many elements for me, though. I don’t know why it has so many signs up there in the two corners [means the game interface]. Are these for two players?’</td>
</tr>
<tr>
<td></td>
<td>P3: ‘I think it is like Monopoly Tycoon. Maybe it is a Space Tycoon game [laughing]. It looks so cute. Look at the character in the bottom corner of the image. I like it. This looks like a Ragnarok game. That game is so much fun.’</td>
</tr>
<tr>
<td></td>
<td>P2: ‘I like it too. It is cute and seems to be fun for me. Even though I don’t know what it is about, I like the graphics. I wanna play it.’</td>
</tr>
<tr>
<td></td>
<td>P5: ‘Yeah, I think this is the best picture that you have shown me. I like the look of the character down there. What does that say in the middle of the picture? I like the look of this circle. It seems like fun for me and I want to play it as well.’</td>
</tr>
<tr>
<td></td>
<td>While P3 was speaking, P4 pointed to the image. P5 also pointed to the image and moved forward to see what the text said. This indicated that the text size is too small to be read by child players.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Researcher: ‘Why? Which parts of it you don’t like and like?’</th>
<th>P5: ‘I like the colour of this image. It seems to be fun and I think the game does not look like it would be an easy one for me.’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image three is presented.</td>
<td>P1: ‘So do I. Even though I can’t read what it says on the picture, I do like the three-dimensional images in this game.’</td>
</tr>
<tr>
<td></td>
<td>P3: ‘Yeah, I like the 3D games as well. It makes me feel like I’m in a fantasy world.’</td>
</tr>
<tr>
<td></td>
<td>P2: ‘I do agree with my friends here. This is my favourite of the styles that you have shown us. I like the character in the image and the style of a three-dimensional game. The use of colourful tones is attracting me too.’</td>
</tr>
<tr>
<td></td>
<td>P4: ‘I like the colours and the moon behind the spacecraft as well as the colour shading.’</td>
</tr>
<tr>
<td>Researcher: ‘Do you think the information in there is readable?’</td>
<td>P3: ‘I think it is still hard to read and there are too many elements to read though [means the game’s interface] but I think it is much easier compared to the previous image.’</td>
</tr>
<tr>
<td>Image three is presented.</td>
<td>P1: ‘Yes, I think so.’</td>
</tr>
<tr>
<td>‘Which parts do you think are easier to read?’</td>
<td>P2: ‘I think some parts are too small, but some parts are fine for me to read.’</td>
</tr>
<tr>
<td>‘What does it say?’</td>
<td>P2: ‘I think the data in the purple circle is easy to read but the information in the top two corners is too small and vague, especially on the left-hand side.’</td>
</tr>
<tr>
<td></td>
<td>P4: ‘But I can read it.’</td>
</tr>
<tr>
<td></td>
<td>P4 [Laughing]</td>
</tr>
<tr>
<td></td>
<td>P5: ‘I agree with P2 that some parts are too hard to read but some are not. I still think the text is all around the picture.’</td>
</tr>
<tr>
<td>Researcher: ‘Oh, you guys did so well. I got so much help from you. Based on your comments this will help me to find the right visual design direction for my new game. I can’t wait to show it to you. OK! Thank you so much and have a lovely day.’</td>
<td>All children: ‘Thank you so much and thank you teacher.’</td>
</tr>
<tr>
<td>Teacher: ‘See, you are smart kids. I think you can be game designers like him in the future [laughing]. You guys did a really good job. Please say, “Thank you and goodbye” to him.’</td>
<td>P4 moved forward to see the images and read the information, while being asked, “What does it say?”</td>
</tr>
</tbody>
</table>
Focus Group: Group 2
Children of six years old

As in the previous focus group, the researcher was provided with a room and five participating children aged six. The school is in a central area of Bangkok. The meeting began with an introduction about the game project. It began at 1pm (05/06/2016) and lasted 45 minutes. The table shows a transcript of the interviews including any observation data identifying the participating children’s actions.

<table>
<thead>
<tr>
<th>Location: Chaiyapreauk School</th>
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</thead>
<tbody>
<tr>
<td><strong>Interview Questions</strong></td>
</tr>
<tr>
<td>Teacher: ‘Hello, everyone. The guy standing next to me is a games designer. Today, he is gonna show you some images for a game design. OK, I will let him introduce himself.’</td>
</tr>
<tr>
<td>Researcher: ‘Hello everyone. My name is Veerapong Klangpremjit. I’m a games designer. I’m here today to show you some graphic designs for a game I’m designing for children your age who have diabetes. I have three images of games about a space explorer to show you guys. I wanna know what you think of them.’</td>
</tr>
<tr>
<td>Researcher: ‘I’m going to show you the first one. What do you think?’</td>
</tr>
<tr>
<td>P2: ‘It is very clean and easy to interpret.’</td>
</tr>
<tr>
<td>P1: ‘Is it the game’s screenshot? I think the game reminds me of a science textbook that teaches us about space and the planets. It doesn’t look like a game for me.’</td>
</tr>
<tr>
<td>P4: ‘It’s obviously a game. I think the game looks like an educational game. It doesn’t look like a fun game for me.’</td>
</tr>
<tr>
<td>P3: ‘Yes, I think so. I think that it looks like an early-years child’s game. I don’t know how the game works. I just see the astronaut and the planet.’</td>
</tr>
<tr>
<td>P5: ‘I recently played a space game. I cannot remember the name of it, but I think it had a similar graphic to this one. It is just the normal [typical] mood and tone of space games.’</td>
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<tr>
<td>Researcher: ‘Why? Which parts of it don’t you like?’</td>
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<tr>
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<tr>
<td>Image one is presented.</td>
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<tr>
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<td></td>
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<tr>
<td>Researcher: ‘Do you think the information in there is readable?’</td>
</tr>
<tr>
<td>Image one is presented.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Researcher: ‘OK! Let’s move to image two! What do you think?’</td>
</tr>
<tr>
<td>Image two is presented.</td>
</tr>
<tr>
<td>Researcher: ‘Do you remember the name of the game you played? What was it like?’</td>
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<td></td>
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</tbody>
</table>
Researcher: ‘Why? Which parts of it don’t you like?’

Image two is presented.

‘What game do you think it looks like?’

P4: ‘I think the game’s interface is too small and has too much detail. I wouldn’t be able to read that kind of game interface all the time while I was playing the game. My eyes might get sore.’

P1: ‘Yes I think so. I think it is too hard to read. I think that is because the type is in white.’

P2: ‘I don’t like that there are so many spacecrafts in the screenplay, which makes me confused about which one belongs to me and which belongs to the enemy. I might shoot the wrong person.’

P5: ‘But I think the design of the spacecrafts is too mature. I expected to see something friendlier to us. Making it nicer would be better. Or maybe using some colour to design the rocket. I don’t know.’

P3: ‘I don’t know. I just like everything about the image.’

<table>
<thead>
<tr>
<th>Researcher: ‘Do you think the information in there is readable?’</th>
<th>P4: ‘I don’t think the text is easy to read. That’s too small for me’.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: ‘I don’t think the text is easy to read. That’s too small for me’.</td>
<td>P1 raised his hand in the air to affirm his answer.</td>
</tr>
<tr>
<td>P4: ‘Because you just cannot read or understand English [laughing].’</td>
<td>P4 made fun of P1 and pointed at him to say that he didn’t understand the English used in image two of the game design interface.</td>
</tr>
<tr>
<td>P5: ‘Even if it were Thai, I also think that it is too difficult for us to understand the text in the image. What does that say? [P5 asked P4]’</td>
<td>P3 stood up and moved closer to the image in order to see the text.</td>
</tr>
<tr>
<td>P5: ‘I also think that there are too many elements in this image as well, and there are too many rockets too. This is quite messy for me.’</td>
<td></td>
</tr>
<tr>
<td>P3: ‘I’m trying to see what is inside the box. What does it say? That is too small for me, as well.’</td>
<td></td>
</tr>
<tr>
<td>Researcher: ‘OK! Here’s the final one! What do you think?’</td>
<td>P3: ‘Oh! What is that?’</td>
</tr>
<tr>
<td>‘Let’s guess what the game is.’</td>
<td>P4: ‘It is a Space Monopoly game. I played it once with my brothers. I won. The game was fun, and I like it. I like this image as well because of its colour. It looks like fun to me.’</td>
</tr>
<tr>
<td>Image three is presented.</td>
<td>P2: ‘I don’t like it, that is too girly a look. It would make me camp if I played that game’.</td>
</tr>
<tr>
<td></td>
<td>P1: ‘No it’s not. Everyone plays it. I just like the graphics. This attracted me and invited me to play it when I saw it on the shelf.’</td>
</tr>
<tr>
<td></td>
<td>P5: ‘Yes, I agree. I like it the most compared to the previous images. I just like it because it looks like fun to me. I like the astronaut in the picture.’</td>
</tr>
<tr>
<td></td>
<td>P2: ‘But I can’t see the rocket. Is it supposed to have rockets in there?’</td>
</tr>
<tr>
<td></td>
<td>P1: ‘But the circle represents another form of spacecraft, don’t you see?’</td>
</tr>
<tr>
<td></td>
<td>P2: ‘I don’t think it does.’</td>
</tr>
<tr>
<td>Researcher: ‘Why? Which parts of it don’t you like?’</td>
<td>P1: ‘This picture allows me to see the astronaut. It is cute and colourful. It has Thai language as well. And I don’t like that there are too many elements within the image. I think sometimes this interface is too messy.’</td>
</tr>
<tr>
<td>Image three is presented.</td>
<td>P2: ‘I don’t like the colour of the image. I don’t like the purple and pink colours in the circle. But I do like the character in the bottom right-hand corner.’</td>
</tr>
<tr>
<td></td>
<td>P3: ‘I’m gonna pick this picture. I just like it. It combines the first two pictures [in terms of the style used]. And I also like the character as well. It is not too serious like the one in image 2. And it looks like a fun game.’</td>
</tr>
<tr>
<td></td>
<td>P4: ‘I pick this one as well. I think its style is attractive to boys and girls. And it isn’t camp at all. I just like its colourful nature, but I don’t like the circle behind the image. I don’t think it is a spacecraft either [smiling].’</td>
</tr>
<tr>
<td></td>
<td>P5: ‘I like the colours. I like the character. But I don’t like how messy it looks. Sometimes I think the style is too messy for me to understand the text within the circle.’</td>
</tr>
<tr>
<td>Researcher: ‘Do you think the information in there is readable?’</td>
<td>P5: ‘No I don’t think it is readable. The text is supposed to sit within a box or something so that I can easily see, like most of the games I know.’</td>
</tr>
<tr>
<td>Image three is presented.</td>
<td></td>
</tr>
<tr>
<td>‘Which parts do you think are easier to read?’</td>
<td>P1: ‘I think some of them are readable while some of them aren’t. Some of the text is laid over complex elements and over the black background. That makes it too difficult to read in some parts.’</td>
</tr>
<tr>
<td></td>
<td>P4: ‘Yes, I agree. But I like it when the text is not too long, just a sentence. Sometimes I found it too hard to understand.’</td>
</tr>
<tr>
<td>‘What does it say?’</td>
<td>P2: ‘I like the character’s bars [window] on top of the screen. It looks like the Pokemon Go screen and I like it. That’s the easiest place for me to read the text. But the rest of it, I just find it is hard to read.’</td>
</tr>
<tr>
<td></td>
<td>P3: ‘Yeah, but ROV has small text as well and I can play that fluently. I don’t think it is too hard to read for me. I think it is fine.’</td>
</tr>
</tbody>
</table>

| Researcher: ‘Oh, thank you so much. I really appreciate your comments on the three images. I will use them to improve my final game design. Thank you so much, guys, and have a lovely day.’ | ‘Thank you so much.’ |
| Teacher: ‘Alright, say, “Thank you” to him, kids.’ | - |
Appendix B-5
Testing the final game

Diabetic Participant_01: XX (six years old)

Firstly, the researcher played with some toys and games with the participating child. Then they had some discussion about the research before the interview began with the caregiver present. The interview was conducted in the participant’s home located in Nonthaburi (north east of Bangkok) at 10am on a Saturday (30/06/2018). The researcher also asked for permission to record their voice and take some pictures, which would not reveal their identity. They agreed to this. The participating child’s answers to each question are shown below:

Researcher: Could you tell me about your experience of using the game to help you manage your diabetic condition?

Participant:

I’ve played the game quite often. It has helped me want to know more about eating appropriate food suitable for my condition. I like the games that allow me to explore space. I also want to know how far I can get in the games and to see what the planet is gonna be like. I have collected almost all of the monsters in the games, which makes me want to report my data into a phone, but every time I want to report my glucose data I have to ask my teacher or parent to do it for me. I do not have my own phone. Sometimes my teacher has forgotten to report the data for me, so because of that I didn’t get the scores. I think when I had conquered the monsters on each planet, I couldn’t show it to anyone. So I’m the only one who knows the progress of my play in the space game. This game has helped me to start to realise the importance of picking the appropriate food.

Researcher: Which part of the game is most helpful in teaching you how to cope with type-1 diabetes (instructional module)?

Participant:

I like to play the mini-quiz games, as I’ve found this is the easiest way to gain scores to increase my tokens. I can repeat them until
I have enough tokens to explore the game’s world. The problem is that I cannot always access a mobile phone. If I can, I play the mini-quiz games as much as I want. Another thing that I found is a problem is that I discovered there is a lack of mini-quiz games about food choice. I think it would be better if I could play mini-quiz games that are different from the previous one I have played before. They are totally the exact same thing sometimes. But the mini games’ content on selecting good food is a good starting point for me to learn about appropriate nutrition for someone with type-1 diabetes.

**Researcher:** What parts of the game make you want to play?

**Participant:**

I love to see how far I have explored in space. I want to earn tokens to unlock myself to explore the game’s levels and to get decoration stuff for my pets. This helps me to constantly report my data [diabetes data: insulin levels, food intakes and insulin intakes]. I also expect to see the further world and monsters to appear when I have archived the points and tokens. Every time I have unlocked a stage, with pets and decorating stuff, I was so excited to see what was gonna happen next. Personally, I think the game offers me quite a lack of options to be able to create what I want. I think the options that give me feedback from my parents is quite good. I’ve felt that sometimes she [his mom] has been kind to me in the feedback I’ve had. Getting scores and game tokens from parents is a pretty cool idea.

**Researcher:** What parts stopped you from developing your creativity because of the lack of options?

**Participant:**

Yes, it was definitely the avatar’s outfits. I also think the rocket’s decorative features had a lack of options provided as well. I felt like it would be better if I had more choices to customise my game’s avatar, my rocket and my pets.
Researcher: What elements made you not want to play?

Participant:

I think the options that are repetitively delivered to me, such as mini-quiz games, have a lack of selective choices. I do love the mini-quiz games, but they are quite repetitious. I played the exactly same questions several times. There is also a lack of monsters provided in the game. It seems like the game is not fully functioning. And I also think the most boring part of this game is the feature about insulin injection, because there is no activity behind this feature. I am just informed that I have to monitor my sugar levels and it tells me if the level is good or not, that’s it. Oh, but I can gain scores if my sugar levels are in good condition. I just like that part. But some parts of it seem like it is very hard to gain the scores, such as reporting data. I just discovered the mini-quiz games are the easiest way to earn the tokens. The scores that I could earn based on coping activities seem too hard for me to get them. I think you should deliver a higher score from this in comparison to the mini-quiz games.

Researcher: Has the game helped you manage your diabetes?

Participant:

Yes, it has helped me quite a lot. At least, the game encourages me to monitor my levels and to be careful about making food choices in my daily life, which I have never thought about before. Previously, I just relied on my parents. When I play the game, it makes me want to be a part of managing my diabetes condition rather than relying on caregivers, which is really good. I feels like I am not a pain for my family anymore. I have the basic knowledge to choose appropriate food and balance my sugar levels. In the past, they [the parents] did not allow me to do this by myself [he meant doing the insulin administration], but at least I can be a part of the sugar monitoring, reporting the data and learning to coping with type-1 diabetes, which is a good start for me, isn’t it?
Researcher: What do you think would make the game even better?

Participant:

In my opinion, the game is supposed to make me feel like I can freely create my own avatars, pets and rockets. I would appreciate having enough choices and options to create and decorate my avatar. The games also have a lack of options in almost every feature, such as the levels, the shop and the pet’s house decoration. I also don’t like the way in which I have to play on my parents’ and teacher’s smartphone; sometimes I feel she isn’t happy about that. I also think that it’s not clear what some of the signs and icons are exactly; sometimes I had to guess what they were meant to be. For instance, the shopping icon; I did not understand the sign at the beginning. I just clicked on it and then the shop popped up, so I knew it was the icon for the shop. But anyway I do love the game’s visual, it is so cute. And sometimes if the game could deliver more difficult tasks, it would be great.

Diabetic Participant’s caregiver_01: XX (40 years old)

Firstly, the researcher played with some toys and games with the participating child. Then they had some discussion about the research before the interview began with the caregiver. The interview was conducted in the participant’s home located in Nonthaburi (north east of Bangkok) at 10am on a Saturday. The researcher also asked for permission to record their voice and take some pictures, which would not reveal their identity. They agreed to this. The participating caregiver’s answers to each question are shown below:
Researcher: How has this game supported your child in coping with diabetic management in their daily life?

Participant:

Oh, it was a good start to teaching him to cope with his condition. I really appreciate it. I have no idea about playing games, doing games or any kind of games experience. You know, people of my age. But I did realise that this game had helped my child, as he was eager to gain scores that depended on engaging in diabetic coping activities. This was what surprised me. I never saw my son excited about learning about coping strategies before. I think this is a good idea. One thing that was very notable was that he came to me and asked for my response to his sugar levels. This had never happened before; it really was a good sign.

I don’t know much about his progress in learning about diabetic coping strategies, but one thing I do know for sure is that it truly engages him to learn and think about his condition much more than in the past. This game reduces the barriers between me and my son and allows us to talk about his condition directly and straightforwardly. Previously, he never thought about his food choices before. After playing the games he seems to know more about selecting the right food. It would be better if the game taught him to count food carbs [carbohydrate intakes] and insulin dosage. But I was impressed by the progress he made through this game. It was a really good start. I can see the difference between before and after playing the game and the result is a good sign that he will cope with living with type-1 diabetes, which I’m happy about. If the game was fully finished, I would pay for it [smiles].

Researcher: What were the benefits of playing this diabetic game?

Participant:

Again, as I have said, my child is eager to play it and learn about it [coping with type-1 diabetes]. One thing is that, when your child is newly diagnosed with type-1 diabetes, you wonder if
your child will be able to cope and happily live with the condition. You know it is a lifelong condition. This means you have to live with it forever. This was what concerned me at the start. I do not think this game is gonna solve all the problems that I worry about, but it has helped me. It has helped my son to be happy about tackling his condition. This is a good sign, isn’t it? I think the most frequent feature I have seen him playing with recently is the good food quiz game, which is about making the appropriate food choices for someone with diabetes. Personally, I didn’t think that kind of food was relevant to Thai food. I saw my son picked the almond, a waffle and some vegetables. I did not think that ingredients for someone with diabetes were easily found in Thailand [she laughed].

Anyway, I do think that the organisation module that you call ‘notebook’ allows me and my son to help each other to record his daily data. I love it! In my case, I am lucky enough to get help from his teacher in school to record his data, which includes his times for insulin, insulin intakes, food intakes and sugar levels. I can track what he does and has during his school day and of course this greatly reduces my anxiety about his condition. The function I love most is the food intakes record. Previously, before using this game, I normally noted it in a notebook, which was not very convenient for me. As you know, because he has type-1 diabetes, my son cannot eat the food provided by the school. Noting down what the child has eaten during the day and the week is so important. I have to report this to the diabetic doctor. This game makes it much easier. I would love it even more if the data could be automatically uploaded and shown to the doctor easily.

**Researcher:** What were the weakest areas of the game in promoting their coping activities?

**Participant:**

I think it has to be operated on a smart electronic device, such as my phone, a tablet or even a computer. Relying on this means that you have to pay a massive cost for those things [a phone or tablet]. In my case, I allow my son to play on my phone [iPhone] sometimes. He asked me if he could have his own quite often.
after he got this game, but I think this would be too expensive for a child of such a young age. I think the design of the notebook feature, which I mentioned previously, has too a narrow space for making notes. Could you make it bigger? Sometimes, I have also found it is too hard to read in terms of the style of the graphics and text size. Yeah, they are so cute, and it might be suitable for early-years children, but for users of my age it is hard to read.

In addition, I think the game has too few game options. I think this is because it is just a prototype, isn’t it? But I do love the idea of it. I also think that the game is meant to deliver more mini-quiz games, which aim to teach them information within each strand of the coping activities [insulin and sugar levels, food intakes and recording his diabetic status].

Researcher: What was the progression of diabetic behavioural change during and after playing the game?

Participant:

As I have said, I have seen him much happier about taking care with his condition. He seems to know a little bit more about good food choices. I think you have to focus more on Thai food. That is why I don’t think the ways of teaching good food selection in the game are pragmatic. But it is a good concept. I can see him reporting his data quite often, which may be because he loves to get the scores [smiling]. Previously, carrying out coping activities was mostly done by caregivers and teachers. After playing this he seems to be a part of these activities.

If you are asking for huge progress, this game has not improved him that much, because of the very limited activities. But the game has made it a lot easier and more convenient, in terms of his willingness.
Researcher: Do you have any recommendations to improve the games even more?

Participant:

Umm, I don’t think I know enough to advise you how to re-design the new game. I think you should use ingredients in the teaching food intakes module that are more relevant to Thai food choices. It would be much more interesting if you applied new kinds of technologies into this game, such as augmented reality and QR code. For instance, if you scanned your mobile phone to food packaging it would reveal the carbs and ingredients suitable for diabetes. That would be interesting.

I do agree with my child that the game is also supposed to provide a variety of games options and choices, to enable him to customise and create creativity outcomes within the games. This would be much more engaging to the child. In addition, if the parents had their own app or program that showed the diabetic child’s daily data on their devices, it would be helpful for us.

G-2) Diabetic Participant_02: XX (five years old)

The researcher talked to the caregiver about her child’s experience of playing the game prototype. The participant child asked us to watch a cartoon and play a board game together, Monopoly Tycoon. After playing the game, we had a meal and then discussed their experience of playing this diabetic game. The interview was conducted in the participant’s home located in a central area of Bangkok, starting at 12am on a Saturday (14/07/2018). The researcher also asked permission to record their voice and take some pictures that would not reveal their identity. They agreed to this. The participating child’s answers based on each question are shown below.

Researcher: Could you tell me about your experience of using the game to help you manage your diabetic condition?
Participant:

The game is nice! I have used it to report my insulin intakes and what I have eaten throughout a day to my mom almost every day this month. Even though the game doesn’t have many mini games to choose from, I think this has helped me to begin learning about making good food choices, which I have never thought about before. The game reduces my fear. Instead of always thinking that coping with a diabetic condition is too hard for a child like me, the game has changed my mind and shown me that it is not too hard at all. We [diabetic patients] can start doing it ourselves now. I think sometimes I want to play more on this game, but it doesn’t seem to be finished yet. Like some parts of it are not working. I tried to change the mini quiz about food choice once, but it was exactly the same thing.

But I do like the game. It makes me more interested in taking care of myself rather than relying on my parents and the doctor. Every time I earned the tokens, I just wanted to see what was going to happen inside the game. Would I be able to unlock the stages, get to the next planet or own more monsters? This is good news for me to have this game in my daily routine.

Researcher: Which part of the game is most helpful in teaching you how to cope with type-1 diabetes (instructional module)?

Participant:

I love the way I can record what I have taken in the daily routines in the ‘my diary’ module. This was fun when I saw that my parents turned them into scores that enabled me to buy stuff to decorate and create a notebook, like my scrap book. I think that there is not as much decoration stuff for me to decorate it [the notebook in the organising data module] as I want. I prefer to see the ‘blink blink’ stuff, some kind of glitter, unicorns and maybe some Disney characters. I also learn how to eat proper food and what the appropriate sugar levels are.
Researcher: What parts of the game make you want to play?

Participant:

Yeah, I like the notebook and also the pet’s house as well [she meant the virtual pet module in the ‘my rocket’ feature]. This game has a house for captured monsters, which I can decorate and buy some furniture for. I love decorating things. I want to gain scores to increase my money so that I can buy more furniture to decorate the house or the spacecraft. That part is fun, yeah, but I think there are too few options to be chosen and bought within this module.

Researcher: What elements make you not want to play?

Participant:

Yes, I think that sometimes the mini-quiz challenge, especially the quiz about picking good ingredients, is too repetitive. I expected to be able to play with several different kinds of food choices in this module, as well as guessing the appropriate sugar levels. These two modules make me think that it could be better. I think both of them were quite predictable for me. And I think that the monsters that owned the planets were not challenging enough, they were too static. I expected to see something livelier, especially in the case of the monster. It was like I was fighting with sculptures rather than with scary villains [she seemed to hesitate about saying this directly].

Researcher: Has the game helped you manage your diabetes?

Participant:

Yes, this has helped me. I have learned the basic concepts of eating good food, having a good balance of sugar levels, openly talking to my mom, learning how to monitor my sugar levels sometimes. The game makes these kinds of activities a lot more fun [she meant the activities of managing type-1 diabetes conditions]. Playing this game makes me want to show my progress in improving my health condition to my mom, as I see her feedback.
and responses to my results [she meant the results of her sugar levels, insulin intakes and food intakes].

I also think that the game can make me wiser, because sometimes I have told my mom that it was time to monitor my sugar levels. She seemed surprised when I asked her that. That made me proud; it was like I am a good kid [smiling].

Researcher: What do you think would make the game even better?

Participant:

I would love to see it have more functions, like more planets, more monsters and more decorative stuff to create my rocket as I would want it to be. I think that almost all of the monsters within the game are too boyish in style. I would love to see more planets that might represent girly characteristics. How about a Barbie planet? I would love to see that. And it would be great if I could play it through a watch like an Apple watch. I would like one of those.

I think the games are sometimes too slow to implement and respond to my playing action, like sometimes I click on the icons and they do not indicate immediately whether my action has been successfully operated or not. This makes me bored sometimes, but that is not too often, it’s OK for me. And I expected to see that the games could upload my planets and explored space territories into Facebook. That would be great because I have a Facebook account as well [smiling].
Diabetic Participant’s caregiver_02: XX (38 years old)

The researcher talked to the caregiver about her child’s experience of playing the game prototype. The participant child asked us to watch a cartoon and play a board game together, *Monopoly Tycoon*. After playing the game, we had a meal and then discussed their experience of playing this diabetic game. The interview was conducted in the participant’s home located in a central area of Bangkok, starting at 12am on a Saturday (14/07/2018). The researcher also asked permission to record their voice and take some pictures that would not reveal their identity. They agreed to this. The participating caregiver’s answers based on each question are shown below.

**Researcher: How has this game supported your child in coping with diabetic management in their daily life?**

**Participant:**

It is great. I have given her my pre-owned smartphone, which is a cheap one, and I give it to her teacher when she is at school. At the end of the day, I can check her daily data in which she informs me of her insulin dosages, blood sugar levels, and food intakes. This information is filled in by her teacher at school. I’ve found that this kind of thing has reduced my anxiety a lot and also made me think that my child is not isolated, as she gets help from her teacher. This has changed my mind about her teacher, who I had not trusted before. I feel that we are not alone anymore [laughing]. This is a thing that has helped me and her teacher to work as a team, which I am happy about.

I have also found that she seems to be happy in herself about being someone with type-1 diabetes, as she is eager to report the data and get the scores to enable her to buy the virtual stuff in the game. In my eyes, I don’t think the game is constrained in its difficulty level as she said [her child], because I think it was intended to be used as a starter kit. I do not expect to see her play this game for a long time. It is only supposed to be played for one or maybe two years, until she becomes a teenager. I think it would be great if you could let me know her real-time data.
Researcher: What do you mean by the term ‘real-time data’?

Participant:

Well, I mean that it would be great if I could be informed every single time about her insulin levels, insulin intakes, food intakes and her thoughts on her school days. It could be some app that linked me and my child together so that she could constantly report her diabetic status.

Researcher: That is an interesting idea.

Researcher: What were the benefits of playing this diabetic game?

Participant:

I really do like the idea of this game. I mean I have never played games before and literally have no idea about it. It sounded weird to me when I heard about it at the beginning. But when I saw the game, I felt it very interesting. One thing that was obvious in terms of my child’s progress was that she took more responsibility in activities to manage her condition, especially in recording self-data in her daily life. Previously, she seemed to be so quiet about her condition but after playing the game, she seems to have more awareness. Sometimes she has said a certain kind of food doesn’t go well with her condition, which is a pretty good result, don’t you think?

In addition, I think the game has helped bring me and the school much closer. The teacher said to me that the system makes it much more convenient for her and me to report her diabetes condition [sugar levels status]. Previously, I mainly kept notes in a physical diary, a notebook, which was not sufficiently accurate. Sometimes the teacher forgot to report what my child had eaten during the school day, which I worried about so much.
Researcher: What were the weakest areas of the game in promoting their coping activities?

Participant:

Yes, obviously I think most of the weak points are that there is a limited number of selectable icons within the game. This makes me think that the game could be fully developed to the next stage, but that doesn’t pose problems for me. I am looking forward to seeing it when it is ready. Personally, the graphic appearance didn’t appeal to me. I mean that I had to operate some of the features, because it wasn’t designed for my child, right? For instance, the module where the game allowed me to give a score based on food intakes, overall sugar levels and insulin dosages, this kind of thing [she means the interface design in this part] seemed to be too childish for me to understand, and some of the type was too small to read as well.

I also think that you should have provided me with an instruction book as well, because at first, I had no idea about where to go, or what I was supposed to do to play. You know my child, she taught me how to play and how to give her scores [smiling]. In addition, I also think that the games should not allow her to play the mini-quiz challenges repeatedly, because sometimes I saw her play this module a bit too often in order to gain the scores that enabled her to do something more in the game. I think that this is quite cheatable. I expected to see her progression based on her actual performance for coping with type-1 diabetes awareness, rather than focusing on the scores and rewards in the game. But your game did great [smiling].

Researcher: What was the progression of diabetic behavioural change during and after playing the game?

Participant:

Firstly, I think it has provided much more convenience for us, in terms of this game giving us a more accurate way to record diabetes data in our daily routines. My child seems to take more re-
sponsibly in her activities for managing diabetes and is willing to cooperate with the insulin injections. I don’t think this going to last long [laughing]. More importantly, she knows the basic information about coping strategies, how she is supposed to behave with her condition, and I’m happy with that. Previously, every time she visited the doctor, she seemed to be bored and listless. This game has helped her want to learn about coping with the condition.

**Researcher:** Do you have any recommendations to improve the games even more?

**Participant:**

Yeah, as I told you previously, I think the game is supposed to provide more options to enable the child to choose; for instance stickers within the data organisation module and character designs maybe. I have an idea of linking the game with the diabetic social circle. I mean a system that can link the diabetic community to share their coping experiences with each other. This would be very interesting. I would love to see a situation where my child could see the playing progress of other diabetic children and they could share their good foods and ingredients and sometimes compete with each other.

I also think that it would be great if the games had more choices in the good food selections such as providing more ingredients in the mini-quiz challenge. Personally, I think it is too easy. In addition, is it possible to have a feature that allows teachers and caregivers to upload the child’s real-time data? Because it would be very useful for us, if I could get the up-to-date data of insulin intakes of my child when she is at school. This feature is gonna make me feel such relief with regard to my child’s condition when I’m working at the office.
Appendix B-6
Questionnaire

1.) Age
2.) Gender
3.) Incomes
4.) Education background
5.) Occupation
6.) Have your child ever played digital games?
7.) Do you agree to allow your child to play digital games?
8.) The rationale behind why playing digital games is prohibited?
9.) How long you allow your child play digital games in one week?
10.) Do you know what game your child recently play?
11.) What platform do your child play digital games?
12.) Do you think your child is too young to play digital games?
13.) What type of games are suitable for the early ages child?
   12.1) Adventure games
   12.2) Battle games
   12.3) Simulation games
   12.4) Puzzle games
   12.5) Cooking games
   12.6) Sports games
   12.7) Educational games
   12.8) Games for creativity
   12.7) Others
14.) Which games and toys are good for your child?
15.) What factors effecting intent to buy digital video games for your child?
   14.1) Games’ content
   14.2) Price
   14.3) Supporting for child’d physical development
   14.4) Supporting for child’s social and mental development
   14.5) Game’s production quality
   14.6) Graphic appealing
Appendix B-6
Examples of questionnaire's data

Participant-01
8.) แบบประเมินทักษะการคิดความสม่ำเสมอ เด็กไม่รับ 5-6 ปี

| 0 ภูมิทัศน์ | 0 ภาพผล | 0 แบบประโยคสร้าง เขียน สร้างภาพ
|---------------|-------|----------------
| เด็กไม่รับ | ผล | 加

หากเป็นเกณฑ์ จำลองสถานการณ์ จริงๆ แล้ว สถานการณ์จริงเหมาะสม เช่น รายของ ประมวลทักษะ เป็นต้น

9.) ขอลงเหตุผลอย่างใดที่พบข้อใหม่หรือที่ขาดสม่ำสมของทางเหล่านี้

10.) คำศัพท์ของเกณฑ์ที่พบที่เหมาะสมกับ 5-6 ปี

11.) ปัจจัยใดในการเลือกใช้เกณฑ์ของผลงานในหลักสูตรของทาง

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ขอขอบคุณที่ประเมินเกณฑ์ในการแสดงผลการประเมินตามเกณฑ์ของทาง
Appendix B-7
Children’s Drawing
Appendix B-7
Children’s Drawing, Part 2
Appendix B-7
Children’s Drawing, Part 3
8.) เกมประการที่ทางานคิดความเหมือนกับ เด็กในวัย 5-6 ปี

| เกมเหมือนกับ | เกมเด็กดี | เกมประเภทสราง เช่น สร้างป่า | เกมทำเอง
|-------------|---------|-------------------|------
| เกมจอดรถ | เกมจอดลาย | เกมจัดเก็บ | เกมจัดเก็บ
| เกมจัดสินค้า | เกมจัดสินค้า | เกมจัดเก็บ | เกมจัดเก็บ
| O เกมทำดิน | O เกมทำดิน | O เกมทำดิน | O เกมทำดิน

หากเป็นเกม จัดลองสถานการณ์จะประสบการณ์achine เช่น ฆ่าของ ประกอบด้วยเชิง เป็นตาม

9.) ขอนอนหรือเก็บเสียของที่งานชื่อใหม่ของท่านกลับ...ครับครับ

10.) ทานิดาของผลประโยชน์ของที่มีมากสูงกว่า 5-6 ปี

11.) ปิ่นจึงโอโนะการเลือกซื้อเกมหรือของเล่นใหม่กระตุ้นของท่าน

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ขอบคุณเป็นอย่างยิ่งในการช่วยให้ความสำเร็จความรู้ในเรื่อง
Appendix C-1: The ‘Garden tower’ initial sketches design, Part2
Appendix C-1: The ‘Garden tower’ initial sketches design, Part 3
Appendix C-2: The ‘Garden tower’ wireframe
Appendix C-3: The ‘Garden tower’ using scenarios, part 1

OH What is this?

OK, Let’s see my Avatar.

I will take a look into the house first.

Oh, that’s my data storage, nice!

Let’s see my garden, but, what? Why it’s so empty!

Yes! It’s time to test my insulin levels

Not too bad!

Oh great!

Let’s see, What can I buy?

Ok, I will grow all of these seeds :)

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Appendix C-4: The ‘Rocket Ninja’ initial sketches design
Appendix C-5: Initial draft of Rocket Ninja' design
Appendix C-6: Rocket Ninja finale wireframe
Appendix C-7: Rocket Ninja finale game scenarios, part 1

1. Oh! Is that a test?
2. Let's me guess. Which ones are suitable for Diabetic oh/ah?
3. Umm. Not bad at all :)
4. Oh, it teaches me to inject insulin as well.
5. Oh, is that a test?
6. Wow! Nice Job
7. Oh, it's time for sugar levels monitoring!
8. I have to report the insulin levels. Nice :)!
9. Yes! I got scores!
10. Let's me see my daily data.
Appendix C-7: Rocket Ninja finale game scenarios, part 2

OH! What is this?  
Let's start the game!

I will create my avatar character first.  
Oh, my rocket as well!

Am I allowed to have my team?  
Yes! I can choose the role in my team as well.

Look at that world!  
Let's see! What can I do?

Oh, I can learn selecting good food for me. Nice!  
Oh! Almond. I see.
Appendix C-7: Rocket Ninja finale game scenarios, part 3

Let's me see my planet.

Oh! I have to get more scores to go to that planet. The best!

What can I buy to decorate my space craft?

I can own the monster, as well. If I can conquer that planet :)

OK, Let's me report the daily data to my mom.

The food intakes!

Shall I type it?

Or uploading food pictures?

Oh, overall data!

Let's my mom see it!

You part is hidden for children only!
Appendix C-7: Rocket Ninja finale game scenarios, part 4

Let's me see my planet.

Oh! I have to get more scores to go to that planet. The best!

What can I buy to decorate my spaceship?

I can own the monster, as well. If I can conquer that planet :)

OK, Let's me report the daily data to my mom.

The food intake!

Shall I type it?

Or uploading food pictures?

Oh, overall data!

Let's my mom see it! This part is locked for cosmetics only!
Appendix D

How to install the games

1.) Go to the link below or open the files in the provided CD:

https://www.dropbox.com/sh/9ah8ty09pawjec9/AADuzSUGh9WFfWhOdXTRTGQ6a?dl=0

2.) The files can be opened on a PC and Android mobile phone.

2.) To play the program, the readers are able to play the icon of .APK file through the Internet Explorer, Chrome and Bluestacks.
Appendix E

Model of the rewards system that was intertwined with the game’s design elements

**INSIGHTS CLUSTER**
- Prosocial gamer elements

**DESIGNING TRIGGERS**
- Scale of game’s features

**REWARDS**
- External rewards

**ACTIONS**
- Coping actions

**External drives**
- Internal resources

**Co-operated heros**
- Imaginative and fantasy tone

**Mysteries scenarios and rewards**
- Customisation of virtual belonging

**Tokens**
- Badgets

**Interacting with the caregivers**
- Showing their gaming progress

**Customising their virtual stuff**
- Reporting daily self-data

**Decorating the diary of self-data**
- Reporting daily self-data

**Interacting with the caregivers**
- Showing their gaming progress

**Customising their virtual stuff**
- Reporting daily self-data

**Decorating the diary of self-data**
- Reporting daily self-data

**Internal resources**
- Not being isolated from caregivers

**External resources**
- Reduce information anxiety

**INSIGHTS CLUSTER**
- Prosocial gamer elements

**DESIGNING TRIGGERS**
- Scale of game’s features

**REWARDS**
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**ACTIONS**
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**Decorating the diary of self-data**
- Reporting daily self-data

**Internal resources**
- Not being isolated from caregivers

**External resources**
- Reduce information anxiety