Preschool Smart System for Autism Children

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***Abstract*—**This paper we focus in our research in one of the environments for children between (4-6) age Special for children autism .In this project, wedesign a smart system for children with autism and we use the design of Follow up the parents of a child in an advanced learning. Additionally, design of model for information courses to the using then of facilities for teachers and kids. Finally, We would like to encourage the exchange learning the Platform external environment and the learning resources of the Interior. We also have upgrade efficiency of the teaching and open a major opportunity for student Autism.

Keywords- Autism,preschool, ICT application, children. smartlearning systems, educational intelligent games.

I. INTRODUCTION

Today, it is estimated that one in every 110 children is diagnosed with an Autism Spectrum Disorder (Centers for Disease Control, 2010). Autism is a developmental disorder that appears in the first 3 years of life and affects the brain's normal development of social, cognitive, and communication skills (American Psychiatric Association [DSM-IV-TR], 2000). This affects the way a child perceives the world, and it makes communication and social interaction difficult. Typically-developing children generally learn social interaction and symbolism through play, usually with toys or by observing others. Many children with autism lack these skills and instead demonstrate repetitive behaviors or intense interests that interfere with social interactions. They will play with a single toy to the exclusion of all others, or arrange toys in precise stacks or lines. They also lack pretend play skills and are sometimes unable to use one object to represent another symbolically, such as using a banana as a telephone.

Behavioral methods are often used to improve the play skills of children with autism. Skills can be taught in isolation, that is, a researcher can teach a child play skills that can be used alone or with others. This method helps children with autism learn skills that will help them play with peers (Terpstra, 2002). For instance, after learning isolated play skills, children demonstrated more ideas about how to play with the toys during spontaneous play when cues and Instruction were provided (Lewis & Boucher, 1995). Discrete trial training is a behavioral method used to teach play skills to children with autism.

In facing the challenging world, parents said to be having a limitation time to guide children and spend time to teach a non-formal education before the children go to preschool Especially for children with autism and they need special attention and understand the meaning of autism. “Autism Spectrum Disorders (ASDs) are a group of neurodevelopment disorders characterized by core deficits in three domains: social interaction, communication, and repetitive or stereotypic behavior.”(Wang, 2009)

Any autistic child suffers from abnormal cerebral structure, and because of that the pattern of his/her thinking is quite different from a normal child in the same age. While autism can give rise to problems in social interaction, communication, and cognitive and motor difficulties, there’s so much that assistive technology can do to help people with autism live functional lives. Thus, most of parents nowadays are moving toward E-Learning concept because it is easy, efficient and provides mobility advantages.This study is focusing on developing a web-based application for preschool Autism children in preschool on how to improve and help them in reading in English. In order to make them understand and learn how to read, this application may include audio, video, graphics, text and some were said to put games effect on touch screen. Other than that some of the technologies used in E-Learning are by using ICT materials such as e-mail, videoconferencing, and satellite broadcasting. E-Learning is also known as any software or hardware that encourages reader to read on digital device. (Landoni, 2010; Chou & Lin, 2010; Wang, 2009).

By observation, we can see that previous study and researches already developed so many applications and these applications day by day being used by the targeted user. But, most of the E-Learning technologies had been developed only for primary school students up to university students. However, the consistency of usage is poor. And there is limited system developed for pre-school students. Users tend to be interested in the beginning of the use for the application but lesser throughout the time being.

E-Learning concept is said to be effective as compared to traditional learning or face to face learning. It is also provided varieties of advantages on time and mobility. As it is said to be mobile, E-Learning usually comes with a system used for the learning process itself, the medium used to transfer the knowledge such as computers, laptop, devices and othergadgets and also a connection to the network. (Liu, 2010; Kumaran& Nair, 2010).

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In providing and offering the state-of-the-art technologies, E-Learning concept is together improving the academic knowledge among students. It becomes one of the famous ways to absorb new knowledge. E-Learning appears as a prominent learning style in adult learning in universities, colleges and even in schools. There are many applications being developed by researchers to pre-school students nowadays to enhance the teaching and learning process. However, most of the application created and designed for those pre-school students still need to be facilitated by teacher or any adult when the children want to use it (Muda& Mohamed, 2005). Thus, our project is conducted to develop an E-Learning system that minimize the teacher's effort and at the same time may enhance and help the student to learn how to read in English.

Despite the advantages and benefits provide by E-Learning, the researchers believed that by taking this into consideration to create an application for English Reading will be a good idea. We are moving and aware about the advantages of E-Learning. Therefore, we have to use it wisely. (Liu, 2010; Kumaran& Nair, 2010, Harrison, 2000; Landoni, 2010; Chou & Lin, 2010; Wang, 2009).There is five main objectives of the proposed research asbelow:

Use ICT to provide fun, interactive and motivating learning environment for pre-school students. Provide learning environment that based on self-pace and without timeframe limit. A Pre-school child can study everywhere and anytime based on his/her time availability.Cultivate independence learning from young age. Encourage the use of ICT among pre-school students because ICT is essential in today's world. Environment friendly and cost saving because all learning content are deliver in electronic format.

II. PROPOSED PROJECT FOR PRE-SCHOOL AUTISM CHILDREN AGED 4 -6

The research target to use by pre-school autism children aged 4 -6 to learn English language included comprehension, phonics, vocabulary, writing and more. This project is on developing a web-based application which focuses only on English Learning application for preschool students. It is good to apply ICT application at an early stage of education which is the preschool student. This is to ensure that the children are well-prepare for elementary pedagogical approaches.Most children between five and six years of age begin their education at preschool set up throughout the country by both government and non-government agencies and the private sector. The project includes:

a. **Interactive story:**This is an interactive English story book that included the narration to enhance the listening skills. Besides that, user has options to read along with the narration.

b. **Education games:** This is arcade-style education games included fun activities that provide fun and easy ways to help the children learning English Language.

c. **Star Collection and Prizes Exchange:** System allow user to collect the stars and exchange virtual prizes to motivate and encourage them participant in all the reading, singing and games activities

d. **Collection and Prizes Exchange:** System allow user to collect the stars and exchange virtual prizes to motivate them to learn

e. **Access Control:** Allow only authorized users to login and access the relevant user menu respectively.

f. **User and class management:** Manage user login information and manage class information

With the purpose to develop an E-Learning application for preschool students, the group members need to develop a guideline to know the requirements needed. These requirements should focus on how the application should be designed in order to attract the interest of preschool students.

III. SIGNIFICANCE OF THE RESEARCH

A. Contribution to Parents

The research findings or the prototype of the web-based application will be absolutely gives benefit to parents as they should find an interesting way to develop reading skills in their child. This is to ensure that the child is ready to absorb knowledge when they entered the primary school. We hope this application may facilitate parents to give informal education to their children. Parents may take the benefits of this research study in their child development to make sure their children are well-prepared for elementary school program.

B. Contribution to Pre-School Teachers

This is one of the ways for pre-school teachers to make the learning in class fun and enjoyable. With E-Learning, students may interact with audio, video, graphics and texts which will make things interesting. Nevertheless, teachers are the medium that helps students to aware of the surrounding and alert with the changing environment. This can help the generation of smart school as aspired by our Malaysian Government in Multimedia Super Corridor (MSC) Application. Thus, the study also focuses on minimizing the teacher's effort in facilitating the students in learning process.

C. Contribution to the Pre-School Students

As been debated by previous study, every human has our own learning style. By this, our study would like to contribute to child who was born with various learning style (Kolb, 1981). By this various specialties, various methods should be used in developing the child's mind. Some of them might good in using conservative way of leaning but some of them might good in using technologies in their learning. However, we must accept that students nowadays should learn to use computers and technologies as our government is aiming for

smart school program all over Malaysia. As mentioned above, the program has been stated in 4 flagships of MSC's Applications.

IV. RESEARCH METHODOLOGY

This sub-topic will cover the details explanation of methodology that is being used to make this project complete and works well. Many methodology or findings from this field mainly generated into journal for others to take advantages and improve as upcoming studies. The method is used to achieve the objective of the project that will accomplish a perfect result. In order to complete this project, the methodology based on System Development Life Cycle (SDLC) has been used. Refer to the Modern System Analysis and Design by Hoffer, George &Valacich (2008), they suggested five phases in SDLC which are Planning, Analysis, Design, Implementation and Maintenance. We are more concern on the first three phases due to this project do not involve the system implementation in the actual kindergarten.

Planning is the first phase in SDLC which the system needs are identified, analyzed, and prioritized. Through the interview, observation and research on the current teaching methods in the three selected kindergartens, our group had identified a list of high-level functional and non-functional requirements that shall be included in this project. Each of the requirements has been prioritized based on three main categories: mandatory requirements, desirable requirement and optional requirement. Refer to Appendix 1 in this project paper for a list of functional and non-functional requirements identified.

Analysis is the second phases of SDLC. It is involving the study of the system requirement needed, and the requirements are structured according to their relationship. In our project analysis phase, our group had used the Unified Modeling Language included use case diagram and specification, activity diagram, sequence diagram and collaboration diagram to help us perform more details analysis on our system, and relationship among each component. Each diagram has been presented in the class to get peer feedback and input.

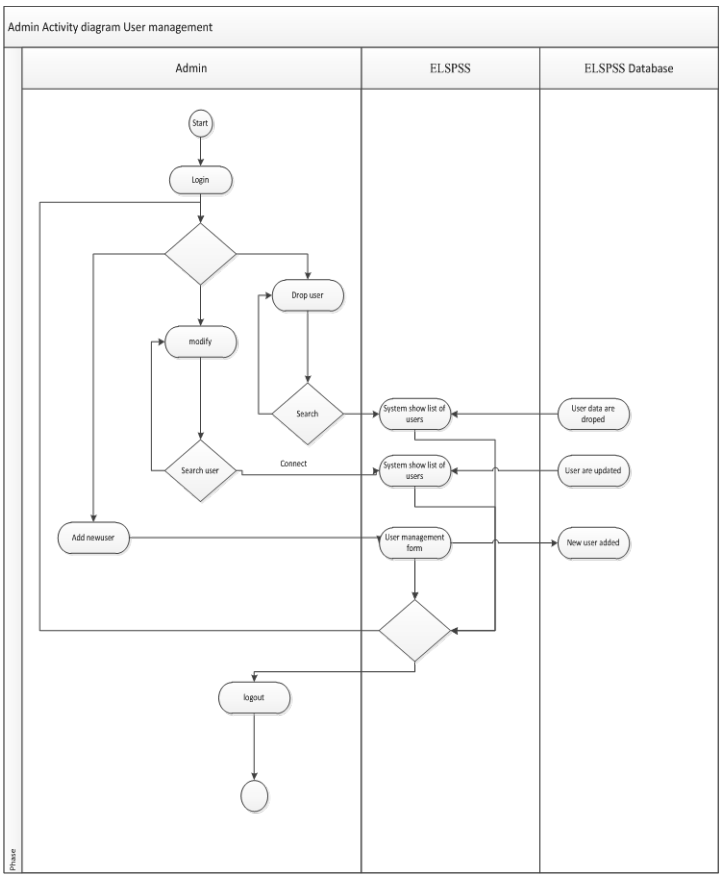

Figure 1. Activity Diagram For Access User Account Management

Visual Paradigm and Rational Rose are two main UML software tools that we used for the diagram drawing. In figure1.Explains activity diagram for accessuser account management. Figure 2.activity diagram read a story.

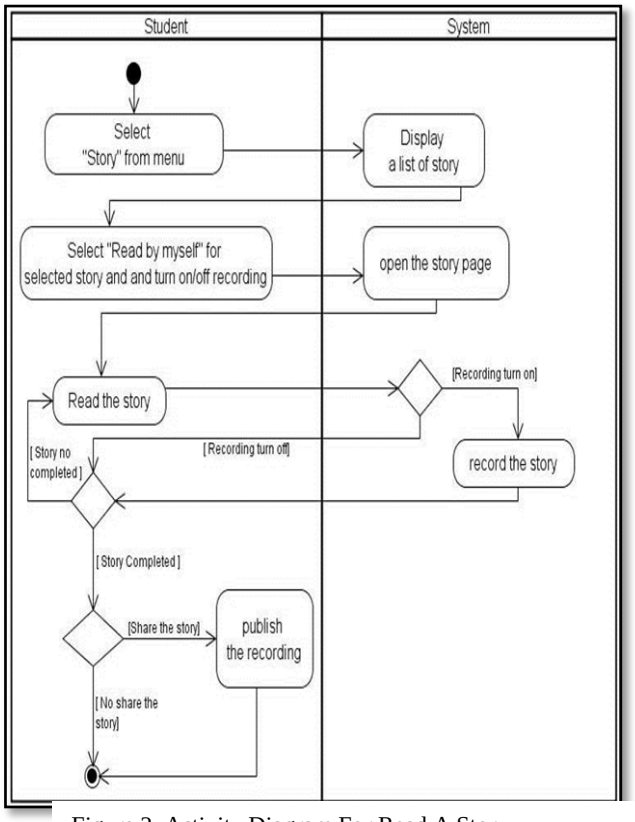

Figure 2. Activity Diagram For Read A Story

Design is the third stage of the SDLC cycle. In this stage, we convert the analysis part into logical and physical system specifications. A comprehensive user interface design has been designed to show case how the proposed system looks like. Since the proposal system is web based, therefore web technologies such as HTML, Java scripting language and CSS styling language has been used to help us develop the user interface design.

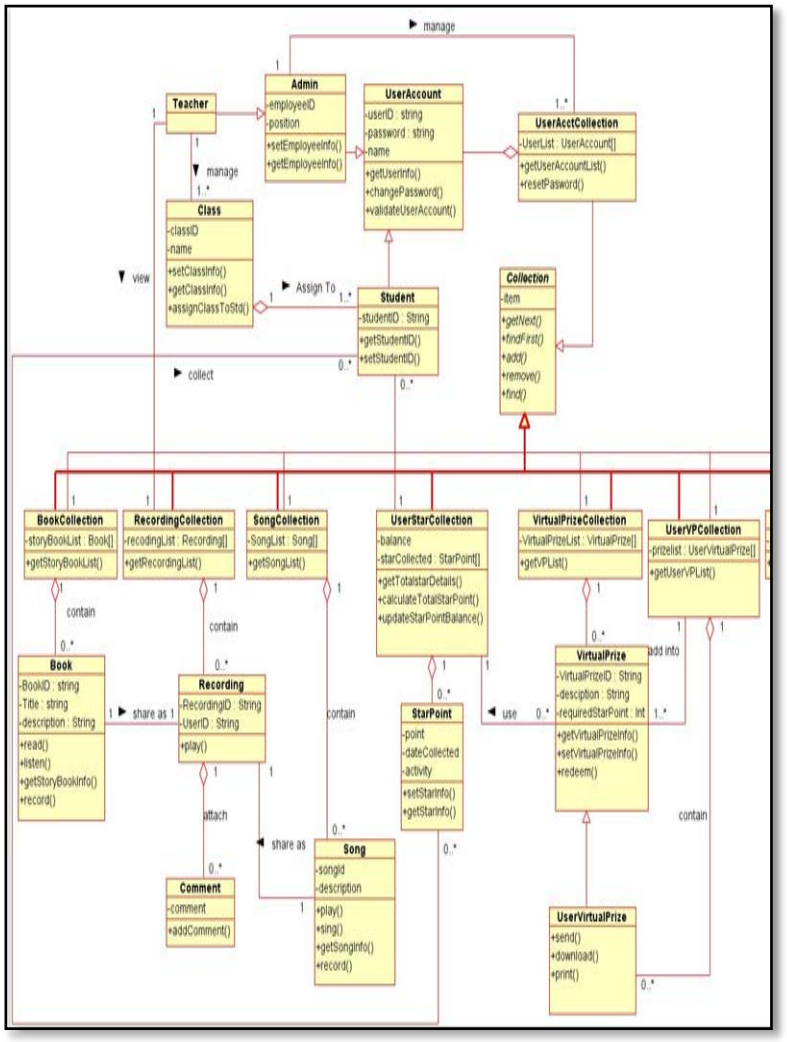

Figure 3. Explain class diagram for smart system .

As result of the analysis and design, a list of functional and non-functional requirement has been produced as shown in Appendix 1. Besides that, a comprehensive set of details UML diagrams also has been produced. Use case diagram and specification documented shows the functionality of the system from three main users' perspective: Admin, Teacher and Students.

Main menu

System will display different interface main menu based on user category (Admin, Teacher or Student). Below figure 4. Illustratedthe view main menu for each of the category.

Figure 4. Main Menu

Based on the login information, system will displayed the relevant user interface to the user as describe in figure 4.

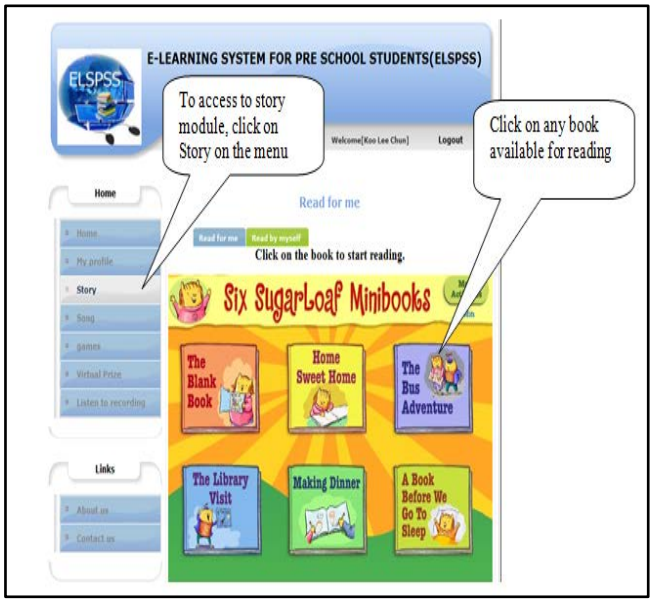

Figure 5.Read Story Menu

In figure 5 explain interface system and read by myself is same as read for me except that the system will mute the reading with background audio still playing. Besides that, user has option to record the reading and publish to others user for listening.

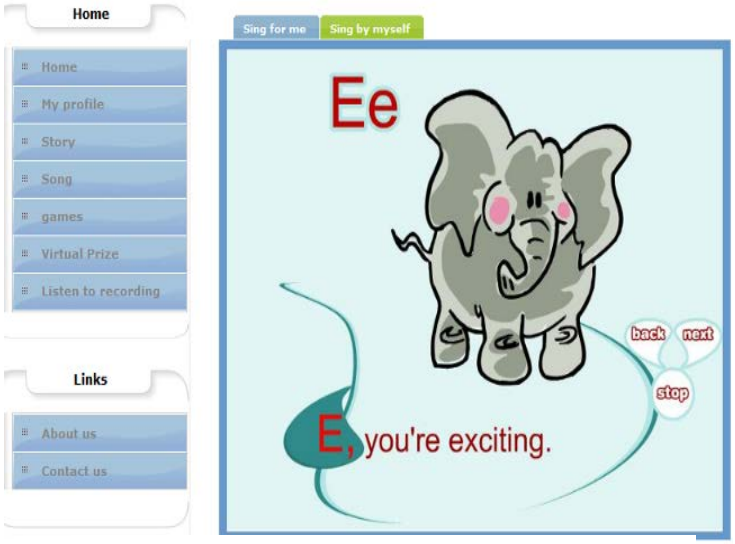

Figure 6.Read Story Menu

In figure 6 Once finish listen to a song, system will auto-generate some falling star for user to collect. These stars will entitle user to earn the star points which can be used to redeem some virtual prizes.

V. CONCLUSIONS AND FUTURE RESEARCH

We suggested that this system should be fully implemented and a pilot test should be done on the specific kindergarten. This will help to provide a platform that enables us to evaluate the effectiveness of the proposal system. Besides that, we also suggest that future research shall look into features that can be included in the system to encourage parent's involvement to help their children learning English.

Learning language through practical is essential for the children and important for communication. Therefore, we also would like to suggest future research look into a best way to integrate the proposal system into current social network application such as Face book, and yet ensure the children are encouraged to use English for communication. Besides that, the research also shall look into advantages and disadvantages of such integration especially in the children security.

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APPENDIX 1

- M – mandatory requirements (something the system must do)
- D – desirable requirements (something the system preferably should do)

- O– optional requirements (something the system may do)

No.	Requirement ID	Requirement Description	Priority
	ELSPSS_01	**Access Control**	
1.	ELSPSS_01_01	All users are allow to login to the system and access respectively modules	M
2.	ELSPSS_01_02	All users are allow to change their password	M
3.	ELSPSS_01_03	Admin/Teacher are allow to reset student's password	M
4.	ELSPSS_01_04	All users are allow to logout from the system	M
	ELSPSS_02	**User Account Management**	
5.	ELSPSS_02_01	Admin/Teacher can add a new user	M
6.	ELSPSS_02_02	Admin/Teacher can remove a new user	M
7.	ELSPSS_02_03	Admin/Teacher can modify an user account information	M
8.	ELSPSS_02_04	Admin/Teacher can search and view a user information	M

FUNCTIONAL REQUIREMENTREQUIREMENT

Listed below are the functional requirements and non-functional requirement of the system. In the priority column, the following short hands are used:

Non Functional Requirement

No.	Requirement ID	Requirement Description	Priority
	IMS_05	**Performance issues**	
1.	IMS_05_01	Speed. For a single user, the system should crash no more than once per 10 hours.	M
2.	IMS_05_02	Reliability. If the systems crash, it should behave perfectly normal when user refresh the page.	M
3.	IMS_05_03	A user who wanted to read story, listen to story, sing or play activity game should be able to get the intended page less than 1 – 5 seconds.	M
4.	IMS_05_04	A user should be able to log in into the system less than 30seconds.	M
5.	IMS_05_05	Capacity. The system should be able to handle simultaneous 100 users in a peak hour. (the system only be used by one single preschool)	M
6.	**IMS_06**	**Operation Issues**	
7.	IMS_06_01	Technical Environment The system use some basic hardware and software tools, which establish the network infrastructure and communication protocols, required to ensure network connectivity between clients and servers.	M
8.	IMS_06_02	Technical Environment The system use significantly Web and application server infrastructure	M
9.	IMS_06_03	System Integration The system will applicable and links to any other system integrated with the company.	M
10.	IMS_06_04	Both the host and the client must have compatible network interfaces in order to communicate via a client-server network.	M
11.	IMS_06_05	Portability User may access to the system even they are using different operating system such as Windows, LINUX, MAC OS and etc.	M
	IMS_07	**Security issues**	
12.	IMS_07_01	An outsider only can view the general information of the system.	M
13.	IMS_07_02	For any new registered user (parents or children) an ID will be provided.	M
14.	IMS_07_03	For failure log in, the system should allow only 3 attempts for log in process.	M
15.	IMS_07_05	There are the differences between the interface of System Administration and Teacher / Parent / and Student	M
	IMS_08	**Cultural**	
16	IMS_08_01	Multilingual The system is only in English to ensure that learning English as the objective of the system is achieve.	M

	ELSPSS_03	**Class Management**	
9.	ELSPSS_03_01	Teacher can add a new class information	M
10.	ELSPSS_03_02	Teacher can remove a class information	M
11	ELSPSS_03_03	Teacher can modify a class information	M
12	ELSPSS_03_04	Teacher can search and view a class information	M
	ELSPSS_04	**Listen and reading Book**	
13.	ELSPSS_04_01	Student can listen to a story book	M
14	ELSPSS_04_02	Student can read the story herself/himself	M
15	ELSPSS_04_03	Student can record his/her story reading	O
16	ELSPSS_04_04	Student can share his/her recording to the class	O
17	ELSPSS_04_05	Student can listen to his/her classmates recorded reading	O
18	ELSPSS_04_06	Student/Teacher can write their comment about a recorded reading	O
19	ELSPSS_04_07	Student can collect star point from the system	M
	ELSPSS_05	**Play games/activites**	
20	ELSPSS_05_01	Student can play a game/activities	M
21	ELSPSS_05_02	Student can save a game/activities	D
22	ELSPSS_05_03	Student can continue a game which saved before	D
23	ELSPSS_05_04	Student can collect star point from the system	M
	ELSPSS_06	**Listen and sing song**	
24	ELSPSS_06_01	Student can listen to a song	M
25	ELSPSS_06_02	Student can sing the song by himself/herself.	M
26	ELSPSS_06_03	Student can record his/her singing	O
27	ELSPSS_06_04	Student can share his/her singing to the classmates	O
28	ELSPSS_06_05	Student/Teacher can listen to their class recorded song	O
29	ELSPSS_06_06	**Student/Teacher can write their comment about a recorded singing**	O
30	ELSPSS_06_07	Student can collect star point from the system	M
31	ELSPSS_07_01	Student can search/view his/her star point summary included total point earned, total point redeem and balance	M
32	ELSPSS_07_02	Student can redeem a virtual prize based on his/her earned star point	M
33	ELSPSS_07_03	Student can search/view their collection of virtual prize	D
34	ELSPSS_07_04	Student can send a virtual prize to his/her classmates, download or print the virtual prize	O