

Using English Learning Toys as the Emotional Analysis Tool to Evaluate Children Behavior

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Abstract: This study aims to develop a user-center design; UCD English learning toy for children to learn English. The research mainly used qualitative interviews to make a recording and conversation with the children. From observing the users' interaction with the toy, the researchers can record a unique learning process and emotional fluctuation from the children. By doing a comprehensive evaluation, the analytical items include participants' emotion, facial expression, speaking, and motion factors. In addition, the research sought whether the children can use the toy's voice functioning to recognize the English word or a sentence from the word cards. The study results have shown that the English learning toy increased the children's curiosity, motivation and imagination during the interactive process with the toy.

Keywords: English learning toys, user-center design, emotional analysis, children behavior

1. Introduction

According to the Central Intelligence Agency (2014), Taiwan ranked at 215th for the lowest birth rate in comparison with the total of 223 countries in the world. The birth rate has been on a decline (Sander, 2017). Many parents only need to foster one child per household, thus allowing them in putting more effort on their child's education development. There's an idiom that states "To Get off to a Good Start" which sends a message for productive parenting, therefore, in this case most parents would like their child to have access to knowledge at the earliest.

The United Nations Educational, Scientific and Cultural Organization, or UNESCO, had mentioned the importance of literacy by proposing that "literacy is not an end in itself, it is a fundamental human right" (Oxenham, p 24). The organization maintained the importance of building up a persons' literacy capability. Starting from 2005, Taiwan Ministry of Education had started a new policy for children to learn English from the 3rd grade. This initiative has generated a spark in learning English as a national movement. This study has designed an English learning toy. Resnick (1989) once mentioned that "effective learning depends on the intentions, self-monitoring, elaborations, and representational constructions of the individual learner," (p. 2). From this philosophical inspiration, the purpose of this study is to see how a designed English learning toy can enhance a child's interests and motivation to learn English. Furthermore, the study intends to discover on how a child's emotional fluctuation change when they integrate with the learning toy.

2. Literature Review

2.1. Behaviorism

By the 1900s, some psychologists believed that learning happens according to the external environment's stimulation (S) and learners' response (R); rewards play an important role that influence a person's motivation and behavior (Ormrod, 2010). Ivan Pavlov (1849-1936) and B.F. Skinner (1904-1990) are perhaps the two best known behaviorists. Pavlov created the classical conditioning theory by experimenting with dogs, seeing how they salivate when they have been trained that a ringing bell means food. On the other hand, Skinner (1938, 1953) advocated operant conditioning, for he thought that learning occurs when people make a response based on a reinforcing stimulus. In addition children learned through imitation. As for this study, the research use the English toy's movement, voice, and eyes as reinforcement conditions to stimulate a child's desire toward learning a second language.

2.2. Social constructivism

Lev Vygotsky (1896-1934) focused on how the environment, especially society and culture, can influence children's cognitive development. Vygotsky pointed out the intimate relationship between children and play. He suggested that play can not only enhance a child's imaginative capability but *zone of proximal development (ZPD)*. Vygotsky defined ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (as cited in Cole, John-Steiner, Scribner, & Souberman, 1978, p. 86). The second stage of the qualitative interviews were designed from Vygotsky's (1978) theory on scaffolding, which interprets on hoping that children can get their imagination while they are integrating with the English learning toy.

2.3. Social constructivism, User-center Design

The original concept of user-center design; UCD was initiated by Norman and Draper (1986) through their laboratory research at the university. Since then, UCD has become a culture vernacular that has been widely used for designing a user-friendly products' principles (Abrass, Maloney-Krichmar, & Preece, 2004; Mao, Vredenburg, Smith, & Carey, 2005; Sotamaa, 2005). Norman's (1988) designing principles are based on the idea of knowledge, simplification, visible, mappings, error adjustment, task-orientation, and standardization. Furthermore, Garrett (2011) pointed out the essential element for user experience requires "design for engagement" (p.132). In regards to the application of Norman's principles and Garrett's concept, this study designed an English learning toy that is efficient, memorable, error adjustable, and satisfied.

3. Methodology

3.1. Research Question

The aims of the experimental observation and the research questions are as followed: (1) Evaluate children's interactive relation with the toy: investigating if children can make interaction with the toy naturally, or if they have difficulty in operating with the toy? This designed question aims to seek if there are any other hidden questions. (2) Compare the children's interactions with the toy into three different situational experiments: seek how children's emotion are, see how their preference and usage are different while they play with the toy in three different situations.

3.2. *Experimental Participants*

This study has visited different family and looked for children whose age was from 3 to 5 years old. A total of 7 participants included four girls and three boys. Each child was given a coding letter from A to G. A: girl 3-years-old; B: boy 5-years-old; C: girl 3-years-old; D: girl 5-years-old; E: boy 4-years-old; F: girl 4-years-old, and G: boy 5-years-old.

3.3. *Experimental designed*

The experimental design mainly focused on the learning toy of its user-center design. As for the English words cards, the research team created a story and different characteristics for the whale under the sea.

3.3.1. *The designing of the English learning toy*

Qualitative interviews were used for analyzing the children's emotional change. Seven children whose age from 3 to 5 years-old participated in the study. The children interacted in many ways toward the English learning toy—touching and speaking are the two main variables (See Figure 1.1). When a child touched the toy, the toy responded and provided a feedback. For example, when a child touches the right side of the toy, it swims to its right side; the eyes sparkles “love” graph to present its happiness, and it makes a voice of “turn right”. However, if a child makes no reaction towards the toy, it vibrates on its own for every 10 seconds and speaks an English word randomly by the programming setting.

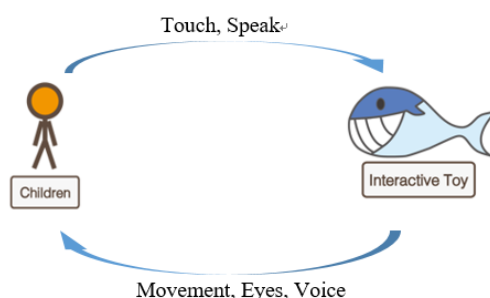


Figure 1.1 interactive situations between a child and the English learning toy

3.3.2. *The designing of the word cards and dialogue*

In this study, qualitative interviews were divided into two stages with three designed experiment scenarios. In the first stage, the researchers observed the children's interaction and their natural reaction towards the toy. Then the researchers analyzed the children's explicit behavior such as speaking /operating and expressing their emotions such as thinking / mood status. In the second stage, a story teller would tell each child a story of the whale (English learning toy) and introduce a word card that is relevant to the story. Based on the creation of the story, the researchers have designed several English word cards and dialogue with several main characteristics (See Table 1). Each card has the characteristic's colorful graphic, word or phrase. In addition, several English sentences along with the Chinese translation were printed out on a paper. The purpose of using the word cards is to enhance the children's voice interaction with the toy.

As for the three designed experiment scenarios, scenario A would be the observation of the children's interaction with the toy. In scenario B, the children play with the toy in the water. For the scenario C, several learning English word cards would be added while children play with the toy in the water. These three scenarios would be tested with each child individually in the first stage and the second stage. After the children have participated with these two stages, one child who gained the highest performance would be chosen and be further interviewed with the researcher. The purpose of this interview is to seek the child's learning ability, efficiency, memorability, error and satisfactions through the interaction with the whale.

For analyzing the children’s emotional change that integrated with the English learning toy, the researcher wrote a report through specific observation, videotaping, photo taking and interviewing. After collecting the information from each participant, the emotional change curves are drawn to the diagram.

Table 1: Designed English words and dialogs by this study

								
Right 右轉	Left 左轉	Mermaid 美人魚	HippoCampus 海馬	ClownFish 小丑魚	Shrimp 蝦子	Jelly Fish 水母	Shark 鯊魚	Blue 藍藍
								
Stop 停	Forward 前進	Hide and Seek 捉迷藏	Salmon 鮭魚	Castle 城堡	Wish 願望	Baby Whale 小鯨魚	Atlantic 大西洋	Coral 珊瑚
哈囉 Hello	你好 How are you?	祝你好運 Good Luck !	你喜歡吃什麼東西 What kind of food do you Like ?					
當我的朋友 Be my Friend	你叫什麼名字呢 What is your name?	你最喜歡什麼 What is Your Favorite ?	高興看到你 Good to see you					
高興能和你聊天 It is nice to chat with you	你想做什麼 What do you want to do?	你從哪來 Where are you from?						

4. Analysis of Results

Two main research questions of this study are to: (1) evaluate children’s interactive relation with the toy; and (2) compare children’s interaction with the English learning toy into three different situational experiments along with participants’ emotional analysis. Seven children have participated in this study. The evaluation of these children’s interaction toward the toy and how their emotional fluctuation has changed with the toy are analyzed in this suction.

4.1. Evaluation of children’s interactive relation with the toy

Overall, the children who interacted with the English learning toy have stimulated their learning tendency and increased the ability of imagination. First, after the children notice that the toy can make response when it was touched by hand, the children started used their finger to squeeze, turn, touch, and swipe the toy. The children are especially fond of seeing if the toy would have different reaction when they touched the different parts. In addition, they are mostly interested in the toy’s movement and figure change. For example, if the whale’s flippers and tail are flipping or vibrating, they would like to be more integrated with the toy.

Second, the children have created their own imagination. While playing with the toy, the children enhanced their imagination dramatically. All the seven children asked the whale whether it can swim in the sea because they recognized the appearance of the whale as being designed to go into the water. Also, they ask some questions which are related to the water. It appears that most of the children would like to play with the water when they focused on where the whale lives. After applying the English word cards and dialogue, the children created their own words to communicate with the toy.

4.2. Analysis on the children's emotion while integrating with the English learning toy

Qualitative interviews were mainly used in this study. In order to compare and analyze each child's emotional reaction when he/she integrated with the English learning toy, the researcher wrote an observational report. The report has described each child's characteristic and all the specific information that were collected from videotaping, photo taking and interviewing.

The vertical line of each figures (See Figure 1.2, and Figure 1.3) represent the change of the children's emotional status. Each child's emotional reaction and status scaled with five levels—1,2, 3, 4, and 5. Through specific observation, if the child appeared to be in a state of happiness, the emotional status marks 4; with joyfulness the marks are 5. In contrast, if the child appeared with a bored face, the emotional status marks 3; with the depressing face, the mark is 1. Mark 3 represents the natural emotional status. Therefore, the higher line of each child's emotional status shows more interests in playing with the toy; the lower one shows a less interest in playing with the toy. Each child played the English learning toy into the three designed situational experiments. The three situations are divided into scenario A, scenario B, and scenario C. The horizontal line of the figures showed the timeline through scenario A to scenario C.

Figure 1.2 is the comparison diagram of emotional change curve into different genders—boys and girls. The emotional change curves showed that boys' emotional fluctuation changed more rapidly than girls. The reasons were that boys had a stronger intention to drive the interactive toy. The boys tried to use the context of the word cards to make the toy give a feedback. On the contrary, the girls tend to pay more attention on the contents that they've applied with the toy. For example, they want to know the story context and how it related with the toy's outer appearance and feedback.

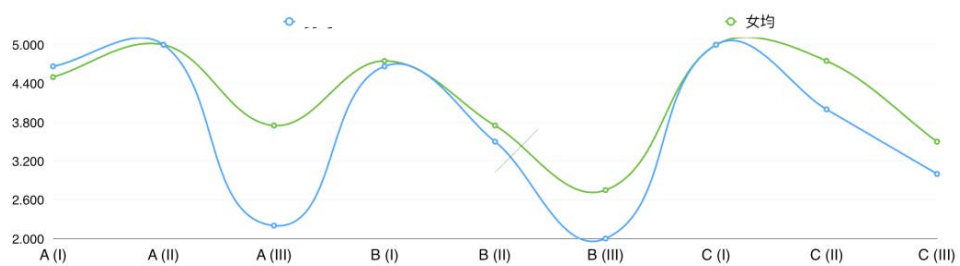


Figure 1.2 Compared boys and girls emotional reaction toward the English learning toy

For the entire situational experiment, the seven children have shown their emotional fluctuation change consistently (See figure 1.3). In a certain interval of time, the participants' emotion showed a similar direction as going up and down in the bars.

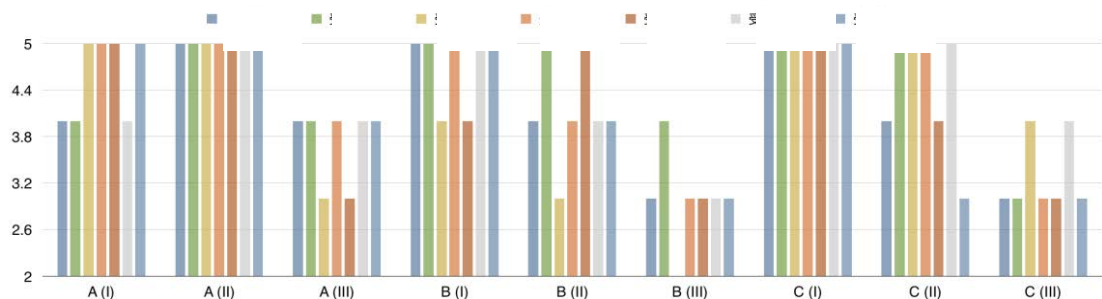


Figure 1.3 The comparison of the seven children's emotional change multiple bar chart

Figure 1.4 has shown how the children’s emotional fluctuation with the three different scenarios. In scenario A—A(I), when the children first see the toy, the figure did grab their attention. However, when they acquainted themselves on how to operate the toy they drop their attention and interests. Therefore, their emotion fluctuation dropped to A (II). Later, when the toy has been put into the water the children’s emotion aroused to A (III) and made the interaction with the toy. Then, the children’s emotion drop dramatically from B (I) to B (II) until the story teller told the whale’s story and showed the English word cards and dialogue that is related to the story. The main reason for children to lose their interests in scenario B was because the toy’s reaction didn’t meet their expectation. For example, when a child discovered that the toy whale cannot dive down and spray the water, he/she started feeling bored. While the children showed more attention on the word cards by using their imagination, their learning tendency in scenario C (CI and C II) had remained longer than in scenario A and B. Therefore, the emotional fluctuation drops slowly in C (III).

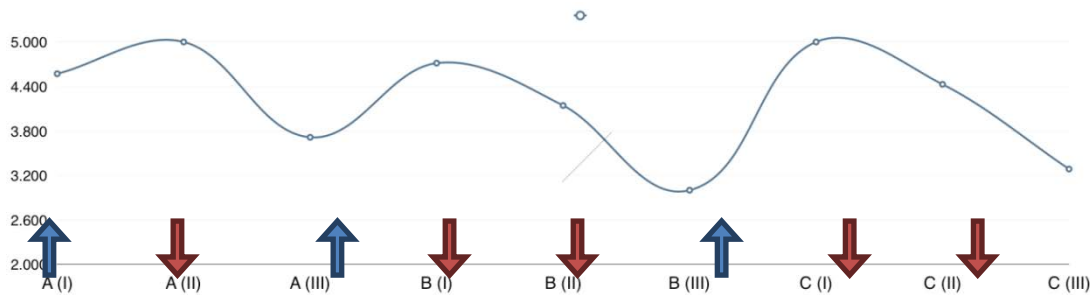


Figure 1.4 The comparison of the seven children’s emotional change curve

4.3. Adjust the English learning toy with one selected child after the two stages experiment

As for the qualitative interview, seven children have participated in the study. Three designed situational scenarios are applied into two stages experiment. Seven children have been observed by the researcher through their entire experiment with two different stages. Based on the researcher’s observation among these two experimental stages, there are some improvements that can be made with the English learning toy. Therefore, one 4-years-old girl child, coding number as “F”, received the highest performance from the two stages experiment. Participant “F” has chosen to participate for the further experiment after learning that the toy has got some mechanical and functional improvement.

Based on the previous situational experiment, the toy’s speaking volume has been adjusted and increased. F had the same test again; F’s overall learning capability has increased. Since the English learning toy is designed whether it is efficient, memorable, error adjustable, and satisfied, the following is the testing results:

Table 2: Child “F” reaction toward the English learning toy with the four designed principles

Designed Principles	Experiment Results
Efficiency	Toy’s efficiency was divided into touching and speaking: Touching: F gain immediate feedback after touching the toy. Speaking: F had to make her pronunciations more accurate so that the toy can respond.
Memorability	The design for the children to integrate with the toy is

simplified. Therefore, F can operate the toy without difficulty. In addition, she has been through the two stages experiment, so she has learned how to operate with the toy.

Error	Toy's using error rate was divided into touching and speaking: Touching: the way of touching the toy is directly and easy to try. Speaking: F has a difficulty in correcting her own articulation due to not knowing how to articulate the word correctly or make an improvement. As a result, the error rate is high with a low response.
Satisfaction	"F" created her own way to integrate with the toy through the different experiments. Overall, F was highly engaged in playing with the toy. She paid attention on how to change her action to stimulate the toy. She seemed to enjoy playing and learning from the toy.

5. Discussions and future recommendations

This study sought whether the designed English learning toy would stimulate a child's learning tendency. Also it aimed to find out how the children's emotional fluctuation changed when they integrate with the English learning toy.

The formation of the language learning toy was based on Norman's (1988) user-centered design; UCD. Through the qualitative interviews with the seven children on the two stages experiment, the study discovered that children did learn, and want to learn and discover more during their interaction with the toy. This result is consisted with Vygotsky's scaffolding (1987) as it pointed out that play not only stimulates the children's capability of imagination, but also allows them to learn beyond their zone of proximal development. Also, the study result is similar to Skinner's (1938, 1953) operant conditioning; when the children gained feedback through their correct operational process toward the toy, the positive feedback drives them to have further interactions with the toy.

This study initiatively evaluated the child's emotional fluctuation with the English learning toy. The work hopes that further research could be conducted in order to create a child's English learning based toy, whereas the diverse content creates an interaction to stimulate and enhance the children's mind for development.

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