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Study on English Learning Support Using Question Cards and Smart Speakers

Ayame KOBAYASHI a*, Shigeto OZAWA b
[a] *Graduate School of Human Sciences, Waseda University, Japan*
[b] *Faculty of Human Sciences, Waseda University, Japan*

Abstract: This study intended to clarify how children interact with smart speakers when they learn English as a second language. Second, it aimed to determine the topics children find easy when talking with smart speakers. Han. J. et al (2008) have stated that children's interactions in English with robots were effective for the learning of English words and for the acquisition of vocabulary. The subjects were eight students who had not experienced smart speakers. The researchers used 60 question cards to help beginners to ask questions to smart speakers and subsequently encouraged the children to create their own questions. The participating students exhibited two trends of preference in the questions they asked: first, students asked questions that assumed 'Alexa' was a human being, even though they knew it was an artifact; second, children selected questions that could be generated by exchanging words (nouns) and that could satisfy their intellectual curiosity. Specifically, children were found to ask questions such as "How many calories are in a donut?"

Keywords: smart speaker, English learning, utterance research, constructive interaction

1. Introduction

Smart speakers respond quickly and exhibit synchronicity. Thus, they are useful for output activities that are essential to language learning. The authors of this study examine effective ways of using familiar technologies such as smart speakers as instruments of educational support.

Miyake et al. (2012a, 2012b) and Ishiguro et al. (2011a) have evidenced the learning that can be achieved by introducing robots into practical applications of human-robot symbiosis. Han. et al. (2008) have asserted that children's interactions in English with robots were effective for the learning of English words and for the acquisition of vocabulary (Han, et al., 2008; and Kanda, et al. 2004).

Reeves and Nass (1996) have find the media equation that individuals' interactions with computers, television, and new media are fundamentally social and natural, like interactions in real life.

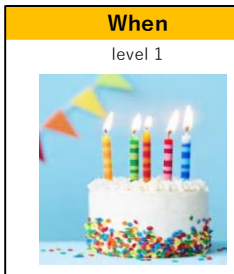
The purpose of this study is to clarify how children interact with smart speakers when they learn English as a second language. Second, the present investigation elucidates topics that are easy for children in their conversations with smart speakers.

2. Method

The subjects of this study consisted of eight children who learn English as a second language (a boy and a girl in the first grade of junior high school, a boy and a girl belonging to the sixth grade of elementary school, and two boys and two girls attending the fifth grade of elementary school).

In this study, 60 question cards (hereinafter referred to as cards) were used to investigate the types of utterances made by students when they talked to a smart speaker (Amazon Echo Dot Smart Speaker with Alexa). Fig.1 presents a sample card, the level division, and the number of individual categories and levels. The card used grammar that was aligned to English textbooks utilized in public elementary and junior high schools. For this reason, the level classification was the same as Level 1 for grammar expressions learned from elementary school to the first grade of junior high school. Four discrete levels were established. In addition, nine categories such as Who, What, Where, and so on were instituted. The size of the card was designed to fit 4 sheets of A4 paper vertically and 3 sheets horizontally. Copyright-free images were used from Shutterstock for the illustrations.

The 60 cards were classified into five groups. Groups 1 and 2 assumed everyday conversations. Group 1(daily-open) comprised 12 cards. Group1 was defined as questions whose responses changed from time to time. Group 2 (daily-closed) consisted of 9 cards. Group 2 represented questions whose answers would remain unchanged such as "When is your birthday?" Next, Groups 3, 4, and 5 envisioned questions that were used to obtain information. Group 3(interest-based) encompassed 14 cards and denoted Internet search questions on a subject of interest. Group 4(tool-based) contained 12 cards and questions in this category could be used to obtain information using a clock, a dictionary or other tools. Group 5(knowledge-based) included 13 cards that incorporated questions about knowledge that children learned at school or in their personal lives.



Category (Who, What, Where, When, How, etc.)
Level
Level 1 : elementary - the first grade of junior high
Level 2 : the first - second grade of junior high
Level 3 : the second - third grade of junior high
Level 4 : the third grade of junior high and more
Visual information (Free images by Shutterstock)
Example of question

Category	SUM	Level 1	2	3	4
Who	12	3	5	4	0
What	18	7	5	2	4
Where	3	2	0	0	1
When	5	4	1	0	0
How	15	3	5	7	0
Do you	2	1	1	0	0
Can you	2	1	1	0	0
Tell me	2	0	0	0	2
Order	1	0	1	0	0
SUM	60	21	19	13	7

Figure 1. A sample of the 60 question cards and the number of every category and level

Utterance analysis was conducted on the transcripts of the ICT recordings. The data accumulated in the Alexa application were also qualitatively analyzed using Excel. The survey period encompassed 7 weeks from May 27 to July 12, 2019. Regardless of how many times the same student repeated the same question, an utterance was counted only once because of instances in which the same question was asked multiple times in the same scene either because there was a problem with Alexa's voice recognition or because of the student's inability to understand the contents of Alexa's answer.

3. Results

Table 1 exhibits the number of utterances recorded by 8 students. The total aggregate of utterances made by the 8 students was 228 (N = 8, Ave = 28.5, SD = 5.72). By group, the participating students asked 46 (Ave = 5.8, SD = 0.83) daily-open questions, 56 (Ave = 7.0, SD = 2.12) daily-closed questions, 59 (Ave = 7.4, SD = 2.00) interest-based questions, and 41 (Ave = 5.1, SD = 1.96) tool-based questions. There were 26 cases (Ave = 3.3, SD = 1.64) of knowledge-based questions.

Table 1
The number of utterances of eight students for seven weeks

	Students A	B	C	D	E	F	G	H	SUM		AVE	SD
1. Daily-open	6	5	7	5	5	5	7	6	46	20.2%	5.8	0.83
2. Daily-closed	8	8	7	4	9	8	9	3	56	24.6%	7.0	2.12
3. Interest-based	10	7	6	9	8	8	8	3	59	25.9%	7.4	2.00
4. Tool-based	2	8	3	5	7	5	7	4	41	18.0%	5.1	1.96
5. Knowledge-based	5	5	2	3	5	3	3	0	26	11.4%	3.3	1.64
SUM	31	33	25	26	34	29	34	16	228	100.0%	28.5	5.72

Figure 2 depicts the 12 most popular questions that found place in the top 20% of all questions asked with the proportions recorded for each group. Daily-closed questions represented 41.7% of the top 20%, and this category was the most popular choice. The five cards chosen in this context asked questions such as "When is your birthday?" "Can you sing?" "How old are you?" "Can you beatbox?" and "Where are you from?" Daily-open questions formed 33.3% of the 12 most popular questions, and four cards were chosen, with questions such as "How are you?" "What's your favorite song?" "Who is your best friend?" and "What's your favorite Japanese food?" Interest-based questions took 16.7% of the 12 most popular questions and the two cards chosen were: "Who made Alexa?" and "How many

calories are in a donut?" Tool-based questions formed 8.3% of the most popular dozen and the selected question was "What time is it?" Knowledge-based questions did not find space among the top 20% of the questions that were asked by the participating students.

Some of the 60 question cards evoked spontaneous question generation. The question that most led to such unprompted production of original questions was "How many calories are in a donut?" Specifically, there were nine instances of the word 'donut' being reworded as chocolate, cake, pizza, pasta, hamburger, etc.

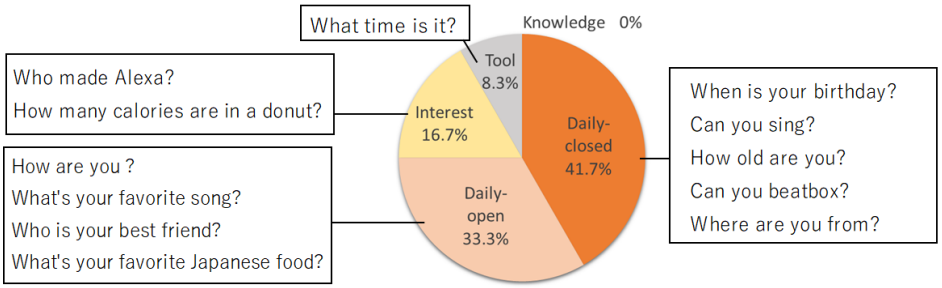


Figure 2. The 12 most popular questions in the top 20% with the proportions in each group

4. Discussion

Based on the results obtained from the utterance analysis of the 60 question cards, the researchers could identify two trends from the questions that the students liked and listened to. First, students tended to ask daily-closed and daily-open questions to Alexa; for example, when a student asked, "How are you?" Alexa would reply "I'm quite cheerful." Therefore, even if Alexa did not physically appear to be a robot, the students thought that Alexa was a friend who was learning with them. This result is consistent with the media equation theory (Reeves and Nass, 1996).

Second, the questions that most led to spontaneous question generation by students were those that could be produced by replacing words (nouns). Two trends were seen among these: first, students tended to choose questions with numbers for answers. Perhaps such questions were selected because numbers are clearly defined and relatively easy for beginners learning English. In addition, it is believed that surprises from results that were unexpected stimulated the intellectual curiosity of the participating children and led to a proactive learning attitude.

For these reasons, it seems natural to conclude that incorporating smart speakers into the learning environment could create many output opportunities necessary for language learning. Auxiliary materials such as question cards can be combined with the use of smart speakers to provide children with opportunities to generate their own questions.

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