Robot-assisted instruction of L2 pragmatics: Effects on young EFL learners' speech act performance

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Abstract

Technology, as a source of instruction, has fulfilled various purposes in foreign language learning environments. During the last decade, Robot-Assisted Language Learning (RALL) has attracted teachers’ and researchers’ attention due to the look and feel of humanoid robots. However, in the field of pragmatics, studies highlighting the role of RALL have gone relatively unnoticed. To bridge this gap, this study sought to explore the effect of RALL on pragmatic features, including request and thanking speech acts by young Persian-speaking EFL learners. For this aim, 38 preschool children (3 to 6 year-old boys and girls) with no English learning experience were randomly assigned to the RALL (19 students) and non-RALL (19 students) groups. In the RALL group, a humanoid robot was used as an assistant to the teacher to play games, repeat the sentences, and interact with the students. In the non-RALL group the lessons included games similar to those in the RALL group, but without the presence of the robot. There were eight one-hour teaching sessions over a period of four weeks for both groups. Following completion of the lessons in both groups, the results of post-tests were analyzed using an independent sample t-test. The findings revealed a significant difference between the RALL and non-RALL groups’ pragmatic performance for thanking and requesting. Based on these findings it can be concluded that RALL instruction was more effective than non-RALL instruction in improving the young learners’ performance.

Keywords: RALL, Humanoid robot, Pragmatics instruction, young EFL learners

Language(s) Learned in This Study: English


Introduction

For many years, second language (L2) instructors have helped learners produce and perceive appropriate language related to context. In this regard, pragmatic instruction has been considered an important method of increasing L2 learners’ attention to target community norms and patterns of behavior. There have been many studies showing that L2 pragmatic features, like speech acts, should be taught to learners (Derakhshan & Eslami, 2015; Soler & Pitarch, 2010; Taguchi & Roever, 2017). L2 learners, whether child or adult, should learn how to convey their intention and interpret others’ intentions across languages. Children’s ability to interpret and convey speech acts in their mother tongue begins to develop from an early age (Dore, 1974). They learn different speech acts such as offering, asserting, and attention drawing. Among these, the act of request making assists in fulfilling needs and getting others’ help. After a child learns how to make requests, parents generally introduce the new speech act of thanking to teach them politeness. Therefore, thanking is another speech act a child would learn and use in his/her everyday life. These two speech acts have always been complementary and as an L2 learner, a child, ought to learn
how to make requests and thank politely.

Numerous studies have previously indicated the positive impact of using technology for pragmatic instruction in classroom contexts (e.g. Eslami, Mirzaei & Dini, 2015; Huang & Chang, 2015; Taguchi & Sykes, 2013). From among the diverse technological advancements, robotic technology has successfully paved its way into teaching and learning. It is argued that the interaction between students and a robot is more promising than MALL (Mobile Assisted Language Learning) and CALL (Computer Assisted Language Learning) (Alemi, Meghdari, & Ghazisaeidi, 2014; Han, 2012; Movellan, Eckhardt, Virnes, & Rodriguez 2009). However, there seems to be a gap in the literature regarding the use of robots to teach pragmatics, especially in the case of young learners. Instruction in L2 pragmatics could help children distinguish different contexts and also be polite in a second language, enabling fewer miscommunications in the future. In addition, robots are attractive to children and capture their attention and imagination (Alemi, Meghdari, Basiri & Taheri, 2015).

Accordingly, the current study investigates the impact of applying the Robot Assisted Language Learning (RALL) method to teach request and thanking speech acts to young children.

**Literature Review**

In the context of second language instruction, pragmatics was investigated under the umbrella term Interlanguage Pragmatics (ILP). Kasper and Dahl (1991) redefined ILP in a narrow sense as “the nonnative speakers’ comprehension and production of speech acts and how their L2-related speech act knowledge is acquired” (p.1).

Despite the considerable number of studies done on adults’ ILP instruction (Holden & Sykes, 2013; Huang & Chang, 2015), young learner's second language pragmatics instruction has received scant attention in academia, and there are only a few studies focused on the speech act of requesting (Achiba, 2003; Kuo, 2010; Rose, 2000). Achiba (2003) conducted a longitudinal study on children’s requests during her residence in Australia, studying a child’s process of request making based on her interaction with a peer, an adult neighbor, and a teenager. She recorded her findings in both audio and video formats and made extensive and comprehensive diary entries. Achiba (2003), concluded that a child’s request making is dependent on the addressees and situations in which the speech act occurred. As mentioned previously, the previous studies have concentrated on only the request act for children, ignoring the thanking step.

According to Usó-Juan (2010), requests are defined as a face-threatening act because they implicitly express the speaker’s intention to impose upon the hearer to do something. Both the requester’s and recipient’s faces are threatened in the performance of requests. Usó-Juan (2010) further posits that learners should possess a satisfactory pragmatic expertise in order to make requests appropriately and prevent them from being considered uncooperative, rude, and insensitive.

On the other hand, thanking is defined as “An illocutionary act performed by a speaker which is based on a past act performed by the hearer. The speaker feels grateful or appreciative, and makes a statement which counts as an expression of gratitude” (Eisenstein & Bodman, 1986, p. 167). This face-demanding speech act is an aspect of politeness in language and involves someone’s state of indebtedness to the others (Brown & Levinson, 1987). Expressing gratitude and thanking others is an everyday normal interaction between individuals in a community and it is a part of the social use of language. Leech (1983) regards thanking as a speech act which is inherently polite in nature, placing it under the convivial category of speech acts. As it is evident, the face-threatening aspect of request and the face-demanding aspect of thanking complement each other in a community. In other words, the generally positive aspect of thanking covers the potentially negative aspects of request making, producing a balance between interlocutors.

Regarding the focus of this study on teaching ILP to children, it should be noted that children acquire pragmatic knowledge of their L1 very early and start to convey their intention by using different speech
acts. Dore’s (1974) investigation on Primitive Speech Acts (PSA) of children in their one-word stage suggested that, although the child’s primitive intention is less complete than adults’ speech acts, “before the child acquires sentential structure, he possesses systematic knowledge about the pragmatics of his language which is best described in terms of “primitive speech act” (p. 344). When considering children’s ability to learn the speech acts of their first language (L1), they comprehend utterances by relying strongly on knowledge of their world rather than the meaning given by the linguistic elements (Marinac & Ozanne, 1999; Strohner & Nelson, 1974) or the speaker’s intended meaning (Robinson & Whittaker, 1987). Bishop (1997) stated children’s comprehension of utterances benefits from the context in which they are made. Furthermore, children understand direct utterances better than indirect ones. In this is the case, it should be possible to teach ILP to children since their comprehension is based on what they have previously experienced in the world. According to Piaget (1936), children first try to understand the world around them, then make connections between what they already know and what they are discovering in their surroundings.

Discovery learning, the idea that children learn through acting and experiencing actively, was noticeably responsible for the alternation of many primary school programs. Ormrod (1995) defined discovery learning as “an approach to instruction through which students interact with their environment by exploring and manipulating objects, wrestling with questions and controversies, or performing experiments” (p. 442). Given children’s ability to learn from the context and their previous experience, the teacher’s role in the classrooms would no longer be to transmit knowledge but instead they should facilitate the process of learning and provide an opportunity for children to learn their language through discovery learning (Piaget, 1936). Moreover, Brookfield (2017) and Laba (2014) stated foreign language learning needs the active participation of learners in the classroom and their active engagement in and real-life materials in the form of tasks and activities. Due to the fact that context was very important in the pragmatic domain of his study, Vygotsky (1978) argued that social interaction is important for cognitive maturation and asserted that children always learn in a social context in contact with the more skillful individuals. He stressed that scaffolding is needed at the onset of child’s learning and believed that the teacher should first guide the child and help him or her to link what was known before with what is being learned now, then gradually the child will not need as much help. This allows the teacher to slowly remove the scaffolding; at the end, the child becomes self-directed and self-empowered (Vygotsky, 1978).

Like Vygotsky, Oxford (1997) believes that engaging students in dialogues with each other and providing a collaborative, cooperative, and interactive setting for them to learn through pair or group work can create a participatory, interactive, and student-centered classroom setting. Thus, in the realm of ILP instruction for children, the applicable framework would be constructivism as children construct the meaning of L2 speech acts that take place in context.

According to Martinez-Flor and Usó-Juan (2010) there are three main conditions for learners to develop pragmatic abilities to be able to communicate successfully. This entails providing appropriate input, providing opportunities for production or output, and provision of feedback. Martinez-Flor and Usó-Juan (2010) suggest input should first be understood by the learner. Other sub-conditions they suggest are teacher talk, materials, and input of learners’ peers which are all important in improving pragmatic ability. Second, we need to consider the role of output or production with tasks such as interaction, practice, and group work, which all elicit production. Classroom activities and organizations where learners are actively involved in interaction, like role-play, are crucial to producing output. Finally, they proposed the role of feedback, whether positive or negative. In other words, the provisions of feedback for students would compel them to become more accurate in their use of pragmatic functions and also prevent miscommunications.

Regarding robotic technology, RALL is defined as “targeting language learning in particular” (Han, 2012, p. 5). Also, Han posits that most robots in RALL are connected to educational materials and can act as a native speaker to make contact with learners (Han, 2012). According to Xie, Antle, and Motamedi’s (2008) study, students become more engaged with the learning process when there is a tangible object, an obvious
characteristic of robots. Another key feature of a robot lies in its interaction capability (House, Malkin, & Bilmes, 2009) and body movements, which make learning and teaching more intelligible. Human-Robot Interaction (HRI), as the name implies, is one of the distinctive characteristics of a robot as compared to other devices like computers (Thrun, 2004). This means that robots can interact with humans directly without any mediation. Fink (2012) asserted that the more the robot’s behaviors and characteristics are similar to human, the more efficient and natural people will find them. Thus, when incorporating robots in child second language instruction, robots should be presented as peers or friends to make it more appealing and interactive (Vogt, De Haas, De Jong, Baxter, & Krahmer, 2017).

Also, according to Toh, et al. (2016), robots have proven to be appropriate tools in language instruction since they provide more interaction. In a more recent study, Mazzoni and Benvenuti (2015) employed a Mec-Willy robot as a partner to children in order to teach fruits and vegetables vocabulary and observe the Socio-Conflict paradigm’s effect. This paradigm is based on interaction and negotiation of meaning through collaboration and partnership. The findings of the study indicated that using the robot as a partner was beneficial for learning vocabulary and increasing partnership.

Moreover, a number of studies have focused on RALL in the EFL context in Iran. Alemi, Meghdari, and Ghazisaeidi (2014) employed a humanoid (NAO) robot to teach vocabulary to junior high school students. They also reported that students’ anxiety decreased as a result of interacting with the robot and they were highly motivated to continue their English language learning. Other studies have been done using the same robot for different subjects and all results demonstrate a promising impact on learning (e.g., Alemi & Haeri, 2017a; Alemi, Meghdari, & Haeri, 2017b; Alemi & Bahramipour, 2019). In one recent case, Alemi and Bahramipour (2019) conducted a case study in which the NAO robot was used to teach vocabulary to students with Down syndrome. Their results revealed that the robot had a very positive influence on the students’ learning gains.

Taking into account that children can learn ILP features through discovery learning and construct meaning based on the interaction occurring in the environment (Ormrod, 1995) and that a robot can facilitate this process and provide an interactive environment for children, the current study examines this issue, combining RALL methods with ILP instruction, to teach request and thanking sequences to children.

**Research Questions**

1. Is there any significant difference between the RALL and non-RALL groups’ post-test performance on the acquisition of the speech act of thanking by young Iranian EFL learners?

2. Is there any significant difference between the RALL and non-RALL groups’ post-test performance on the acquisition of the speech act of making requests by young Iranian EFL learners?

**Method**

**Participants**

The participants of this study consisted of 38 children from a private kindergarten in Tehran, Iran. In this bilingual kindergarten, English is taught as a foreign language to preschoolers. Before choosing the participants, the kindergarten principal offered the researcher a list of 38 children who were at the first level of the English course. These children were then randomly selected and divided into two groups, including RALL (n = 19) and non-RALL groups (n = 19). The sample included both boys and girls ranging in age from 3 to 6 years old. The children were all preschoolers and unable to read and write in either Farsi (the children’s first language) or English. All had little English background and knew only few words of English, a pre-test demonstrated they were unfamiliar with any complete sentences in English.

The RALL (i.e., experimental group) had the robot in their class as a teacher assistance (TA) while the non-
RALL (i.e., control group) was managed by the teacher who was also the researcher. The RALL and non-RALL classes took place on different days and lasted eight sessions (two days a week for four weeks) for both groups.

All parents’ approval for participation in the study was provided through informed consent forms. All the participants in this study were native speakers of Persian without previous instruction in English. Figure 1 shows the RALL group with NIMA (the robot) and the teacher.

**Figure 1.** RALL students with NIMA and the Teacher.

**Instruments**

1. **The robot**

   In this study, a child-sized humanoid programmable robot called NAO (Figure 2) was used as an assistant to the teacher. It was designed and made by Aldebaran Robotics. The robot was renamed NIMA (an Iranian male name) in order to facilitate more intimacy between the robot and children. The robot was programmed by a team including the researchers, an engineer to program the lesson plans into the robot using the Choregraphe program (Figure 3), and an operator to control the robot in the class. The Choregraphe program is a user-friendly application which allows users to create actions and behaviors and test them in advance. The text-to-speech engine of this software converts text into speech, which corresponds to the related actions. In addition, the program has the ability to regulate the pitch of the voice and produce either a child or adult voice. For this study the voice pitch was designed to be a 7-year-old boy with a medium pace so its speech would be understandable for the children.

   Users can save the created programs and use or change them as needed. This program facilitates interaction with the robot by both a text-to-speech engine and created actions. The humanoid robot performed a variety of activities, such as playing games, singing songs, dancing, talking, and interacting with children. The robot programs were written by a robotic engineer for eight hour-long sessions based on the designed lesson plans. The interactions in the lesson plan are step-by-step dialogues between NIMA, the teacher, and the children for all the sessions and were performed through text-to-speech and preprogrammed actions.
**Figure 2.** NAO robot (NIMA) H21 version.

**Figure 3.** A sample of created action on the Choregraphe program

**II. Teaching Materials**

The teaching materials for this study for both RALL and non-RALL groups were based on the Functional Communication in English textbook by Tajeddin and Alemi (2014) and also stories from the ESL library website. Functional Communication in English is a pragmatic-based book that consists of pragmatic sentences for all ages. The researcher chose novice-level sentences for children and tried to find a story for each sentence from the ESL library website.

Due to the fact that children are taught some basic English vocabulary in kindergarten, the lesson plans were written based on those words in order to fulfill that need. In addition, all of the pragmatic sentences were written based on a story about NIMA and the related action for each sentence was performed by him.
Each lesson plan consisted of one pragmatic sentence and five basic vocabulary words. Other teaching instruments, such as flash cards, real classroom objects, and a CD player, were used in the class to increase the interaction between NIMA and the children. In addition, the lesson plans included some games such as pass the ball, Simon says, and mystery bag, which are all well-known and practical for a child’s learning. The above games were performed by NIMA in the RALL class to increase the children’s motivation, while the games were performed by the teacher in the non-RALL class.

The lesson plans were created to teach requests and thanking speech acts, and, aside from the presence (or absence) of NIMA were similar for both groups. Request making and thanking were both used since they are both appropriate and at the level of the learners (Tables 1 & 2 show the sentences).

The following Tables (1) and (2) are the list of request and thanking sentences taught and tested in both the RALL and non-RALL groups:

<table>
<thead>
<tr>
<th>Request Speech acts</th>
<th>Relevant Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water please</td>
<td>Showing thirsty lips</td>
</tr>
<tr>
<td>May I go to the bathroom please?</td>
<td>One hand up for permission</td>
</tr>
<tr>
<td>Give me the…. please</td>
<td>One hand towards the listener and grasping action</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thanking Speech acts</th>
<th>Relevant Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thank you</td>
<td>Showing appreciation by bending towards listener</td>
</tr>
<tr>
<td>You are welcome</td>
<td>Pretend not to mention the kindness</td>
</tr>
<tr>
<td>Thank you for the….</td>
<td>Pointing to the object and saying thank you…</td>
</tr>
</tbody>
</table>

**III. Pre-test and Post-test**

Before starting the lessons, the investigators administered a pictorial pre-test to both groups in order to homogenize the students based on their speech act knowledge. These scores were then compared to results of the post-test to measure the participants’ abilities before and after the intervention. Next, they were randomly assigned to two groups and, at the end of the course, a pictorial post-test in Power Point format was administered to both groups. Results were evaluated using an independent samples t-test. The questions in the pre-test consisted of asking what the picture’s activity was in Farsi (student’s L1). The teacher would ask if they knew the answer in English; for the post-test, the teacher asked the questions for each picture in English. The procedure for measuring both comprehension and production is explained below:

In both tests, the child looks at the picture for context and should then produce the correct speech act. If this does not happen, the teacher can deduce that the child acquired neither comprehension nor production. In other words, first, he did not comprehend the context, so then he could not construct the meaning, and last, he could not produce the related speech act. Accordingly, he gets no point for that picture.

*Figure 4* shows two sample pictures from the pre- and post-test for “May I go to the bathroom?” sentence. The two pictures indicate the sentence used in the pre-test and post-test, respectively.
In addition, the validity of the tests was examined by two independent English teachers. Since the pictorial test did not meet the requirements for a statistical reliability check, the test’s reliability was ensured by asking ten other children, who were previously instructed and familiar with the sentences, to respond to the prompts. To make sure that the pictures were reliable and gave consistent results over time and with different groups, the test was administered to two groups over a time period of two months.

**Data Collection Procedure**

To collect the data, 38 students were randomly assigned to RALL and non-RALL groups. The robot was used as an assistant to the teacher in the RALL groups, while the teacher taught the same lesson plans alone in the non-RALL group. Participants completed eight one-hour teaching sessions two days a week for four weeks. The duration was the same for both groups. Prior to the lessons beginning, pre-test, based on the designed lesson plans, was administered to both the RALL and non-RALL groups, the results revealed that the participants were homogenous in terms of English background. After eight teaching sessions, a post-test was administered to measure the participants’ learning gains. Because all of the children were unable to read and write, both pre-test and post-test were pictorial. Each session started with a warm-up, which was either a song or a game, based on the children’s needs and desires. Before starting the intervention with the RALL group, the robot’s actions, along with the relevant sentences were piloted in the CEDRA laboratory of Sharif University of Technology in order to reduce software failure and to make sure that there would not be any mismatches between the robot’s movements and speech. The teacher practiced each sentence and story before the class under the supervision of the robotic engineer, and if necessary, they resolved or changed the movements or lines.

As mentioned above, the lesson plans were designed based on the children’s needs and all speech act sentences were contextualized in a short dialogue between NIMA and the children or the teacher. The students then learned the new sentence in their dialogue. The detailed instruction in the RALL class is explained session-by-session.

In the first session NIMA was introduced as the children’ friends and then had a conversation with them. He talked about his age, abilities, and asked the children’s names one-by-one. The children were excited and asked to shake hands with, touch, and kiss NIMA (Figure 5). Next, to increase their motivation, NIMA showed his abilities to children by walking and dancing and lastly play-acted as a soccer player with song and music. The first session was generally positive. In the non-RALL class the teacher and children were introduced to each other and the teacher taught the same lesson plans alone.

*Figure 4.* The two samples pictures related to the “May I go to the bathroom?” speech act.
In session two, after warming up with a song, the teacher told the children a story about NIMA. In the story NIMA needed help collecting several items and the teacher then asked the children to give NIMA his stuff such as a bag, ball, and hat. Each child would approach NIMA and bring an item NIMA has asked for, give it to him, and hear: “Thank you!” from NIMA (Figure 6). Next, they would do this activity in pairs and say “Thank you” when receiving an object.

Figure 5. Students touching and kissing NIMA in greeting one by one.

Figure 6. The child hears “Thank you” from NIMA after giving him his ball.

In session three, the teacher showed flash cards of classroom objects to the students and asked them to repeat the name after her. Next, they played a game in which NIMA would bring out the classroom objects from his “mystery bag” and the children would guess what that was. After repetition, the teacher asked NIMA to give her some objects (See Excerpt 1).

Excerpt 1: Class Session 3

T: NIMA give me the glue please!
N: Here you are.
T: Thank you NIMA.
N: ……….
T: NIMA you should say “you are welcome”.
N: You are welcome
T: Can you repeat it again louder?
N: YOU ARE WELCOME!

In this short dialogue the teacher taught children that there should be an answer to the thank you, which NIMA forgot to say.

The children were then divided into two groups and each group received one object and said “thank you” and the other group said “you are welcome.” This game helped children practice both comprehension and production of the taught speech act in the proper context.

In session four, the story was about how NIMA was so thirsty after coming back from the gym. He would say water please to the teacher and the teacher would bring a glass of water for him. Next, NIMA called out to the students one-by-one and used the taught speech act, shown in Excerpt 2.

Excerpt 2: Class Session 4

N: Water please!
S: (the child would give him a glass of water with the help of the teacher)
N: Thank you
S: You are welcome

Each time a student completed his or her conversation with NIMA, she or he would receive positive feedback from NIMA in the form of applause or a short song. This would encourage the children to interact even more with NIMA. In the next step, it was time for the students to produce the sentence. NIMA would play a song and the children would “pass a ball” until the music stops, whoever held the ball after the pause would say water please, receive a glass of water, and continue the above conversation.

Session five was written based on NIMA’s birthday party. NIMA sang songs and danced, exciting and delighting the students. The teacher gave each child a small present to give to NIMA such as a flower or doll. For example, a child would give a flower to NIMA and hear: “Thank you for the flower.” In this case, they would learn how to respond gratefully for a specific object. The teacher asked the class to repeat the sentence chorally. NIMA would then repeat the same dialogue making mistakes and receive corrective feedback from children. This strategy helped the children to understand that making mistakes are not embarrassing and getting corrective feedback is a normal phenomenon during learning.

In session six, the children were asked to bring some of their toys to the class. The teacher asked the students to share their toys with NIMA because he forgot to bring his. In this case, NIMA would ask one of the students: “Give me your car or doll please!” The selected student would share his or her toy with NIMA and start a dialogue with him. Any time a child shared his or her toys with NIMA, NIMA would dance for them and make kissing sounds to encourage more interaction in the class. Next, the students would share their toys with each other in pairs and use the taught sentence with different vocabularies under the teacher’s guidance and NIMA’s corrections.

Session seven’s story was written based on NIMA’s need to go to the bathroom. The teacher started to teach some vocabulary about body parts, which is part of kindergarten course. In the middle of the lesson NIMA
asked: “May I go to the bathroom?” the teacher answered “yes” and he stood up and went towards the bathroom. At this time, the teacher then asked the children where he went and most of the students were able to answer correctly. After NIMA came back from the bathroom, the children played hide and seek with NIMA one-by-one. Before hiding, they would say the taught sentence and then go towards the bathroom and hide. Then NIMA would guess where the child was hidden. This activity was able to teach the students how to request politely when they are in this situation.

The last session was a farewell with NIMA. The teacher explained in Farsi that NIMA wants to return to his country because his parents are waiting for him. The teacher asked the children to draw a picture for him as a memento. Interestingly, most of their drawings included themselves and NIMA (Figure 7). The children seemed to accept saying goodbye to NIMA and came to him one-by-one to hug him and offer their drawings.

![Figure 7. Some of the children’s farewell drawings for NIMA.](image)

**Results**

The pre-tests were administered to exclude those subjects with prior knowledge of the speech act sentences. The scores obtained from the pre-tests were zero showing all the children were uninstructed in English requests and thanking sequences. There was no difference in their pre-test scores.

To answer the first research question, an independent samples t-test was conducted between the post-test scores of the RALL and non-RALL groups. Before conducting the independent samples t-test, the assumption of normality was examined. Both skewness and kurtosis were between -2 and +2, so according to Tabachnick and Fidell (2013), the data met the assumption of normality.

As displayed in Table 3, the RALL group (M = 16.26, SD = 2.23) had a higher mean than the non-RALL group (M = 13.89, SD =1.59).

<table>
<thead>
<tr>
<th>Instruction</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>RALL</td>
<td>19</td>
<td>16.26</td>
<td>2.23</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>Non-RALL</td>
<td>19</td>
<td>13.89</td>
<td>1.59</td>
<td>0.36</td>
<td></td>
</tr>
</tbody>
</table>
The results of the independent samples t-test for the RALL and non-RALL groups are presented in Table 4. As shown by Levene’s test, the assumption of homogeneity of variance was met (F = 1.22, p = .27), so the first row of the Table 4 was reported. In addition, the result of the independent samples t-test (t_{36} = 3.76, p = .001, r = .53, representing a large effect size) indicated that there was a significant difference between the RALL and non-RALL Iranian young EFL learners groups’ post-test performance in the acquisition of thanking speech acts. It can, therefore, be said that the RALL group outperformed the non-RALL group because of the presence of the robot.

Table 4. Independent Samples t-test for Both Groups in Thanking

<table>
<thead>
<tr>
<th>Posttest Thanking</th>
<th>Levene’s</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>1.22</td>
<td>.27</td>
</tr>
</tbody>
</table>

Another independent samples t-test was conducted to answer the second research question on the existence of any significant difference between the RALL and non-RALL groups’ post-test performance on the acquisition of requests. It was performed between post-test scores as dependent variable and the RALL and non-RALL groups as a categorical independent variable coded as RALL = 1 and non-RALL = 2. Before conducting the independent samples t-test, its statistical assumptions were checked. Both skewness and kurtosis were between -2 and +2, so according to Tabachnick and Fidell (2013), the data met the assumption of normality.

As displayed in Table 5, the RALL group (M = 16.05, SD = 2.50) had a higher mean than the non-RALL (M = 13.31, SD = 2.38) in making requests.

Table 5. Group Statistics for RALL and non-RALL Post-tests

<table>
<thead>
<tr>
<th>Instruction</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>RALL</td>
<td>19</td>
<td>16.05</td>
<td>2.50</td>
<td>.57</td>
</tr>
<tr>
<td>Non-RALL</td>
<td>19</td>
<td>13.31</td>
<td>2.38</td>
<td>.54</td>
</tr>
</tbody>
</table>

The results of the independent samples t-test for the RALL and non-RALL groups are presented in Table 6. As can be seen, the assumption of homogeneity of variance was met (F = .26, p = .61); this information is also presented in the first row of Table 6. Thus, the result of the independent samples t-test (t_{36} = 3.45, p = .001, r = .50, representing a moderate effect size) indicated that there was a significant difference between the RALL and non-RALL groups’ post-test performance in the acquisition of request speech acts by young Iranian EFL learners. The findings indicate that both groups showed improvements in the acquisition of requests, while the RALL group’s scores were more satisfactory due to presence of the robot.

Table 6. Independent Samples t-test for Both Groups in Making Request

<table>
<thead>
<tr>
<th>Posttest Thanking</th>
<th>Levene’s</th>
<th>t-test for Equality of Means</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.26</td>
<td>.61</td>
</tr>
</tbody>
</table>

The aforesaid results showed the effectiveness of employing a humanoid robot as an assistant to the teacher over the non-RALL group. In other words, due to the large effect size of the t-test for both thanking and request making, it can be said that the RALL group outperformed the non-RALL group in their post-test performance on both speech acts. The t-test results provided evidence that the robot had a deep effect on
students’ motivation and learning process compared to the non-RALL.

Discussion

This study concentrated on children’s ILP instruction by using a robot as an assistant to the teacher. Addressing both a need for young learners to be appropriate in L2 contexts, while also adding much needed empirical insight into the ILP development of young learners, this study indicates a positive effect of robotic mediation. Results demonstrate that learners are able to learn L2 pragmatic features. This claim is in line with Dore’s (1974) study, asserting that some universal aspects of pragmatic features can be taught to children. According to Piaget (1936), children have the ability to interpret meaning in the context based on their own experimentation.

In addition, we focused on request and thanking speech acts based on the children’s familiarity and experience with them in their mother tongue. As a result, the children could be prepared to ask their questions and thank others in a second language. According to Piaget (1958), teachers should be aware of the children’s level and then, based on their level of understanding, set suitable tasks and activities. In this study, children were in the preoperational stage, or 3-6 years old. Obviously, we chose simple speech act sentences at a preschool level so that they would be able to verbalize, memorize, and understand them easily. It was challenging to choose simplified speech acts for pragmatic instruction for children, and since there were no previous ready-made pragmatic instruction materials for children, the researchers had to prepare their own sentences.

This study proved to be an effective technique to teach ILP to children, and was based on Martinez-Flor and Usó-Juan’s study (2010) conditions for effective instruction: providing appropriate input (i.e., input was provided by NIMA in a story-based situation), providing opportunities for production or output (i.e., collaboration between NIMA and the children in the form of games and activities), and provision of feedback (i.e., recasts, repetition, and encouragement from NIMA) for learning different speech acts.

One notable program designed for the robot was when the robot makes intentional mistakes and then is corrected by the children. This scenario creates a normality of making mistakes, thereby reducing embarrassment for the children themselves. In addition, when they constructed meaning incorrectly, NIMA corrected them by telling stories, using context and flash cards to help them correctly comprehend and construct the correct meaning. This supports the results from Alemi, Meghdari, and Ghazisaeidi’s (2014) study in which NIMA made intentional mistakes and was then corrected by students, which was found to be effective in decreasing students’ anxiety.

Additionally, this study provided an opportunity for children to learn their language through discovery learning (Piaget, 1936). For this to happen, the robot had to play different speech act roles (e.g., waving for goodbye), which caused the children to link the action and the sentence and then explore the meaning behind that specific sentence. In other words, based on the constructivism theory, children need to experience to achieve a new level of comprehension, so they need activities which represent the concept of the related context. In addition, based on Brookfield (2017) and Laba (2014), in this study, the teacher prompted the children to practice real-life roles with NIMA and amongst themselves actively, which helped them to both participate in the classroom and gain experience on their own.

Following Oxford (1997) and Vygotsky (1978), the children’s lessons and activities in both groups were scaffolded using different strategies, (e.g., using games, singing songs, and motional activities), to facilitate their participation and offer an interactive environment. Thus, the results of this study offer further proof of Vygotsky’s (1978) and Oxford’s (1997) assertions, since both the RALL and non-RALL groups showed improvements after the intervention. This may be due to increased motivation as a result of the active participation provided for them. However, the RALL class outperformed the non-RALL group. We posit this is because the robot was more interesting to children than the teacher alone. In other words, the children were attracted to and interacted with NIMA.
Moreover, since the robot was introduced as the children’s friend, based on Vogt, De Haas, De Jong, Baxter, and Krahmer’s (2017) study, talking to the robot, rather than the adult teacher, made the environment less stressful for the children and helped them communicate freely and without any barriers. This argument is in line with Alemi, Meghdari, and Haeri (2017b) study in which children’s attitude towards NIMA was video recorded and examined by experts. In their study they concluded that children’s anxiety at the time of interacting with the robot was less than the stress of interacting with the teacher. These findings are also in line with Fink (2012) who believed that giving a social identity or personality to a robot would enhance users’ performance. In other words, the closer the robot’s appearance and behavior are to humans, the more natural and effective the interaction will be.

The only distinction between the two groups was the presence of the robot as an assistant to the teacher in the RALL group. As a result, it can be said that the significantly better performance of the RALL group on the post-test is likely due to the presence of the robot, which provided a positive, safe, and exciting environment for the children. Even shy students were active in the classroom when interacting with the robot. Although, in this study, both groups played the same games designed based on the speech acts, the RALL group showed more interest in playing with NIMA while also touching, kissing, and having face-to-face interaction with him. This also supports the results of Alemi, Meghdari, and Haeri (2017b) in which they employed the NAO robot to evaluate Iranian EFL learners’ attitude towards RALL. Their results indicated that children’s motivation to learn increased as a result of interacting with the robot, while their anxiety decreased due to the friendly atmosphere provided by the robot.

As mentioned earlier, context is important in pragmatic instruction. Furthermore, for learning to take place, comprehension and production should occur in the context. Bishop (1997) believes that young children use a context-dependent strategy to comprehend speech acts and, when getting older, their interpretation becomes more text-dependent. In the current study, the context was provided by telling stories in concert with flash cards, pictures, and classroom objects to help children comprehend through their visual memory rather than verbal memory. Production, on the other hand, was elicited through repetition and different kinds of games and activities in both groups. According to Marinac and Ozanne (1999), children rely on their world knowledge to comprehend utterances. Piaget (1936) and Vygotsky (1978) also believe that human learning is founded upon previous knowledge. One issue that could affect the comprehension of speech acts in this study could be the real-life stories that were programmed into the robot. Each story was designed to help children to construct the meaning of each speech act. For example, when they hear NIMA saying thank you after receiving an object, they construct the meaning of appreciation in a manner similar to the way they acquire it in their first language (L1). So, based on their previous knowledge of L1 they should be able to construct the meaning of thank you (Dore, 1974). In addition, the children enjoyed following the robot’s action and role playing, which helped them comprehend the concept easier than the non-RALL class. In the non-RALL group the pressure to introduce, tell, and role play each story was on the teacher alone. However, in the RALL group the same procedure was facilitated by the presence of NIMA. As some of the dialogues in the lesson plan were used as positive feedback (e.g., applause or verbal encouragement), it can be said that the feedback encouraged children to utter the sentence and then acquire it. Furthermore, the children actively tried to attract NIMA’s attention by answering correctly and engaging voluntarily. These findings are in line with Alemi, Meghdari, and Ghaziaiedi (2014) and Alemi and Bahramipour (2019) in both of which the RALL group outperformed the non-RALL group in learning vocabulary.

It should be noted that, just like any other technology-based studies, there are some disadvantages to RALL. First, according to Han (2012), conducting such studies are difficult due to their costly nature and problems in terms of controlling participants. Second, the RALL teacher should be familiar with the robot programming and know how to deal with technical problems associated with the robot. And lastly, as Han (2012) mentions, getting the students to trust the robot instead of the teacher, can be a challenge; however, this was not the case in this study.
Conclusion

The current study shed light on RALL as a facilitative technique for teaching and learning by promoting children’s capacity to learn via attraction and motivation. Based on the findings of this study, it can be concluded that RALL instruction in combination with ILP and a constructivist approach was effective for children’s learning because of the children’s engagement and interaction with the robot. Regarding the effectiveness of utilizing a humanoid robot to teach ILP to children, it can be argued that using the robot as an assistant to the teacher can help students to be more active in a native-like setting and have more interest and motivation in the classroom. In addition to the motivation and interaction that the robot provided, various tiring and time-consuming tasks, such as repeating sentences, playing games, and correcting mistakes, can be programmed into the robot to help the teacher control the class. In fact, the programmability of the robot allowed the teacher to pre-program different movements, games, and activities to simultaneously entertain and teach children. The humanoid robot with its child-sized appearance, childish voice, and friendly feedback helped children to interact with less stress. In addition, the robot was a new experience for the children and increased their enjoyment of the lessons. It could be observed from the current study’s findings that children showed more attention and excitement when interacting and playing with the robot.

The findings of this study also showed that ILP instruction could assist children with L2 ILP development. This study also offers some implications for future studies. First, since children are future members of society, teachers and educators should provide a healthy pedagogy for them that reduces potential communication challenges in the future. Second, due to the interest of younger students, different kinds of humanoid robots should be more affordable in order to use them in classrooms. Moreover, schools and institutions should apply new teaching methods and trends from the first level of education to increase the students’ motivation to learn.

This study only addresses preschoolers and for only two speech acts. Future investigations should extend this work to include more speech acts, such as compliments, apologies, and complaints, with different age groups. In addition, both longitudinal and cross-sectional studies can be done on both children and teenagers using a robot for their studies. Furthermore, it is necessary to replicate the results of this study in varying contexts to obtain more robust results. The current study adds to our understanding of the application of a robot for teaching L2 pragmatics to children. As technology continues to advance, the role of robots will continue to offer benefits for learners of all ages.

Acknowledgements

Our profound gratitude goes to the Director of the Center of Excellence in Design, Robotics, and Automation (CEDRA) and Social & Cognitive Robotics Laboratory of the Sharif University of Technology, Prof. Ali Meghdari for his support and encouragement. We also appreciate the Iranian National Science Foundation (INSF) for their research grant award in support of the Social & Cognitive Robotics Laboratory at Sharif University of Technology (http://en.insf.org/).

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