

## Robot - Assisted Language Learning: A Review

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**Abstract** - In recent decades, robots have progressively been executed as mentors in both first-and second - language training. The field of robot-helped language learning (RALL) is growing quickly. Studies have been distributed focusing on various dialects, age gatherings, and parts of language also, utilizing various robots and approaches. The current survey presents an outline of the outcomes got so far in RALL research and talks about the current prospects and constraints of utilizing social robots for first-and second - language learning. Thirty-three examinations in which jargon, understanding abilities, talking aptitudes, punctuation, and communication through signing were instructed are talked about. Next to bits of knowledge into learning increases accomplished in RALL circumstances, these investigations raise increasingly broad issues with respect to understudies' inspiration and robots' social conduct in learning circumstances. This review finishes up with bearings for future exploration on the utilization of any model of robots in reading and listening process.

**Key Words:** Robot Assisted Language Learning (RALL), Robot Interaction, Learning skills

### 1. INTRODUCTION

Traditionally, technologies corresponding to computers, tablets, and smart-phones supply a good array of potentialities for first- and second-language learning. These types of technology, especially interactive white boards, automatic speech recognition programs, instructive virtual games, chat programs, tablets, and animated books, are more and more being integrated into language education for each kids and adults. These technologies yield types of acquisition that aren't forever gift in ancient school rooms, corresponding to matched and tailored instruction, access to linguistic communication input, direct feedback, and also the chance to observe with a virtual agent, which can be less discouraging than active with a peer or students.

One of the most recent kinds of technology employed in education and the main focus of this review are social robots. Social robots are robots that are specifically designed to move and communicate with individuals, either semi-autonomously or autonomously, following activity norms that are typical for human interaction. These robots are totally different from, let's say, robotic arms in factories, that are usually designed to perform a selected task and customarily don't move with individuals.

They additionally dissent from virtual agents or computer-based intelligent tutoring systems, as social robots perpetually have a material body of some kind and are thus gift within the world, instead of being solely nearly gift via a screen. The sphere of artificial intelligence has developed apace over the past decade, resulting in the provision of robots that may be used for academic functions. In recent experiments, robots are used as tutors, let's say, in teaching prime numbers, puzzle-solving skills, and, even additional recently, language. Most aims of this review are to present the present state of data concerning robot-assisted learning (RALL), discuss advantages and drawbacks of RALL, and establish potential areas for future analysis on this subject.

The second advantage is that robots give additional natural interaction than different sorts of technology thanks to their look, that is usually android or within the form of an animal. Several robots will use nonverbal cues akin to eye gaze, pointing, and different forms of gestures. Whereas this conjointly holds for animated characters on a screen, robots are typically perceived as additional useful, credible, informative, and pleasurable to act with than animated characters. What is more, robots are additional probably to be perceived as a typical teacher, peer, or friend instead of as a machine: each youngsters and adults have an inclination to anthropomorphize robots, that is, to attribute human-like characteristics and behaviors to robots. Therefore, robots may be programmed to require up a selected role, parenthetically, the role of a tutor or friend, reckoning on whether or not the aim of the educational tasks is to instruct or correct students on a task or to own them observe freshly learned info with peers.

Even though it's clear that benefits robots doubtless have, there are variety of problems that require to be addressed, so as for robots to be effective language tutors. This review presents the present state of RALL analysis, with special target emotive aspects akin to students' motivation and their responses to robots' social behavior. The general goal of our review is to achieve insight into the potential of robots as first-and second-language tutors and to spot areas for any analysis. Studies on educational institution youngsters, school-aged youngsters, and adults are reviewed. Throughout our review, studies are delineate in relative detail to permit a radical analysis of the studies conducted and also the potentialities robots provide for supporting language learners.

## 2. VARIOUS METHODS

In our review, we have a tendency to take a narrative approach. Specifically, we have a tendency to synthesize the relevant literature so as to supply a comprehensive summary of the work conducted thus far. Given the restricted variety of RALL studies so far, we've got adopted Associate in Nursing inclusive approach in choosing studies. We have a tendency to didn't apply rigorous criteria with regard to the standard of the studies, as thanks to the rising nature of the sector this might have diode to a loss of data.

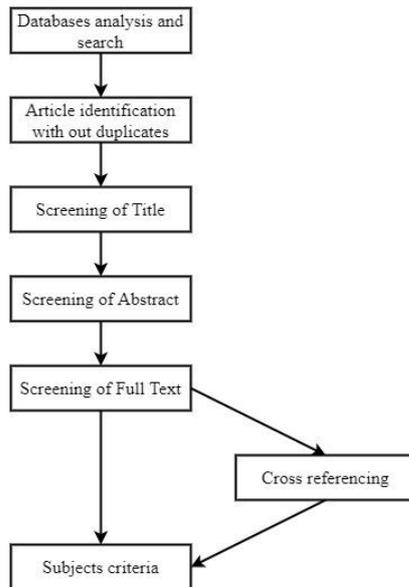


Fig – 1: Selection Process

Figure 1 shows the search, screening, and identification procedure. Studies were enclosed if they (a) used Associate in Nursing empirical style during which language was instructed to youngsters or adults (i.e., reviews and studies during which a selected automaton or style of a study were projected were excluded) (b) used a physically gift robot (rather than a virtual robot), as we have a tendency to were inquisitive about physical robots that have Associate in Nursing embodied presence throughout the educational task (c) assessed students' language-learning gains or affection aspects; (d) contained comfortable details to gauge the planning and outcomes (e) were printed papers in journals or conference proceedings and (f) were written in English.

A total of 750 papers in Google Scholar, 750 papers in Psychosis, and one hundred sixty papers in internet of Science were examined supported their titles. a complete of 102 studies were known as doubtless relevant, as their titles enclosed (parts of) our search terms. After reading the abstracts of all 102 papers, forty six papers were excluded supported the standards mentioned higher than. Specifically, we have a tendency to excluded papers that didn't report on associate empirical study, didn't specialize in learning, planned a particular golem or a style of a study, instead of an empirical study assessing students' (affective aspects of) learning, or re-portable on a locality of a study (e.g.,

preliminary results or a set of the data), that was totally delineate during a later revealed paper that was enclosed within the review).

Subsequently, the complete texts of the remaining fifty six papers were scan, and twenty seven more papers that didn't meet the inclusion criteria were excluded. Reasons for exclusion enclosed proposing a particular golem or a style of a study , not that specialize in learning, news on a locality of a study solely, and also the use of a virtual golem instead of a physical one. Thus, twenty nine studies met the inclusion criteria. The references of those articles were checked and Google Scholar's "cited by" perform was used for every of these articles to spot alternative doubtless relevant studies. In thus doing, four further studies that met the inclusion criteria were found, yielding a complete of thirty three studies for our review.

Information on the planning, characteristics, and main findings were extracted from all thirty three studies. Studies were then allotted to at least one of 2 categories: language-learning outcomes or emotive aspects of RALL. Studies on learning outcomes were sorted in line with whether or not they addressed word learning or alternative language skills. Studies on emotive aspects were sorted in line with whether or not they targeted on psychological feature aspects, the robot's novelty, or the robot's social behavior. For an overview of all the studies and their characteristics, types of robots used in these studies and their main characteristics are given below in the table.

## 3. ROBOTIC ASSISTED WORD LEARNING

### a. Stage 1 (Preschool and Young School)

Out of all thirty three RALL studies enclosed within the review, thirteen targeted on word learning. Most of those enclosed educational institution kids or children who simply entered school. In 3 of those, kids and were conferred with words during a second language (L2) or in their natural language (L1) over multiple sessions. Pretests indicated that the youngsters didn't nonetheless grasp these words before the studies, and post-tests indicated that the youngsters learned solely few words in every of the 3 studies. To name a sample review as mentioned in Table-1.

Topic	Alemi, Meghdari, and Ghazisaedy (2014)
Study	N = 46; age = 12; country: Iran
Method	Aim: 45 L2 English words; duration: 5 weeks; 2 conditions: robot-assisted group and control group
Robot	NAO; autonomous; Role: Teaching assistant
Results	Robot-assisted group learned more words and learned faster than control group.

Table – 1: Sample Review Paper

First, during a study on Japanese kid learners of English (L2), associate degree communicative Robovie golem was placed into many lecture rooms of 6-year-olds and 11-year-olds over a amount of two weeks. kids were free in selecting what quantity to act with the golem and will interact with the robot alone or with category mates. kids engaged in numerous activities with the golem, comparable to necking, singing, and enjoying rock-paper-scissors. The golem used numerous English sentences, and therefore the authors tested kids's data of six totally different target words and phrases that were ordinarily utilized in the interactions between the golem and the children, parenthetically, "Hello" and "Let's play along." The study showed that learning gains were little. On average, the youngsters knew just one or 2 of the six words or phrases examined within the post-test.

These outcomes are almost like those obtained during a second RALL study on preschoolers' L2 word learning, by Gordon, during this study, a golem that personalized its psychological feature ways reckoning on the child's emotive state was used. Specifically, 3- to 5-year-old communicative kids contend many games on a pill along with a Mega golem over the course of seven sessions within which they were educated a complete of eight L2 (Spanish) words. On average, kids learned just one or 2 out of eight words targeted during this study, as indicated by their scores on a post-test. we'll discuss this study's results for personalized psychological feature ways more during a later section on the consequences of robots' social behaviors.

#### **b. Stage 1 (School & Adults)**

In distinction, in a study, the automaton was used as a teaching assistant. Here, a NAO automaton power-assisted in teaching young adolescents L2 (English) words by interacting with the scholars, creating gestures depiction the target words, showing footage, and telling stories. Students were tutored a complete of forty five words over the course of ten sessions. The categories incorporating the automaton were compared to Associate in Nursing grade that didn't have a robot assistant however engaged within the same kind of activities. Results indicated that the scholars within the RALL categories learned quicker, learned a lot of, and maintained a lot of words than the scholars educated.

An another study had 9- to 11-year-old German youngsters play L2 English games with a Nabaz tag automaton for one session. The results indicated that youngsters learned virtually fourteen out of twenty words on the average. These are terribly high learning gains. Crucially, however, these learning gains didn't considerably dissent from those of kids who had been tutored these words through paper vocabulary lists. this means that youngsters of this age might typically be consummate word learners and acquire high learning gains across differing types of vocabulary interventions.

Finally, a study on adults learning words in a synthetic language used the automaton as a lecturer. The participants during this study were schooled ten words within the linguistic communication Vimmi via associate degree "I spy with my very little eye" game. In every trial, a NAO automaton asked the participant to seek out the image of the target word among distractor photos. Participants' data of the target words was assessed in an instantaneous post-test via 2 translation tasks: one from Vimmi to German and one from German to Vimmi. Participants made, on average, seven out of ten words within the Vimmi-to-German translation task and three.5 out of ten words within the German-to-Vimmi translation task. These learning gains are substantial, particularly only if (a) translating words is tougher than a receptive task, (b) there was just one session, and (c) the educational task consisted of solely 3 trials per target word.

Language use includes a lot of skills than simply vocabulary. These alternative skills, admire reading, speaking, grammatical skills, and signing, are studied less extensively in RALL analysis than word learning; solely eleven of the thirty three chosen studies self-addressed these skills.

## **4. READING SKILLS**

RALL studies on reading skills show that a mechanism could also be useful in helping the teaching of reading skills, either within the perform of AN assistant or as an educator. Specifically, comparison AN L1 mechanism-assisted digital book-reading program to an equivalent program while not a robot, Hyun, Kim, Jang, and Park (2008) found that preschoolers within the robot-assisted program improved a lot of on story-making, story-understanding, and word-recognizing skills over a 4-week amount than kids who weren't power-assisted by the mechanism. Similar results were obtained in another study on early L1 reading during this study, 2-year-old kids followed AN early L1 course of study over a amount of two months, supported either by AN iRobiQ mechanism with a screen or by a pill while not a robot. The results indicated that each teams improved on early acquirement tests measure comprehension, storytelling ability, retelling of stories, and word recognition. However, the youngsters who had interacted with the mechanism improved a lot of on their storytelling ability, word recognition, and story-retelling skills than kids who had worked with a pill solely.

## **5. GRAMMER**

Two RALL studies self-addressed L2 synchronic linguistics learning, and each incontestible positive effects of the mechanism on children's learning. First, Kennedy (2016) found that a NAO mechanism completely affected communicate children's learning of the French articles "le" and "la." The mechanism tutor schooled 8- to 9-year-old kids 3 rules relating to French articles. the youngsters improved their knowledge of French articles and maintained this

information in an exceedingly post-test every week later. within the second RALL study on L2 synchronic linguistics learning, Herberg, Feller, Yengin, and Saerbeck (2015) investigated children's learning of Latin and French rules, appreciate those governing plural and article use, in 2 separate sessions with a NAO mechanism. The mechanism either checked out them or looked away throughout tasks within which the youngsters had to observe the recently non-heritable data.

The study showed that kids learned the foundations from the mechanism. Unexpectedly, however, kids performed worse if the mechanism had checked out them, though the impact was found for troublesome things in Latin solely. A doable rationalization of this finding, planned by the authors, is that rather than representing a comforting social presence throughout the task and swing the kid relaxed (which was the supposed outcome), the mechanism multiplied pressure and, as such, created the youngsters perform worse. These results indicate not solely that the precise learning materials and their issue could have an effect on experiment outcomes however additionally that the robot's behavior may affect learning in surprising ways in which.

## 6. SPEAKING SKILLS

Studies addressing L2 speaking skills found mixed results. One study used a ROBOSEM mechanism to show Korean-speaking kids to use English intonation patterns. Native English speakers vary their intonation over native speakers of Korean, and fewer varied intonation shows Korean L2 English learners' combativeness. within the study by In and Han (2015), kids didn't learn to vary their English intonation upon interacting with the mechanism as compared to their pretest performance. The experimenters over that the robot's speech system (as opposition human speech) isn't effective enough to evoke changes in intonation. However, another study, additionally conducted in peninsula and geared toward rising L2 English speaking and listening skills, did realize improvement in different speaking skills. Specifically, this study examined kids whereas they were twiddling with 2 robots, the Mero mechanism and also the Eng-key robot, with the aim of rising their L2 (English) speaking and listening skills. The study showed that children's L2 listening skills didn't improve upon interacting with the robots however that L2 speaking skills did improve. curiously, the youngsters during this study improved on all four aspects of speaking skills.

## 7. CONCLUSION & DISCUSSION

Studies on language skills although word learning are rare in RALL analysis. Also, they're generally numerous, within the sense that they need checked out totally different age-groups and used terribly different analysis styles.

The goal of this review was to supply an summary of the present proof on RALL and to spot potential topics for future analysis relating to the employment of robots for instruction. cardinal studies addressing word learning, reading skills, descriptive linguistics learning, speaking skills, and linguistic communication are mentioned, that specialize in 2 vital aspects: (a) the robot's result on children's L1 and L2 language-learning gains and learning motivation and (b) the approach robots ought to behave to maximize learning outcomes. Below, these aspects are going to be mentioned individually, followed by a discussion of potential avenues for future analysis.

Mixed results were found with relation to L1 and L2 acquisition outcomes. Most studies centered on word learning and failed to clearly show whether or not robots are effective for word learning. additional analysis is required to work out the foremost effective role for the mechanism (e.g., teaching assistant or peer learner), the age-groups that robots are most helpful (e.g., educational institution kids, school-aged kids, or adults), and also the best range of sessions for word learning (one or multiple). The few studies examining reading skills, descriptive linguistics learning, and linguistic communication showed quite positive results, whereas the proof with relation to speaking skills is additional mixed. Note that the studies created completely different comparisons: Studies on descriptive linguistics learning and linguistic communication compared different mechanism behaviors or platforms to assess the foremost effective robot (behavior), whereas the studies on reading and speaking skills compared the effectiveness of a mechanism to alternative sorts of technology or ancient lecture rooms. Moreover, the conflicting results between skills might result from variations in demands on the robot's interactive qualities (e.g., having the ability to possess contingent conversations), that are possible higher in lessons on speaking skills than in lessons on reading or descriptive linguistics. Lessons on reading and descriptive linguistics are often mediate through a pill or alternative devices that show words or rules (thus combining the mechanism with other sorts of technology), whereas robots cannot fall back on such devices and want additional skills (e.g., speech recognition, linguistic communication generation) once active speaking skills with learners.

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