Utilization of Socially Assistive Robot's Activity for Teaching Pontic Dialect

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Abstract. Socially Assistive Robotics (SAR) aim at supporting their users, through social interaction, in carrying out various tasks. One of the areas in which SARs are widely used is teaching foreign/second languages, particularly to children. Socially Assistive Robots create incentives, shape appropriate attitudes, and foster suitable conditions to support learning through the social relationships developed with humans. This paper examines the extent to which a SAR could be utilized to teach the Pontic dialect to adults. For this purpose, four educational activities were designed with specific learning goals incorporated into the curriculum. A total of thirty adult students participated individually in this teaching intervention and then expressed their impressions and attitudes during personal semi-structured interviews. At the same time, the activitieswere recorded on video. The research data were analyzed based on qualitative research methods. The data analysis found that most participants viewed the endeavor favorably. Interaction with the SAR strengthened a positive learning atmosphere and stirred their interest. All participants made positive remarks on the fact that they had the ability to engage in language activities in an alternative, pleasant manner. However, some of them highlighted the absence of deeper and more substantial communication that is achieved between humans, a shortcoming that is the result of the currently unsolved design weaknesses of robots. Nevertheless, indications are positive and there is interest in further research on the use of SAR in teaching languages to adults.

Keywords: Socially assistive robots (SAR) · Teaching second language ·

Huma nrobot interaction (HRI) · Pontic dialect · Adults' education

1 Introduction

Socially Assistive Robotics (SAR) have been developed enhanced with social behavior that aim to support their users, through social interaction, in carrying out various tasks. One of the areas in which SAR is utilized is teaching foreign/second languages,

particularly to children (Vogt et al. 2019), (Rintjema et al. 2018). Through the social relationships developed with people, Socially Assistive Robots create incentives, shape appropriate attitudes, and foster suitable conditions to support learning (Belpaeme et al. 2018). Regarding the use of anthropomorphic robots in adults' language learning, it seems that their interaction with the Robot depends on their existing knowledge level and previous knowledge of their peers. Moreover, they are more active through the learning process when the Robot encourages them to do so (Engwall and Lopes 2020).

Gamification techniques has been proposed to enhance the learning of dialects and culture (Burlian et al. 2019). SAR can be perceived as a more pleasant educational activity compared to the traditional one, even perceived as an educational game itself that enhances learning motivation (Boyle et al. 2016). Moreover, SAR may be effective in learning procedures due to its effect in students' attention and triggered reactions such as the cause of surprise (Velentza et al. 2021). Generally, review study on the use of SAR for language learning summarizes that both children and adults have positive attitudes regarding the use of robots, and they seem to be motivated from their role, while enjoying the interaction. On the other hand, the rrobot's social behavior stands in a thin line between being social enough to keep the learners' interest, but not overdoing it, to distract their attention (van den Berghe et al. 2019).

The current study was designed to examine the extent to which a SAR could be utilized to teach the Pontic dialect to adults. For this purpose, four educational activities were designed with specific learning goals incorporated into the educational curriculum. A total of thirty students participated individually in this teaching intervention and then expressed their impressions and views during personal interviews and structured observation strategies. At the same time, the activities were videotaped. The research data were analyzed based on qualitative research methods, leading to the result that most participants viewed the teaching activity and the collaboration with the SAR favorably. Interaction with the SAR strengthened a positive learning atmosphere and sustained their interest. Participants made positive remarks on the fact that they had the ability to engage in language activities in an alternative, pleasant manner. However, they stressed the absence of deeper and more substantial communication that is achieved between humans, a shortcoming that is the result of the currently unsolved design weaknesses of robots. Nevertheless, indications are positive and there is interest in further research of the use of SAR in teaching languages to adults.

1.1 Dialects

It is very common to occur differences and deviations within a language. These differences in intensity and origin are called linguistic diversity and are often associated with specific geographical areas where it is found and are called dialect and idioms. These forms of linguistic diversity are called dialect and idiom. However, there are courses teaching dialects in similar ways to foreign languages. The speakers of a dialect face significant difficulties due to the deviations from the dominant language in the vocabulary and the general structure (Inoue and Hanzawa 2021). Dialects are sometimes underestimated in relation to languages, and that is why it is important for teachers to adopt alternative teaching practices (Wheeler 2019).

The Pontic dialect is one of the main dialects of the Greek language. The characteristics of the dialect are found in phonetic-phonological, morphological, syntactic, and lexical (Tzakosta 2015). A brief record of the characteristics of the dialect could be made based on whether they refer to older linguistic structures (archaisms) or to elements that are newer and constitute deviations from both the origin and the modern Greek.

In June 2016, a memorandum of cooperation was signed between the Pan-pontic Federation of Greece (PSPE) and the University of Macedonia, followed by the establishment and operation of two adult classes on a weekly basis.

2 Related Work

SARs are usually assigned the roles of teacher, peer, care eliciting companion and telepresence robot teacher (Sharkey 2016). The use of SAR in language learning (Robot Assisted Language Learning - RALL) has some advantages. According to Hirata, Ishiguro's colleague - a pioneer in RALL-related research, SAR can reduce stress levels in students and offer them opportunities for "authentic" learning through close-up interaction (Nazikian 2015). In addition, Kim et al. (2013, mentioned in Nazikian 2015) argue that SAR in the classroom can increase student engagement.

Some of the characteristics of SAR (reproducibility, movement, anthropomorphism, interaction) are directly related to educational goals such as attracting attention, recalling pre-existingk nowledge, providing visualized examples, providing feedback, etc.(Aidinlou et al. 2014). Therefore, SAR can be used to provide individualized practice, support the communicative use of language through role-playing games or even the diagnosis and evaluation of students (Nazikian 2015). This can be done through activities such as storytelling, dialogues for practicing pronunciation, question-and-answer or command execution games, according to the method of Total Physical Reaction (Aidinlou et al. 2014). However, there is a gap in research on how to use SAR in dialect learning.

Despite the similarity of teaching approaches between a second language and a dialect, there are also fundamental differences, as stated in Sect. 1.1. The task of teaching Pontic is relatively recent, as mentioned in the previous section. On the other hand, the domestic literature on the teaching of dialects refers to their use in the direction of critical literacy in school levels of education (Tzakosta 2015). In Greek literature, it was not possible to find any work relevant to the issue of the didactic approach of the Pontic dialect or any other Greek language dialect. In the international literature we found the term 'second dialect', and the way of its conquest is examined. The relevant works refer to a large percentage of the linguistic variants of English, but also to other languages. However, the emphasis is mainly on the phonological part and the vocabulary (Siegel 2010).These conddialectis usually acquired in a natural way, when the speakers meet the dialect in their everyday life, and less in organized didactic circumstances. The literature includes cases of adults learning a second dialect (pronunciation modification) for work reasons (actors) or for better integration into a new environment (Siegel 2010). In most cases of systematic dialect teaching, however, the teachers/designers of the programs act on a case-by-case basis, depending on the nature and the characteristics of the dialect, the target population, and the conditions.

3 Present Study

The present research focuses on the Pontic dialect teaching with the assistance of the SAR Nao. For some of the speakers/participants, this is delayed, systematic teaching of their mother tongue (which is the Pontic dialect, according to their statement). On the contrary, for some others, it is similar to learning a second language (or second dialect) since it can be used, at least to a limited extent, in their environment.

3.1 Hypothesis

H1: SARs carry out educational activities with didactic objectives that are part of dialect learning.

H2: Conducting learning activities with SAR meets the requirements of adult education.

The first two hypotheses stem from the use of SAR in language teaching so far, as evidenced by the bibliographic review, and by the content's peculiarity of the offered language course, and the characteristics of the trainees. In contrast to the presented surveys with adult participants, the courses at UoM are aimed at people who are activated by strong internal motivations (incentives). In addition, the subject of the courses is a dialect that carries the corresponding cultural burden. Learning the dialect is considered in some way a debt to the ancestors for its rescue, and, in addition to the cognitive part, it also has emotional implications. Both motivation and aspiration, as well as emotional reasons are factors that significantly affect adults in the educational process.

H3: SARs can support adult learning environments with interaction and physical participation.

The third hypothesis stems from the literature and specifically from human-robot interaction (HRI) studies. Many people are cautious in their attitudes towards robots. These attitudes have been widely investigated (Xiaand Le Tendre2020).Physicalcontact is an important factor in non-verbal human communication. Tactile is probably the most basic and primitive form of communication, which can nevertheless express positive or negative messages between people (Knapp et al. 2013). Respectively, in the HRI field, physical contact has also been studied (Wullenkord et al. 2016). Tactile contact between humans and robots can increase humans' attachment, emotional expressions and lead to more positive attitudes toward robots (Argall and Billard 2010, Andreasson et al. 2017). Therefore, we are going to examine the aspect of physical contact with the Robot during the process of the educational activity.

H4: SARs can support an adult learning environment capable of extending course participation both time and duration.

Finally, the fourth hypothesis arises from the fact that the lessons took place in the afternoon, at the end of a probably tiring day. Adult learners often face difficulties from their professional and social obligations. Although overall ability to concentrate is not adversely affected over time (Glisky 2007), adults' attention is often distracted either by fatigue or by responsibilities in their extracurricular activities (Wlodkowski and Ginsberg 2017).

4 Methodological Approach

For educational activities, the use of SAR requires building trust and creating a pleasant user experience. In other words, their success is based on their acceptance by people (Alvin Li et al. 2015). Consequently, the research focuses on the students' perceived emotions from their interaction with the SAR, within the context of Pontic lessons and not in their learning outcomes. It is important for us to gain the students' acceptance towards the Robot and afterward to test their knowledge acquisition. To assess the impact of the interaction on students, we recorded their impressions and opinions, analyzed their thoughts, and drew conclusions to meet the hypotheses. This approach, also known as self-report measures (as opposed to task-performance measure), has been followed in other studies with SAR (Leyzberg et al. 2012, Kidd and Breazeal 2004, Wainer et al. 2007). Additional factors that led us to follow the qualitative approach are the relatively small sample size, and the context in which RALL for dialect teaching took place (Henninget al. 2008). Moreover, the participants' perceptions, interpretations, experiences "constitute important properties" of the research objectives (Bovens et al. 2014).

The current study also shows several similarities with those of the action research. Action research is a "small-scale intervention in the functioning of the real world and a close examination of the effects of this intervention" (Cohen et al. 2008). It attempts to introduce innovative elements into an existing educational situation (which operates in a traditional way) and to consider ways of utilizing these new elements (Cohen et al. 2008). Action research has a dual character that derives from its very name: on the one hand, it improves practices (action) and, on the other produces new knowledge (research) (McNiff 2017).

4.1 Participants

The participants were all adult students in the Pontic dialect courses conducted in the University of Macedonia or other organizations such as schools in Thessaloniki. Apart from their attendance to Pontic dialect courses, there was no other limitation for participation in the study (i.e., gender, age, academic level etc.). The total number of participants was 30, twelve men and eighteen women aged between 20 and 60 years old, from all academic levels, currently studying, working, or being retired, living in big cities, suburbs, or even small villages. More specifically, 13 participants were between 18–29 years old, six between 30–39, four between 40–49, three between 50–59 and four were 60+. Seven participants were Secondary school graduates, and the rest were graduates or students of higher education while (at least) 2 of them had additional studies.

The samples' diversity raised several issues that significantly determined the methodological choices of the research. The issues are summarized in the following points:

The degree of mastery of the Pontic dialect: Some of the participants speak the Pontic dialect with great ease. These are mainly older people (born in the 50s and 60s), who were raised in an environment where Pontic as a code of communication played an important (if not major) role. On the other hand, many participants understand the dialect, but are unable to use it to communicate effectively. Finally, there are

participants who have very little knowledge of the dialect (few words or standard phrases).

The individual goals of each trainee: When formulating the goals of an adult training program, the aspirations, and interests of the people to whom the program is addressed should be considered. For some participants, the emphasis is on its deeper knowledge, on exploring its structure and levels, while for others, to achieve functional communication.

Their previous educational experiences: Each of the participants has taken part as a student (or as a teacher) in activities with educational content, having a formed idea about how an educational procedure should be and what helps them in their quest to gain knowledge. Some of the participants draw their experiences from their student years in the 60s (and the educational reality that prevailed then), while the younger ones probably had the opportunity to take a course using ICT. This differentiation, in terms of educational experiences, can be exacerbated by the fact that even among the Pontic teaching departments there are differences in the methods, strategies and techniques used by each instructor, given that the textbook is just a common starting point.

4.2 Measurement Tools

Interview. Themaintoolofthisresearchisthesemi-structuredindividualinterview.The interview, the "discussion for a purpose" (Bovens et al. 2014), gives the researcher the opportunity to draw rich data on the attitudes, experiences, views, and representations of the participants in the research (Iosifidis 2008). Interview in comparison to questionnaires has significant advantages, regarding the depth in the data collection (Cohen et al. 2008; Iosifidis 2008).

A guide with directions was used to conduct the interview, based on the following questions: (a) The trainees' first concerns and impression when they meet the SAR, and how they shape their attitudes towards it. (b) The second relates to the type of interaction that develops between the SAR and the trainees during the activity. In other words, it is examined whether the SAR meets the required criteria, to become accepted by trainees to support the learning process. (c) The third direction revolves around whether the activities with the SAR cover the learning needs of the participants and help them in learning the dialect. (d) Finally, the fourth dimension concerns the ability of the SAR to enhance the involvement of trainees both qualitatively (increased attention) and quantitatively (increased time).

Research questions are related to at least one of the above directions. The wording of the questions follows the logic of the "funnel", i.e., the questions were more general in nature and then, depending on the initial response of the respondent, additional auxiliary questions were asked to obtain additional information. These auxiliary questions belong to the categories of investigation - probes (continuity, processing, clarification, etc.) and continuity - follow-up (Iosifidis 2008).

The content of the guide stems from similar purpose research tools and guides (Lee etal. 2011; Mubinetal. 2013; Serholtand Barendregt 2014).The NAARS, RAS (Nomura et al. 2006) and GODSPEED (Bartneck et al. 2009) questionnaires were also examined.

Observation. Observation is a non-invasive method, where the observer does not attempt to manipulate the observed. However, the subjectivity of the observer, can give inaccurate interpretations of the participants' behaviors and thus, it is suggested that observation be used as a complementary method, in combination with others (Cohen et al. 2008). The data retrieved from the observation may supplement, verify, or even overturn the data collected in parallel with other methods. This makes it a very common tool for enhancing reliability by using multiple data collection methods (Robson 2010). The observation was made by video recordings, giving the opportunity to examine the execution of the activities and the subsequent of the participants' behavior.

Observation Protocol. The composition of the protocol was mainly based on the list of behaviors that are included in the broader non-verbal behavior listed by Guba and Lincoln (1981) and Includes the Following:

- Eye contact: Eye contact in the context of the present activity was a strong indication of interest, involvement, and interaction.
- Distance from SAR: The inclination of the human body towards SSA is perceived as a sign of intimacy, friendliness and vice versa.
- The orientation of the human body towards the SAR: The face-to-face positioning of the body shows acceptance, intention to stay in the same position, to continue communication, willingness to cooperate.
- Smile-laughter: Feeling of pleasure, cheerful mood.
- Expressions of discomfort: Grimaces that indicate discomfort or embarrassment.
- Reactions to contact with the Robot: The presence or absence of some hesitation is examined when the participant is asked to touch the SAR.
- Reactions totheSAR's movements: The existence of involuntary movements isexamined when the SAR performs a movement. The reflex reaction could indicate a lack of trust towards the SAR.
- General signs of nervousness-anxiety: Signs of nervous movements of the foot, hand, occupation of hands with an object, etc.

The hierarchy scale method was used to label and analyse the data. According to this method, the observer draws inference ranging from the simple recording of events to the formulation of judgments (Cohen et al. 2008). The grading of the scales was simple, since the purpose was not the exhaustive and quantitative recording of the behavior, but a rough sketch that will accompany the interview data. There was a prior clarification among the observers on how the events would be prioritized. For example, the label SMILE has the rating range: NOT AT ALL - LITTLE - VERY MUCH. Little was used for behaviors that appeared at least once throughout the activity, i.e., sporadic smiles.

Validity and Reliability. In qualitative methodological research, validity and reliability are evaluated by the credibility, transferability, dependability, and confirmability of the research(Patton 2014). Triangulation, i.e., the use of two or more methods in data collection to study certain dimensions of human behavior, plays a key role in validity and reliability (Cohen et al. 2008). In the present study, triangulation was used to ensure credibility, by collecting data through two methods, qualitative interview, and observation. Also, during the observation, through the recording of the video, another observer was used, who filled in the observation sheets separately. Finally, the research data was given to a fellow language teacher with experience in educational research, who examined their analysis and coding and made her observations and suggestions. After discussion between the researchers involved, some modifications were made to the original approach. Furthermore, the issue of credibility is also supported in terms of Prolonged Engagement, as reported by Guba and Lincoln (1981), since one of the authors is also a teacher with long-term involvement with language teaching. In addition, due to their background, two of the authors know the Pontic dialect quite well and shared experiences with the participants.

The transferability of research can be ensured by what Lincoln and Guba (1985) refer to as a thick description. The presentation of the research findings first focuses on general descriptions and then on detailed reports of the participants' attitudes based on the recordings. The selection of the documents presented reflects the overall assessment of the specific issue each time with a representative report of different points of view and perspectives. Priority was given to views containing richer and more representative data from the situation under consideration.

Finally, for ensuring dependability & confirmability, it is proposed the complete recording (audit trail), the transparent description of all the steps followed during the research process and the preservation of all the data that emerged in the course (primary data, notes, observations, thoughts during the research, etc.) (Lincoln and Guba 1985; Robson 2010).

4.3 Design and Procedure

Robot. The Nao Aldebaran robot served as the educator, as shown in Fig. 1. The Robot wasconnectedtothewi-fiandthecoordinationofitsmovementswascontrolledfromthe NAOqi OS. The control and planning of the activities were done via the Choreographer and we considered the Pontic culture in the behaviors' design (Shidujaman and Mi 2018; Velentza et al. 2021; Shidujaman et al. 2020). The Robot was named after a traditional Pontic name as 'Giorikas'. An essential factor in shaping the "character" of Giorikas, played the element of humor. The Pontics are very often extroverted, expressive, they like teasing, they often use the language in an "indecent" way (swearing) and they embellish what they say with funny expressions. Since all those who participated in the research (and most students in the classes in general) are of Pontic origin, the effort to match the students' temperament is expected to have positive results. According to Tapus and Mataric´ (2008), we tried to increase participants' involvement in activities when their character "matches" that of the Robot.

Scripts. The scripts were recorded and uploaded on Nao, combined with movements, to be expressively enriched. The first author, who is also of Pontiac origin, recorded the audio of the activities by his voice. Particular attention was paid to the recording quality. Although it is generally considered more tempting to provide instructions for performing activities in the target language itself (Pontic dialect), it was chosen for all activities that the instructions be in the modern Greek language, to make sure that all participants fully understood what they had to do.

Activities. Four activities were designed, related to different skills in learning a second language and the following factors were considered:

- The possibilities offered by the Robot, but also the limitations set by the functional approach adopted.
- The inhomogeneity of the sample in terms of their characteristics.
- The special features of the dialect, with emphasis on the differences from the colloquial one and the difficulties the students are usually facing.

The content of the activities was based on the Pontic Teaching Manual concerned the following areas (a) vocabulary (b) grammar (c) verbal communication - reading (d) auditory comprehension.

(a) Vocabulary

Thirty (30) words used in the activity retrieved from the vocabulary listed in each chapter of the above-mentioned manual. Fifteen (15) verbs and fifteen (15) nouns (adjectives - nouns) were chosen. The participants were asked to select one of two categories of words. This choice was made to enhance the sense of autonomy and choice that can inspire learning activities for adults. The chosen words cover a wide range of the vocabulary of the Pontic dialect. The implementation of the activity took the form of playful activity. It could be compared to practice exercises from the early stages of the implementation of educational activities in PC (Levy 1997), by adding SAR, which plays the role of peer and indicates the correct meaning of a word, between two versions, through social interaction. SAR takes the role of the knowledgeable social partner, in a variation of a series of tasks that examine the effects of social-type interaction on adult vocabulary learning (Verga and Kotz 2017).

More specifically, after the explanatory pronunciation (in modern Greek), the participant heard a word (depending on the initial category he/she had chosen) and two interpretations, one of which was correct and the other incorrect. At the same time, Nao extended both its hands, one at a time, as it uttered the two possible interpretations. The participant chose the correct interpretation, based on his/her discretion, touching the sensor of the respective hand. The explanation of the whole process was done orally before the start of the activity. In addition to the explanations before the start of the proceedings, Nao was giving recorded instructions. During the execution of the activity in each answer, Nao provided positive or negative (mild) feedback according to the given answer. Adults find it effective and prefer positive feedback because when they try to improve, focusing on their mistakes can discourage them (Wlodkowski and Ginsberg 2017). In the positive answers, a random message was reproduced (out of a

total of 4 messages), with a cheerful style and mood-coloring. At the same time, Nao was applauding. Respectively, in the wrong choices, the mistake was pointed out with appropriate (not at all critical) expressions and a parallel negative gesture.

(b) Grammar

The grammatical phenomenon to which it referred was the imperative of the verb. In general, the subject presents peculiarities, due to the completely different way of formation of the precept in the Pontic language in relation to modern Greek. For every one of the six chosen verbs, the following procedure was repeated:

- Nao initially uttered the verb/expression in the definite and waited
- the participant was saying the verb/phrase in the imperative
- Nao (regardless of the answer) said the phrase in the imperative and performed the corresponding action.

The activity was "open", as the answers to be given were not strictly defined. This was clarified before the start of the activity. Nao performing the action says an acceptable (correct) answer that could be given, not the only one, however. It is essentially an alternative treatment of the user's response, in relation to the vocabulary activity, with the recast on the part of the Robot. This type of corrective feedback is an indirect and politewayforstudentstohearthecorrectanswer,withoutbeingembarrassedbypointing out the error (Lightbown and Spada 2021).

(iii) Verbal Communication

The verbal communication activity was a dialogue between the participant and Nao. The original text came from a chapter of the manual and was modified by adding additional phrases to extend its duration. The content was hilarious and fun: the telephone conversation between an elderly woman and her son, Giorika. Users "played" the role of mother, reading the relevant text from a piece of paper.

The purpose of the activity was the practice of reading, but also the utterance of speech with correct pronunciation and coloring of the voice. Dialogues and role-plays are an essential part of the activities, according to modern teaching approaches. In this case Nao serves as a natural speaker of the language, while at the same time his pleasant presence allows students to express themselves in the Pontic language free from possible stress.

(iv) Auditory Comprehension

Auditory comprehension is one of the basic skills required to learn a language. Consequently, language learners must be exposed to a language introduction that is understandabletothem(closetothelevelofknowledgetheyalreadyhave),butsomewhat more demanding, to be useful in learning (Doughty and Long 2008). The auditory comprehension activity was done to expose the average trainee to such an introduction.

InthisactivitythereweretworecordedtextsfromthePontictextbook.Thetextswerenot from the preliminary and the first chapters, so they present some difficulty (in terms of vocabulary and meaning). An effort was made to make the pronunciation as expressive as possible, with an appropriate voice tone.

The participant was able to select one of the two texts, according to the instructions at the beginning of the activity. The text was selected again by touching the corresponding Robot's hand. The text was followed by six (6) multiple-choice questions or "True False". The participant answered orally (i.e., right/wrong or the choice he/she made, depending on the question).

Prior to the activities, the researcher gave detailed information about the procedure, howtointeractwiththeRobotandinformedthemaboutGDPRandtheuseandstorageof their data and the right to cancel their participation at any time. No details were revealed about the capabilities, logic, and operation of the SAR. The research was carried out in different rooms in UoM. In each case, the participant was sitting infront of a table with the SARbeingatashortdistanceinfrontofhim.Theprocedurewassemi-autonomous(inthe cases where the participant gave a correct or wrong answer by touching a specific part of the Robot and the Robot replied with corresponding negative or positive feedback). The rest of the activities were instructed by a Wizard of Oz (Engwall et al. 2022), waiting for the participant to finish their answers, and then giving the appropriate feedback from prerecorded behaviors. The wizard also gave instructions to the Robot to start the activities (via tablet and PC) was sitting in the same place, outside the direct visual radius of the participant.

Immediately after the completion of the process, the interview followed, in a different place. At the same time, the next participant started the activity.

Fig. 1. TheRobotperformingdifferentmovementsaccompanyingitsstorytelling.

4.4 Data Analysis

The data from the observation were recorded in an excel file per participant. The total observations were written by category. The emerged comments and descriptive remarks were evaluated and presented below, as appropriate. The observation for each participant was contrasted, for cross-reference, with what he/she mentioned in the interview.

The audio transcripts of the interviews were converted into text using a computer program. Prior to their word-for-word transfer, a first hearing of the interviews (mainly the first ones) was held, and notes were made on the main points, to obtain a first supervisory look at the data. During the full recording, the text analysis focused on the content, and additional points were highlighted based on the participants' verbal references, i.e., some statements with emphasis, hesitation, enthusiasm, etc., that were considered important.

The approach followed the typological procedure analysis, in which the construction of quality material is done in categories or thematic fields (Iosifidis 2008). The method of contour approximation was used for the coding. According to this approach, data are categorized based on key-codes, derived from theory, research questions or a first contact with the data. This defines contours based on which the data set is analyzed (Robson 2010).

This method is considered as a set of techniques integrated into the broader approach of thematic text analysis (Cassell and Symon 2004). However, the research cases in the current study overlapped between the categories. For example, the usefulness of SAR in learning is examined in the context of adult learning. So, the existence of evidence that supports case 1 reinforces case 2 at the same time. The element of satisfaction, the reduction of stress, the motivation for participation have a positive effect on the teaching of the language lesson. The division of the categories, in relation to the research cases, was made based on the assumption that each category presents, refers specifically to the language course or general issues of adult education.

The categories and subcategories that emerged during the data analysis were the following (Table 1):

Table 1. The categories and subcategories that emerged during the data analysis.

A. Learning the dialect
The views of the participants
The suitability for language courses
Personalized help
Additional information in relation to the class
Transfer of characteristic elements of the dialect
B. Meeting the requirements of adult education
The views of the participants
Creating a pleasant atmosphere
Ease of use
The removal of stress
The fulfillment of the trainee's expectations
C. Interaction with physical participation
The views of the participants
Preferences for activities
D. Substantial and prolonged involvement in the course
The views of the participants
E. The type of interaction that developed
Visual
Physical
Verbal

5 Results

The results are presenting based on the participants' responses per analyzed category and subcategory as stated above. The number of participants that belong to each category is stated in parenthesis. Participants stated that they have a good (16) or very good (8) relationship with technology, while 6 stated that they have a bad relationship (which is mainly due to their inability to respond to it). In their general assessment of the role and position of robots in society and in education, of the 25 respondents, 19 expressed a positive opinion/attitude, 2 expressed concerns and reservations and maintained a neutral attitude, while 4 had a negative view. The main concern raised by the participants (even among those who had positive general attitudes) was the fear of being replaced by robots at some point in the future.

In relation to the hours of the lessons and whether the participants were overwhelmed by the obligations of the day, overall, they answered that the hours were convenient. Fatigue during the course was reported by 7, however, 3 of them reported strong motivation to attend the course as a compensatory factor. Only 2 reported difficulties in the course due to fatigue and inconvenient schedule. These answers, to some extent opposed the 4th research hypothesis regarding the role of fatigue as an obstacle in attending the course.

Regarding the assessment of the participants' Pontic dialect knowledge level, 12 described themselves as beginners, 9 as intermediate, 7 as good and 2 as very good. The main difficulty mentioned was their speech ability. Many described themselves as "passive speakers", with disproportionate ease of understanding compared to speech production. The more advanced ones focused on writing and elements of the structure of the dialect, grammar, and syntax, which they stated to be the main reason why they attended the courses. Participants also stated that they were interested, in addition to the dialect, in the elements of history and culture.

To the question that asked the general impression of the participants, immediately after the completion of the activity, almost all of them answered with positive comments. There were two answers with doubt (technical difficulties and suitability for children). Most of the answers were more complex than a one-word answer or a simple characterization and included individual evaluative judgments. This content was recorded and integrated with the answers to other questions (provided that the same information was not provided by the same person).

A. Usefulness in Learning Dialect

Generally, participants believe that SAR can contribute to the learning of the Pontic dialect. Almost all of them answered positively to the relevant question, either directly or indirectly. These responses hid a variety of perceptions both about the reasons for which they were given and how strong this belief was.

Usefulness in Language Courses in Language Learning: 23 of the participants answered that they consider the SAR to be suitable for language courses. The other four (4) answered again positively, noting that this technique seems to be suitable for young children. Twenty-nine (29) of the participants answered that the activities could help in learning Pontic. Some (5) assumed with doubts that it could be useful, because as they claimed, the indicative activities did not show them the Robot's full potential. In some

cases, the affirmative answer was accompanied by suggestions for future activities. Some answers were also interesting, because although participants expressed some doubts, at the same time they were convinced about the importance of the use of SAR for educational purposes.

Personalized Help: Twenty-four (24) participants answered that the SAR could help them in specific areas of learning. Specifically, most (10) answered that it could help them learn vocabulary, five (5) that it would help them with dialogue activities, two (2) that they could improve their reading ability. As mentioned above, not all participants gave explanations to justify their view of the usefulness of SAR in learning the dialect. Four (4) answered negatively. In one of the negative answers the participant did not seem to consider the indicative nature of the activities, something that was generally perceived by most. In another case, the negative answer was accompanied by the statement that for some people it may be helpful while for others it may not.

Additional Information in Relation to the Class: There is significant diversity between the positive judgments in this subcategory. Most participants (14) highlight elements necessary for a functional classroom that can be found in humans (teacher or classmates) that the SAR lacks. Several participants "saw" in Giorikas roles that differentiate him from the conventional teaching practice, which are the following: Eleven (11) mentioned the role of the collaborator-examiner in practice. Four (4) emphasized the role of correction-feedback and two (2) the ability of repetition. In addition, some saw in Yorikas a "warehouse" of available, correct knowledge.

Transfer of Language Features: Fifteen (15) of the participants gave positive feedback on the verbal interaction with SAR. The formation of Giorikas' character as a natural speaker of the dialect and, therefore as an acceptable collaborator in the teaching activities was largely based on this element. More specifically, they positively evaluated the comments and answers SAR gave them as feedback or the pronunciation, the comprehensible speech. From the other answers it appeared that either the participants did not like the speech style (3) or that the interaction at the level of verbal communication was not convincing enough, due to the mechanical nature of the activities (6).

B. Meeting the Requirements of Adult Education

Of the twenty-five (25) interviewed, 22 answered that SAR has a place in the adult classroom. The 3 who answered negatively were the same people who also had negative opinion about the language lesson.

Creating a Pleasant Atmosphere: All respondents (30) answered that the activity was enjoyable, even those who expressed doubts and concerns on various issues.

Most of the answers to the participants mentioned described the features of SAR such as funny-playful (12), original-innovative (13) and interactive (9). Some answers were one-word, while others were accompanied by a few comments.

When asked if there is a sense of interaction with a machine and whether it caused discomfort, there were two (2) participants who stated that some characteristics caused them discomfort, although in another question, they stated that the activity was

enjoyable and fun. Two more said they felt strongly that they were interacting with an inanimate object, but the sensation gradually subsided, without any discomfort. Seventeen (17) stated that there was a sense of discomfort, but it was not intense and subsided, without feeling it again. Furthermore, eight stated that they felt like talking to a person.

Easy to Use: Most participants did not encounter any difficulties in performing the activities. Only two reported comprehension difficulties.

Stress Relief: Twelve (12) of the participants stated directly or indirectly that SAR helps to relieve stress and that encouraged their participation in the course. In one case, the participant was concerned about how the other participants may felt, although he had a pleasant and stress-relieving experience.

Fulfilling Expectations: All participants who were asked if their expectations were met answered positively. In addition, participants who were asked if they would recommend someone to do similar activities with SAR, 28 answered positively, with five of them clarifying that there must be a teacher accompanying the activity in the class. Many of the participants came to this conclusion rather arbitrarily and thought that they must choose between the SAR and the teacher.

C) Physical Participation

All participants (30) stated that they had no hesitation in encountering the Robot, nor did they have any negative thoughts. The most preferable activity was vocabulary one with 12 (7 unique answers) participants choosing it, which also reinforces the previous answers. The activity of grammar (imperative) followed with 10 (7 unique) preferences, followed by a dialogue with 6 (1) participants choosing it and auditory comprehension with 4 (1) choices. There were two participants who did not point out any activity. Some (3) commented positively on the fact that they touched the SAR.

D) Increase the Engagement Time

Increase Attention and Engagement Time: Most participants (22) answered that the SAR would help them pay more attention and increase their participation in the course. Some pointed out the fact that they wanted to do the activity irrelevantly to the Robot, however the SAR would still help. Of the negative answers (4), only one was fully justified. One of the respondents did not answer and the rest stated that they would be happy to stay in the class shortly after the end to do additional activities with the SAR.

E) Type of Interaction

Participants commented positively or negatively on various aspects of thei nteraction. The Robot's movements received only positive feedback except for onec ase. On the contrary, in verbal communication, there were some concerns, as mentioned above. In addition, the Robot's appearance seems to provoke some comments. Participants commended that although they enjoyed the course and found it helpful for dialect learning, they noticed a "lack of human communication". Moreover, they were convinced that a human- tutor has advanced non-verbal communication skills in comparison with the SAR and that they needed a deeper perspective in the learning

course such as explanations about the words' etymology, extension of linguistic elements in matters of tradition and culture and solving questions. However, they perceived it as appropriate in activities that aim at low-level skills such as repeating exercises and help them memorize vocabulary. Additionally, they found the SAR ideal for self-assessment, and self-correction.

The data from the observation were examined in parallel with those of the interview.

1. Eye contact: A little: 2 Enough: 21 Continuation: 7
2. Smile-laugh: Not at all: 3 Sometimes: 13 Often: 14
3. Expressions of discomfort: Not at all: 23 Sometimes: 7
4. Position towards SAR: Side: 1 Side, then opposite: 2
5. Distance from SAR: Normal: 11 Nearby: 19
6. Contact (physical) with robots: Without hesitation: 28 Initial hesitation: 2
7. Reaction to the movements of the SAR: No: 29 Yes: 1
8. Signs of nervousness-anxiety No: 27 Yes: 3

The general impression of the interviews agreed with the interview and observation data. The participants' answers during the interview were also reflected in their attitude during the activity. Some were very expressive, gesturing, commenting, and talking to Giorikas. Of additional interest is the fact that when students were at a dead end, they used the same coping strategies with real-world situations. For example, one participant gave the command to the SAR in modern Greek. Other students obviously guessed the right word (swayed between the two hands) and repeated the correct interpretation, after the feedback. This type of self-correction, although not done in the target language, is considered to add more value to the feedback received by the student (Lightbown and Spada 2021).

Contacting the SAR, which was the main target of the observation, did not seem to concern the participants. Only in one case there was a slight hesitation, but only at the beginning, perhaps due to speculation that touch can affect the Robot's stability.

In general, the observed behaviors (signs of discomfort at certain points, e.g., delay in loading the activity) corresponded to relevant reports in the interview. Overall, the cross-use of the observation validated the content of the interviews.

6 Discussion and Conclusions

This research attempted to examine how the use of a SAR can contribute to the teaching of the Pontic dialect to adults. For this purpose, educational activities were designed with specific teaching objectives and the trainees/participants were invited to carry them out, interacting at the same time with the SAR Nao. The activities were suitable for adults' educational needs, emphasizing the communication skills needed when teaching a second language, following the latest didactic language approaches and the role of SAR in the educational process. Their impressions and attitudes were recorded during semi-structured interview and observation.

By analysing the participants' replies, we found that they consider that the activities implemented with a SAR have a place in an adult program, despite some minor objections that it may be more suitable for younger ages.

The combination of technology, with the use of SAR with the dialect teaching according to participants was successful. Giorikas is convincing as a natural speaker of Pontic and is generally accepted as an interlocutor in activities. Key role in Giorikas' acceptance from participants were both the implementation part (voice, pronunciation, clarity of content, rhythm of speech) and the general humanoid dialect-speaking.

Although many participants commented positively in favor of the use of SAR in classroom activities, there were also comments that highlighted the "lack of human communication", the absence of non-verbal communication and the lack of deepening in the learning object (etymology, extension of linguistic elements in matters of tradition and culture, solving questions). This contradiction between the positive attitudes and the concerns at the same time, can be explained as a separation of roles between the traditional course and those performed by SAR. After all, SAR is perceived as more appropriate in activities that aim at low-level skills (practice, memorization assistance) as well as in self-assessment, self-correction, while expressing a clear preference in the traditional classroom and interpretation.

The participants choose as the most popular and most useful, the vocabulary activity that provides them with immediate and tangible results, which is in line with the physiognomy of the adult student. Vocabulary activity activates strategies, provides instant feedback in a third-party environment, provides the opportunity for self-evaluation and self-correction by giving instant feedback, all with a pleasant, interactive approach.

Overall, we can say that the use of SAR, verifying the 2nd research hypothesis, can support dialect learning activities. Regarding the 3rd hypothesis, the collected data showed that it is being verified. Participants responded that they had no problem/hesitation in interacting with physical involvement with SAR. The same facts are also confirmed by the videos' analysis. Regarding the 4th hypothesis, while the participants at the begging answered that the day fatigue did not distract them from the activities, later, most of them admitted that there was fatigue that made it difficult to attend the course. Although the degree of this feeling varied, regardless of the intensity, the participants believe that the presence of SAR helped to alleviate their fatigue.

One of the research limitations is the lack of autonomous interaction between the Robot and the participants that needed to be controlled by a wizard in order to focus on testing the research hypothesis. Moreover, another limitation is the short-term interaction. According toresearch data inchildren (Vogt et al., 2019), theresult of an interaction examination should be extended overtime to manifest, if any, the so-called novelty effect, in which the sense of the unprecedented is initially attracted, but gradually the interest fades. Despite the assurances of the participants to the contrary, this limitation must be considered in order to draw general conclusions.

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References

Aidinlou, N., Alemi, M., Farjami, F., Makhdoumi, M.: Applications of Robot Assisted Language

Learning (RALL) in language learning and teaching. Int. J. Lang. Linguist. 2(3), 12 (2014) Utilization of Socially Assistive Robot's Activity 503

Alvin Li, X., Florendo, M., LukeMiller, E., Ishiguro, H., Ayse Saygin, P.: Robot form and motion influences social attention. In: 2015 10th ACM/IEEE International Conference on Human- Robot Interaction (HRI), pp. 43–50 (2015)

Andreasson, R., Alenljung, B., Billing, E., Lowe, R.: Affective touch in human–robot interaction: conveying emotion to the Nao robot. Int. J. Soc. Robot. 10(4), 473–491 (2017). https://doi.org/ 10.1007/s12369-017-0446-3

Argall, B.D., Billard, A.G.: A survey of tactile human-robot interactions. Robot. Auton. Syst. 58(10), 1159–1176 (2010). https://doi.org/10.1016/j.robot.2010.07.002

Bartneck,C.,Kuli´c, D.,Croft,E., Zoghbi, S.: Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of robots. Int. J. Soc. Robot. 1(1), 71–81 (2009). https://doi.org/10.1007/s12369-008-0001-3

Belpaeme, T., et al.: Guidelines for designing social robots as second language tutors. Int. J. Soc. Robot. 10(3), 325–341 (2018). https://doi.org/10.1007/s12369-018-0467-6

Bovens,M., Goodin, R.E., Schillemans, T.: The Oxford Handbook of Public Accountability. OUP, Oxford (2014)

Boyle, E.A., et al.: An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. Comput. Educ. 94, 178–192 (2016). https://doi.org/10.1016/j.compedu.2015.11.003

Burlian, T.D., Sharmila, P., Alavesa, P., Arhippainen, L.: Revitalizing Viena Karelian dialect and culture with gamification, vol. 12 (2019)

Cassell, C., Symon, G.:EssentialGuide to Qualitative Methods in rganizationalResearch.SAGE, London (2004)

Cohen, L., Manion, L., Morrison, K.: Research methods in education. Μεταιχμιο (2008). http://dspace.lib.uom.gr/handle/2159/13669

Doughty, C.J., Long, M.H.: The Handbook of Second Language Acquisition. Wiley, New York (2008)

Engwall, O., Lopes, J.: Interaction and collaboration in robot-assisted language learning for adults. Comput. Assist. Lang. Learn. 0, 1–37 (2020). https://doi.org/10.1080/09588221.2020.1799821

Engwall, O., Lopes, J., Cumbal, R.: Is aWizard-of-Oz required for robot-led conversation practice in a second language? Int. J. Soc. Robot. (2022). https://doi.org/10.1007/s12369-021-00849-8

Glisky, E.L.: Changes in cognitive function in human aging. In: Brain Aging. CRC Press (2007)

Guba, E.G., Lincoln, Y.S.: Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches, pp. xxv, 423. Jossey-Bass (1981)

Henning, J.E., Stone, J.M., Kelly, J.L.: Using Action Research to Improve Instruction: An Interactive Guide for Teachers. Routledge (2008). https://doi.org/10.4324/9780203887295

Inoue, F., Hanzawa, Y.: Multivariate analysis of geography and age in dialect vocabulary—Comprehensive analysis of 250 years of language change -. Dialectologia: revista electrònica, 97–160 (2021)

Iosifidis, T.: Qualitative research methods in the social sciences. 'Ποσοτικές μέθοδοι έρευνας στις Κοινωνικές Επιστήμες '. Κριτική (2008). http://dspace.lib.uom.gr/handle/2159/15539

Kidd, C.D., Breazeal, C.: Effect of a robot on user perceptions. In: 2004 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (IEEE Cat. No.04CH37566), vol. 4, pp. 3559–3564 (2004). https://doi.org/10.1109/IROS.2004.1389967

Knapp, M.L., Hall, J.A., Horgan, T.G.: Nonverbal communication in human interaction. Cengage Learning (2013)

Lee, S., Noh, H., Lee, J., Lee, K.: On the effectiveness of Robot-assisted language learning | ReCALL | Cambridge core. ReCALL 23(1), 25–58 (2011). https://doi.org/10.1017/S09583440 10000273
Levy, M.: Computer-Assisted Language Learning: Context and Conceptualization. Clarendon Press, Oxford (1997)
Leyzberg, D., Spaulding, S., Toneva, M., Scassellati, B.: The physical presence of a robot tutor increases cognitive learning gains. In: Proceedings of the Annual Meeting of the Cognitive Science Society, vol. 34, no. 34, p. 7 (2012)
Lightbown, P.M., Spada, N.: How Languages Are Learned, 5th edn. Oxford University Press, Oxford (2021)
McNiff, J.: Action Research: All You Need to Know. SAGE, London (2017)
Mubin, O., Stevens, C.J., Shahid, S., Mahmud, A.A., Dong, J.-J.: A review of the applicability of robots in education. Technol. Educ. Learn. 1(1) (2013). https://doi.org/10.2316/Journal.209. 2013.1.209-0015
Nomura, T., Kanda, T., Suzuki, T.: Experimental investigation into influence of negative attitudes toward robots on human–robot interaction. AI Soc. 2(20), 138–150 (2006). https://doi.org/10.1007/s00146-005-0012-7
Patton, M.Q.:Qualitative Research&EvaluationMethods: Integrating Theory and Practice.SAGE Publications, London (2014)
Rintjema, E., van den Berghe, R., Kessels, A., deWit, J., Vogt, P.: A robot teaching young children a second language: the effect of multiple interactions on engagement and performance. In: Companion of the 2018 ACM/IEEE International Conference on Human-Robot Interaction, pp. 219–220 (2018). https://doi.org/10.1145/3173386.3177059
Robson, C.: Real-World Research: A Tool for Social Scientists and Professional Researchers. Gutenberg, Athens (2010)
Serholt, S., Barendregt, W.: Students' attitudes towards the possible future of social robots in education. IEEE RO-MAN, 6 (2014)
Sharkey, A.J.C.: Should we welcome robot teachers? Ethics Inf. Technol. 18(4), 283–297 (2016). https://doi.org/10.1007/s10676-016-9387-z
Shidujaman, M., Mi, H.: "Which Country Are You from?" A cross-cultural study on greeting interaction design for social robots. In: Rau, P.-L. (ed.) CCD 2018. LNCS, vol. 10911, pp. 362– 374. Springer, Cham (2018). https://doi.org/10.1007/978-3-319-92141-9_28
Shidujaman,M., Mi,H., Jamal, L.: 'I trust you more': a behavioral greeting gesture study on social robots for recommendation tasks. In: 2020 International Conference on Image Processing and Robotics (ICIP), pp. 1–5 (2020). https://doi.org/10.1109/ICIP48927.2020.9367364
Siegel, J.: Second Dialect Acquisition. Cambridge University Press, Cambridge (2010)
Tapus, A., Matari´c, M.J.: User personality matching with a hands-off robot for post-stroke rehabilitation
therapy. In: Khatib, O., Kumar, V., Rus, D. (eds.), Experimental Robotics: The 10th International Symposium on Experimental Robotics, pp. 165–175. Springer, Cham (2008). https://doi.org/10.1007/978-3-540-77457-0_16
Tzakosta, M. (ed.): The Teaching of Modern Greek Language Varieties and Dialects in Primary and Secondary Education' Η Διδασκαλία των Νεοελληνικων Γλωσσικων Ποικιλιων και Διαλέκτων στην Πρωτοβαθμια και Δευτεροβαθμια Εκπαιδευση'. Gutenberg (2015). https://www.dardanosnet.gr/product/didaskalia-ton-neoellinikon-glossikon-pikilion-ke-dialekton-stin-protovathmia-ke-defterovathmia-ekpedefsi-i/
van den Berghe, R., Verhagen, J., Oudgenoeg-Paz, O., van der Ven, S., Leseman, P.: Social robots for language learning: a review. Rev. Educ. Res. 89(2), 259–295 (2019). https://doi.org/10. 3102/0034654318821286
Velentza, A.-M., Fachantidis, N., Lefkos, I.: Learn with surprize from a robot professor. Comput. Educ. 173, 104272 (2021). https://doi.org/10.1016/j.compedu.2021.104272
Velentza,A.-M., Ioannidis, S., Georgakopoulou, N., Shidujaman,M., Fachantidis,N.: Educational robot european cross-cultural design. In: Kurosu, M. (ed.) HCII 2021. LNCS,

vol. 12763, pp. 341–353. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-78465-2_26
Verga, L.,Kotz, S.A.:Helpme if I can't: social interaction effects in adult contextualword learning.Cognition 168, 76–90 (2017). https://doi.org/10.1016/j.cognition.2017.06.018 Utilization of Socially Assistive Robot's Activity 505
Vogt, P., et al.: Second language tutoring using social robots: a large-scale study. In: 2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI), pp. 497–505 (2019). https://doi.org/10.1109/HRI.2019.8673077
Wainer, J., Feil-Seifer, D.J., Shell, D.A.,Mataric,M.J.: Embodiment and human-robot interaction: a task-based perspective. In: RO-MAN 2007 - The 16th IEEE International Symposium on Robot and Human Interactive Communication, pp. 872–877 (2007). https://doi.org/10.1109/ ROMAN.