Basic research on e-learning system using robot

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Abstract With the progress of robot-related technology, research on robots that can naturally interact with people in everyday situations has attracted attention. In this research, we focus on educational support robots that support learners at educational sites such as schools and cram schools, and at independent learning sites such as homes. Research reports have begun that improve the learning effect and willingness to learn by introducing robots into situations where humans are learning, and it is expected that in the near future there will be a society where robots and humans can learn together. In this research, we introduce a robot closer to humans to the e-learning system, and consider whether it can move like humans, communicate with humans by voice, and improve the learning effect of learners.

Keywords:*e-Learning, Motivation to learn,robot*

1. Introduction

E-learning systems have outstanding functions, such as diversification of learning methods and content, free from time and space constraints, quality assurance, etc., while passive interaction (such as monotony and lack of binding force) is to concentrate energy and learn motivation. There is a problem that is difficult to maintain. Focusing on the use of emotional "warm" cognition, it is expected to maintain the motivation of learning by using the motion of the robot as the information transmission and display medium 1), 2).

In this research, we will additionally introduce a humanoid robot that has a high affinity with existing e-learning systems. It aims to increase self-efficacy by interacting with learners through voice and gestures, thereby enhancing learning motivation. Develop an e-learning system with robots and compare and check the learning motivation and learning results of whether there are robots, and prove the possibility that the introduction of robots can make up for the shortcomings of the e-learning system.

2． E-Learning system with robots

Learn Japanese3), a free e-Learning system that allows international students to learn Japanese grammar, spoken language, words, reading comprehension, hearing, etc. by themselves in 28 lessons, was adopted as the basic system.

In consideration of affinity and freedom of movement, the robot will use the upper body humanoid robot NAO from Aldebaran.

Figure 1 shows the overall view of the robot・e-Learning system developed in this study.

FIG.1 Robot・e-Learning system

The right half including the learner is the conventional e-Learning system, and the robot on the left half was added in this study. Figure 2 shows the flow of learning using this system.

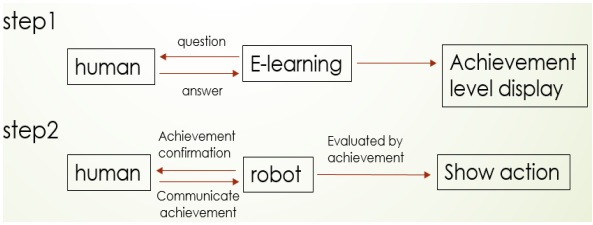

FIG.2 Learning by robot・ e-Learning system

Prepare in advance: In order to take advantage of self-efficacy, each learner can choose his favorite robot action every time. With reference to Reference 4, six emotion-related patterns have been prepared.

Step1 The learner executes Learn Japanese, which is started by an internet browser, and learns. As a compare experiment, the robot makes random gestures during learning.

Step2 The learner conveys the implementation result (evaluation point) to the robot by voice. The robot makes gestures according to the degree of achievement and the selection in advance.

The operation program of the robot NAO used the official development application "Choregraphe" of Aldebaran.

3． Experiment and review of results

1) Experiment contents

The experiment will be divided into two groups: a group (Group 1) to study using the robot and the e-Learning system together, and a group (Group 2) to study using only the e-Learning system on the Internet. Divide a total of 4 learners into two groups to conduct experiments. These four learners have hardly studied Japanese, and the average grades and English proficiency of the learners in the semester are also used as a reference for grouping.

Each time the learner completes the learning content, a test will be conducted.

The test will get a maximum of 100 points, and the test will refer to a part of the Japanese Language Proficiency Test. In a month, learning and testing will be conducted twice a week, and the learning content and learning time of each group will be the same.

After the experiment is completed, a questionnaire will be given to the observer and the learner. Consider two evaluations, interest and motivation.

Record each test score and the results of the questionnaire and make a chart.

2） An example of robot operation

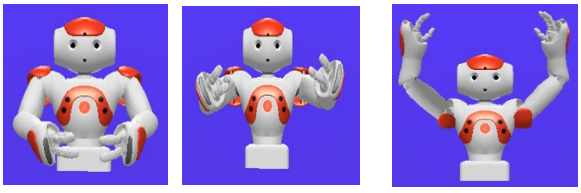

Fig.3 action example bravo

FIG. 3 is an example of one operation (bravo). The robot calls on the learner to check the test score,

evaluates the score taught, and performs the action. When evaluating grades, the learner can be encouraged and complimented by voice.

The movement is divided into three levels according to the score. 0 to 40 points are level 1, 41 to 70 points are level 2, and 71 to 100 points are level 3.

3）Questionnaire description

Questionnaire

1.Did you take an interest in learning Japanese during the winter vacation?
2.Did you participate in the class eagerly?
3.Do you think using robots improve learning effects?
4.Was the class attitude good?
5.Did he/she attend with interest in the class?

The questionnaire is all 5 questions. Questions 1 to 3 are self-evaluation, and questions 4 to 5 are mutual evaluation. The score is 1 to 5, with 1 and 2 questions about interest and 4 and 5 questions about motivation. Mutual evaluation will be conducted within the group. The observer evaluates all the learner's motivation and interests.

The learner's motivation and interest scores are the average of all the data received. And the deviation value is also used

4）Experimental result

	motivition	interest	average score	final score
A	4.75(0.125)	5(0.25)	75	84.75
B	4.5(-0.125)	4.5(-0.25)	69.29	79.5
C	4.75(0.5)	4.75(0.625)	70	80.75
D	3.75(-0.5)	3.5(-0.625)	65.7	75.5
Group1	4.625	4.75	72.145	82.125
Group2	4.25	4.125	67.85	74.125

Note: (standard deviation) ABCD are students.
Group 1: A and B. Group 2: C and D.
Final score:5%(test1+…test7)+65%test8

Looking at the test results, the final score of Group 1 is 10.79% higher than that of Group 2.

Looking at the results of the questionnaire, the motivation score of Group 1 is 8.82% higher than that of Group 2. The interest score of Group 1 is 15.15% higher than that of Group 2.

4. Summary

By introducing the humanoid robot, to build the system in order to check whether affect the improvement of motivation and learning effect of the learner, it was compared experiments with groups that do not introduce a robot.From the results of the experiment, it was shown that when a robot that can communicate with humans by voice and motion is used, it is possible to increase learning motivation and improve learning effects.

In the future, we hope to prevent learners' interest in robots from falling, explore robot behaviors that can achieve long-term collaborative learning, and make the system usable for all ages.

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