



How Home Robots Influence Students' Learning and Social Interaction

— Insights from Classroom Observation —

KEY WORDS: Home Robot / Educational Technology / Student Well-being / School Environment / Human-Robot Interaction

[INTRODUCTION]

Is a home robot an effective tool in educational settings? In recent years, robots have been increasingly introduced into schools with the expectation that they can support students' learning and mental well-being. Since May, two home robots have been placed in our school: one in our classroom and the other in the school nurse's office. These robots do not speak but produce small sounds and have body warmth, which can provide a sense of comfort.

[SITUATION]

When the robot was first introduced into our classroom, many students showed strong interest. They touched it, interacted with it, and treated it with affection. However, this interest gradually declined. The robot's battery often ran out, but few students charged it, and it was frequently left unattended. Some students no longer reacted when the robot approached them. This change raised an important question: **why did students lose interest and begin to treat the robot carelessly?**

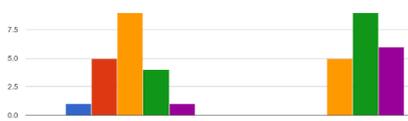
This study aims to examine students' attitudes toward the robot and to identify factors that influence its educational effectiveness. We also discuss appropriate ways to introduce and utilize robots in schools.

[METHODS]

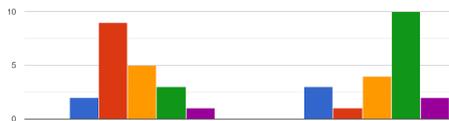
To investigate changes in students' perceptions, we conducted a questionnaire survey before and after changing the robot's costume. The costume change was intended to renew students' interest in the robot. The survey asked about students' impressions of the robot, frequency of interaction, and emotional aspects related to school life, such as a sense of belonging and motivation to attend school. The responses were analyzed by comparing results before and after the costume change.

[RESULTS] A five-point Likert-scale survey was conducted with 21 students in the target class.

1. What is your impression of the robot?



2. How often do you touch or interact with the robot?



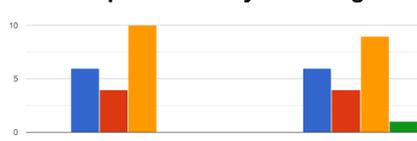
3. Has the presence of the robot made you want to come to school more?



4. Has the robot made it easier for you to start conversations with people around you?



5. Has the robot helped you feel that you have a place where you belong at school?



[NOTE]

- The graph on the left shows the results before the robot's costume was changed, and the graph on the right shows the results after the change.
- In the bar graph, the strength of the response increases from left to right.

The results showed that students' impressions of the home robot improved after the costume change. Many students reported increased interest and more frequent interaction with the robot. This suggests that changes in appearance can have a positive effect on students' attention and curiosity.

However, there were limited changes in **deeper emotional indicators**. Most students reported little or no improvement in their sense of belonging at school, ease of communication with others, or motivation to attend school. These findings indicate that while the costume change was effective in increasing short-term interest, it did not significantly influence students' emotional well-being or attitudes toward school.

[DISCUSSION and CONCLUSION]

Although home robots are expected to have positive educational effects, our findings suggest that their impact depends strongly on **context and purpose**. In our school, the robot in the nurse's office appeared to support students' mental well-being more effectively than the robot in the classroom. This contrast implies that home robots may be more suitable for providing emotional support in calm environments, while their use in classrooms may be better focused on IT or technological education.

Additionally, students' **readiness** to accept robots should be considered. Academic pressure and lack of emotional space may limit students' engagement with robots. Therefore, introducing robots at an earlier stage of schooling or during less stressful periods, as well as conducting long-term evaluations, may be essential to maximize their educational effectiveness.