Staying Connected: Implementing Avatar Robots at Schools in Norway, Denmark, Germany, and Japan

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Time: 16:00-18:00（JST）
Venue: Online（Zoom）
Host: Institute for Future Initiatives, The University of Tokyo
Co-host: JST Moonshot R&D Program “Cybernetic being” Project
URL: https://ifi.u-tokyo.ac.jp/en/event/11893/

(From left to right) Dr. Sofie Sejer Skoubo (online), Dr. Arisa Ema, Dr. Marit Haldar, Dr. Maja Nordtug, and Dr. Celia Spoden

Opening Remarks: Dr. Arisa Ema (Institute for Future Initiatives, The University of Tokyo)

First, Dr. Arisa Ema, who also served as the event's moderator, gave opening remarks. She noted that avatar robots (hereinafter referred to as "robots") are already in use not only in Japan but also in Europe and other countries and positioned this event as a place to explore the possibilities and challenges of robots. She then declared the event open by encouraging participants to think about what they would like to do with robots and what they are worried about from the perspective of the people involved.

Case from Denmark: PhD student Sofie Sejer Skoubo (Aarhus University)

PhD student Sofie Sejer Skoubo, who participated online, gave a presentation on using telepresence robots in Denmark.

The robots serve to connect children with cancer, anxiety, and neuromuscular diseases to their schools. The cooperation of teachers as well as children is essential for the introduction of robots, and it is important that the expectations of all parties involved are aligned.

She interviewed children who had used the robots and their teachers. Based on the interviews, she then used thematic analysis and technological frames to explore children's and teachers' expectations of the robots.

The results indicated that children and teachers have "positive" expectations of robots. The children have expectation to learn and connect with their peers in the school. In addition, the teachers expected the telepresence robot to be a tool to connect the child to the classroom. The implementation of the new technology would require extra resources and time from the teacher's perspective. The facilitation of blended learning and communication with the children was expected to be more time consumed. One teacher mentioned that it is essential to "experience" new technologies first to realize their potential.

Case from Norway: Dr. Marit Haldar and Dr. Maja Nordtug (Oslo Metropolitan University)

The second case study was presented by Dr. Marit Haldar and Dr. Maja Nordtug. This one is related to AV1.

AV1©No Isolation

With the advent of new technologies, our way of life is changing, and many different situations are being explored regarding this change. Now, hybrid hosting of events is an option. What was not the norm in the past is changing. At the same time, the meanings of the words "solitude" and "isolation" are changing.

In Dr. Haldar and Dr. Nordtug's research project, children who missed long school periods due to illness were interviewed, along with their relatives, classmates, teachers, medical personnel, and local government officials. Project members also visited families with children and schools with classmates and teachers to observe how robots serve as a communication tool.

In their presentation, Dr. Haldar and Dr. Nordtug focused on the domestication of AV1 as well as how the robot affords socialization.

1. *Domestication*

   The study found how the taming of two different AV1 devices, namely the robot avatar and the app used to control it, across two institutionally distinct settings create a series of distinct, multi-site challenges relating to appropriation, objectification, incorporation, and conversion.

(1) *Appropriation*

It refers to the encounter when people decide to adopt the technology or not. For example, at home, the focus is often on caring for children who are homebound, but at school, the focus is typically on all children who are attending school.

(2) *Objectification*

It is related to the question of where the robots should be placed. In deciding where to place it, different perspectives need to be considered.

For example, if the robot is used by a child at home, school personnel may be concerned that a third party other than the child may be able to view the classroom. In addition, where the robots should be placed in the classroom can be a vexing issue for school personnel when considering the child's best interests.

(3) *Incorporation*

It is a very important element, especially in domesticating technology. How well technology is incorporated into daily life is important.

For example, if a child attends class from the hospital, this can be challenging because the examination schedule may conflict with class time.

(4) *Conversion*

Robots can be very useful not only as a communication tool but also as a "reminder" (to remind them of who you are).

For example, if you cannot go to school due to illness, you can still stay connected

through conversations with your friends and classmates via the robot, reminding them that you are a part of their class and feeling that you are there.

2. *Affordance*

   It helps to consider how, to what extent, for whom, and under what circumstances AV1 affords socialization. For example, the impact of robots on people depends on their individual characteristics.

   First, one child with chronic fatigue syndrome (referred to in this report as "A") is unable to attend school and does not interact with classmates. In such a case, the robot was ineffective in reducing social isolation. In the words of one of A's parents, the robot could have helped A maintain a network if A had prior connections with classmates.

   On the other hand, the exact opposite effect was observed for another child who could not attend school due to surgery (referred to in this report as "B"). B is a sociable individual and has many friends at school. In the case of B, the robot played a very significant role in maintaining B's relationships with friends.

   In these ways, in addition to the design of the robots, the personality and individuality of the children who use the robots are also factors that influence their effective use. It must be understood that different personalities will have different effects on the effectiveness of the robots.

Cases from Germany: Dr. Celia Spoden (German Institute for Japanese Studies, Tokyo)

The third presentation was by Dr. Celia Spoden, also working on AV1 in collaboration with Dr. Arisa Ema. Here, she introduced her German case study.

Prolonged absence from school due to illness can create not only a lack of educational opportunities but also a sense of isolation. Furthermore, students who were ill for an extended period may face psychological challenges returning to school. The introduction of avatars in the classroom has the potential to solve these issues. However, qualitative research on their effectiveness and challenges is required.

Dr. Spoden interviewed various stakeholders about the robots, including students who used AV1, teachers, parents, hospital project coordinators, and representatives from No Isolation, the developer of AV1.

The introduction of the robots in Germany followed a bottom-up approach. The goal is to help hospitalized children stay socially connected with their peers and keep up with the school curriculum. In the presented cases, the robots were purchased from No Isolation by a charity collaborating with the psychosocial service team of hospitals, which set up avatar school projects and provided support.

In hospitals, the physician determines whether a child is suitable for using the robot in the classroom. However, some children tend to be shy and aversive to attention and do not want to use the robots.

For a successful introduction to the classroom, a program coordinator from the hospital team introduces the robot to the schools and classmates. Emphasis is placed not only on the technical aspects but also on explaining social issues of illness and isolation. Ideally, the robot is placed in a central location where the operating student can see the entire classroom. An approach called the “buddy system” is also effective when introducing the robots. A friend of the student using the robot serves as a buddy and takes care of the robot in school, like charging the battery, getting it from the teachers' room in the morning, and returning it in the afternoon. Also, teachers should care about integrating the robot into the classroom since this is crucial.

The European General Data Protection Regulation (GDPR) plays an important role in introducing robots to the classroom. All teachers and students (or their guardians) must give their written consent. Otherwise, the robot cannot be used. Furthermore, comparing AV1 to OriHime used in Japan, there are some differences due to data protection regulations. Access to the robot is password-protected, and taking pictures, recording, and filming are not allowed or possible. In addition, since teachers are concerned about losing control over access to their classroom, students using the robot must wear a headset to prevent parents from overhearing the classes.

Making returning to school smooth is the most essential goal for using robots in the classroom. Furthermore, the hospitals aim with their avatar robot school programs to provide opportunities for social and educational participation, stabilizing patients’ psychosocial condition, motivating them, and, secondarily, supporting medical treatment.

In contrast to video-conferencing technologies, the robot provides the teleoperating student with a physical presence and autonomy in the classroom. However, as mentioned earlier, the many advantages do not mean that robots suit all students. Children with anxieties or who avoid school need different support.

Case from Japan: Dr. Arisa Ema (Institute for Future Initiatives, The University of Tokyo)

As a final case study, Dr. Arisa Ema introduced the use of robots in Japan. Unlike the cases in Denmark, Norway, and Germany, OriHime, developed by Ory Laboratory in Japan, is used.

OriHime was brought to the venue for a demonstration by her.

OriHime©OryLab

While OriHime and AV1 share some similarities, there are also many differences. While OriHime can use its wing-like arms to express emotions, AV1 uses its LED eyes to do so. AV1 is also designed for classroom use and has a "whisper function" that Orihime does not have. It is possible to whisper with a classmate seated next to you. Furthermore, while only one person can log in to an AV1, OriHime allows multiple people to log in at the same time. OriHime is used not only in schools but also in cafes, restaurants, city halls, and more. They also have contrasting filming and video recording policies, with AV1 forbidding any such activity, while OriHime allows operators to record and film to participate in research studies.

She conducted semi-structured interviews with children, teachers, and the board of education. Questions included how the program was introduced, the process of obtaining funding, the challenges, and how it is being used.

The results of the interviews revealed the following three patterns of robot implementation methods.

1. Board of Education rent to the school or the prefecture or municipality
2. As part of the project (collaboration among schools, board of education, and sponsor companies), schools can use the robot
3. Schools rent individually from the Ory Laboratory

In any case, however, obtaining budgets can be challenging. If you want to continue to use the robots, you must secure a budget from the prefecture or school.

In addition, through interviews, she has learned who uses the robots, where, and for what purpose. This can also be classified into four categories.

1. Used by children in special needs schools, from home or hospital, for the purpose of returning to school.

2. Used by children in special needs schools, from home or hospital, for the purpose of communicating smoothly with classmates (e.g., to attend classes and school events)
3. Used by children who are ill or injured, from hospital, for the purpose of earning credits and maintaining relationships with classmates.
4. Used by children who refuse to go to school (but have good relationships with classmates) from home, for the purpose of earning credits and participating in classes.

Thus, the robots are used not only to earn credits but also to maintain relationships with classmates and teachers. In addition, the cooperation of teachers, especially homeroom teachers, is essential to facilitate communication through the robots. It is important to make classmates understand the presence of the child in the robot. Of course, the cooperation of teachers, parents, medical social workers, psychologists, and others is essential in introducing the robots.

These robots are not only used in the classroom but also in a variety of other settings. They are used as work experience in public libraries and cafes. With the robot, students can go to places that were initially difficult to go through the robot, and experience interaction with a variety of people, providing an opportunity to expand their future possibilities.

Privacy issues when using the robot are also considered, as the face of the child operating the robot is not visible through the robot. This has the advantage that children can interact safely with people they have never met before. The robot's arms and neck can also be moved, allowing children to feel like they are there. However, not all children can benefit from the robots. Children who do not wish to communicate may not benefit. Furthermore, the concept of robots being operated remotely is likely still difficult for elementary school children to understand. It may be effective for junior high school students and older who can understand such concepts.

Panel discussion and Q&A

A panel discussion was held with the speakers after the presentation of the four case studies. First, moderator Dr. Arisa Ema asked questions to all the panelists.

Q1. What is the difference between Zoom and other online conferencing systems and robots? And how should we use each tool differently?

A survey conducted in Japan by Dr. Ema found that while Zoom is effective in terms of getting information from teachers, it is inferior to OriHime in terms of communication with classmates and teachers.

PhD student Sofie Sejer Skoubo, who conducted the Denmark case study, said that the effectiveness of robots for children is still in the demonstration phase and that continued research is needed to confirm their effectiveness.

Next, Dr. Marit Haldar and Dr. Maja Nordtug, who conducted the study in Norway, emphasized that the physical presence of robots in the classroom is significant, noting that their presence in the classroom helps classmates remember and communicate better. On the other hand, they noted that online conferencing systems such as Zoom and Teams may be ineffective because they are not physically present in the room. They also mentioned that budget constraints make it challenging to use both robots and online conferencing systems.

Dr. Celia Spoden added to this and said teleconferencing options like Zoom are effective when all classmates and teachers gather virtually. When only one person participates remotely, avatar technologies offer better opportunities for being present and autonomous in the classroom.

She also reported that teachers in her study could not imagine teaching via the robot because they perceive their physical co-presence as crucial in learning situations, especially for young students.

Dr. Arisa Ema gave additional comments on this robot-mediated education. She shared her own experience that the feeling of talking to a camera is completely different from that of interacting with a robot. From this perspective, technologies with a physical presence, such as OriHime and AV1, are very effective in educational settings. She seemed to suggest that physical presence could make communication between learners and educators more real and effective by providing an interaction-rich learning environment.

PhD student Sofie Sejer Skoubo also provided some additional comments. She stated that where the robot is placed in the classroom is essential and that placing it next to a classmate who is a friend can also be effective. She also suggested that one way to help children remember the presence of the child operating the robot would be to give the robot some personality or individuality, such as calling it by name or putting a hat on it.

Q2. Are improvements in robot functions and other aspects necessary? Or do you think that technological improvements are not very significant in terms of achieving educational and social objectives? (From a webinar participant)

To respond to the question from a webinar participant, first, it was mentioned that interview participants said sound quality is more important than video. Also, simplicity of design is important to make the robot more accessible. AV1 has been intentionally designed to be a simple technology. One crucial requirement, however, is a good Wi-Fi connection.

One developer commented, "*Having a lot of features is not important. What is important is that so many things are possible through the robot*. I especially saw the value in being able to interact with different people through the robot."

Next, Dr. Marit Haldar pointed out that in addition to the Wi-Fi environment, especially in Norway, it is also necessary to pay attention to legal regulations. She stated that it is also important to consider measures such as the intentional disabling of the recording function, specifically to consider not only the children using the robots but also their classmates in the classroom and their parents.

PhD student Sofie Sejer Skoubo from Denmark commented that the Wi-Fi environment, sound, and picture quality are very important. When these issues arise, children can feel left out or excluded by the sudden darkening of the screen.

She also noted that Europe has strict data protection regulations such as GDPR, and in order to comply with these standards, rules are in place, such as requiring children to wear earphones so that parents cannot hear the classroom audio.

She also expressed her doubts about the safety of allowing multiple people to log in at the same time on OriHime in Japan. She would like to know what teachers and other stakeholders think about this.

Dr. Celia Spoden responded to Skoubo's question by saying that by default, several people cannot access to one OriHime simultaneously. In addition, she noted that since legal regulations do not exist in Japan, schools develop their guidelines for using the avatars. This may place a burden on teachers. She also noted that the one-way transmission of video - from the classroom only - is important since parents are concerned that the robot could open up a door to their private home environment.

Dr. Ema continued with additional comments on functional improvements. In the interview, she noted that some children expressed a desire to be able to control the robot and move around freely, as Orihime-D does, and that some children who use wheelchairs expressed a desire for a robot that can see from a higher perspective than a wheelchair. This suggests that

new experiences and different perspectives through the robot are important desires for children and teachers.

She also emphasized the need for a robot that can be operated by eye gaze or voice to accommodate users who cannot use touch panels. Orihime is already capable of these operations.

Q3: For children, does the appearance of the robot have anything to do with how easy it is to handle? Or do other features affect it? (From a webinar participant)

In response to this question, the first response from Dr. Marit Haldar, from Norway, recognized that ease of handling is an important factor for children and that the ideal robot is different for each child. She also emphasized the need for continued research to better understand which elements are important in robot-mediated communication.

In addition, it is introduced that how AV1 is being used in ways that were not originally envisioned. A concrete example was given of a mother with an illness who participated in a school event with her child via the robot. Such unexpected uses are expected to open new possibilities in the development of technology.

PhD student Sofie Sejer Skoubo from Denmark then commented that it is very effective to ask children direct questions to understand what they need. She noted that children have different perspectives and needs, so it is important to consider their individual opinions.

Finally, Dr. Arisa Ema from Japan emphasized that how children view and feel about robots differs for each individual and depends on context and personal background. In fact, some people thought Orihime was scary, while others thought it was cute.

She also agreed with PhD student Skoubo's opinion that we should ask children. She stated that communication through robots is effective when relationships with friends have already been established and the ability to imagine what the other person is like is an important part of communication. Some panelists mentioned that the robot's characteristic feature of not being able to see the other person will help develop this ability to imagine.

Q4: Finally, what are your expectations for future discussions? (From Dr. Arisa Ema)

First, PhD student Sofie Sejer Skoubo from Denmark described the situation in which very few researchers are currently in this field. She pointed out that sharing experiences and case studies is vital, and learning from other researchers will help the research in this field.

Dr. Marit Haldar from Norway then said that through this discussion, it became clear that the experiences among the countries were very similar. It was also noted that due to legal regulations and other factors, participation in classrooms with robots is fraught with difficulties. It was agreed that sharing experiences and knowledge is essential to address these common challenges and move forward with introducing robots.

Dr. Maja Nordtug, also from Norway, suggested that further research and study should be conducted on the difficulties and challenges of using robots. She noted that similar challenges are common to all regions and that information exchange and cooperation would be very beneficial.

Dr. Celia Spoden from Germany mentioned that, unlike AV1 and OriHime, there are telepresence robots showing the image of the operating student. She expressed her opinion that comparing these different systems would also be promising for future discussions.

Closing Remarks: Dr. Arisa Ema (Institute for Future Initiatives, The University of Tokyo)

Finally, Dr. Arisa Ema closed the event by expressing her hope that the discussion will continue in the future and that the community will expand.

More than 100 people participated online in this event, which showed a lot of interest in using robots in schools. I hope robots can be used to help children who cannot attend school. Hopefully, the day will come soon when robots will be considered a natural option for class participation.

(Report written by Manaka Karino)