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Do Students Dream of Electric Cats (or Dogs)?: Using Robotics for a Unique Exam Week Activity in the Library

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Chapter 6

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Introduction

Academic libraries regularly provide fun activities for students during exam weeks in an effort to reduce the stress that most students feel around the end of the term. Most of these activities involve some component of distraction, whether it be providing stress balls, board games, coloring books, or another diversion. A common offering is the opportunity to engage with a therapy animal, usually either a dog or a cat. Animals used in library activities are typically trained to deal with the public, have handlers that watch over their interactions with students, and are provided by an organization with a mission to provide pet therapy to the public.

Using animals to reduce stress and anxiety in humans has a long history in behavioral science. Animal-assisted therapy (AAT) has its roots in the work of Freud, Levinson, and

as far back as Florence Nightingale in the 1800s.[1] Such therapies were linked to improvements in patients' cardiovascular, psychological, and cognitive health, as well as outcomes of treatment and hospitalization. There is a clinical distinction between AAT and Animal Visitation.[2] Visitation is a short-term intervention, whereas AAT is a longer-term, scheduled process with a trained therapist.[3] Visitation is more in line with how therapy animals have been used in libraries.

Activities with live animals began appearing during exam weeks in academic libraries between 2010 and 2011.[4] Outcomes of these activities frequently showed that therapy animals demonstrated the ability to reduce stress and anxiety in students. Multiple studies at universities and academic libraries seem to support the effectiveness of this approach.[5]

There are several concerns that relate to bringing live animals into a library, including shedding and defecation.[6] Although the positive effects of providing therapy animals often outweigh any negative factors, robotic animals, specifically dogs and cats, eliminate the biological concerns of handling a live animal and may offer a similar level of stress relief to students suffering from exam-related stress. A partnership between the University Libraries and faculty from the School of Communication, including co-directors of the Communication and Social Robotics Labs (COMBOTLABS) at Western Michigan University (WMU), examined that question using Ageless Innovation's Joy for All Companion Pets during a collaborative study conducted at Waldo Library during the fall 2019 semester final exam week. Western Michigan University is a Carnegie Higher Research Activity Doctoral University with a total enrollment of 21,470 students as of fall 2019.

Literature Review

The first historical instance of a robotic animal may have been a pigeon that moved by steam power created by Archytas of Tarentum during the third century BC.[7] While it would be a stretch to consider that pigeon a "pet," people have been creating artificial versions of companion animals for centuries. For example, a metallic robotic pet dog by the name of Sparko appeared in 1940 as a companion to a humanlike robot called Elektro, created by Westinghouse, which debuted at the 1939 World's Fair in New York.[8] The dog, which was powered by electric motors, was capable of walking, sitting up, and begging.

Bandi brought the Tamagotchi to the public in 1996.[9] The Tamagotchi did not physically look like a pet, but the software in the device was designed to simulate caring for a live animal. A number of robotic pets followed, including Tiger's Furby and Sony's AIBO.[10] Melson, Kahn, Beck, and Friedman synthesized data from three studies examining the effects of the robotic dog, AIBO, with human populations of different ages.[11] The results indicated that children as well as adults interacted with the robot in the same manner as a living animal.

Even though toys like AIBO move and behave like pets, they still visually look like robots. Ugobe's Pleo went a step further with a lifelike dinosaur toy that the company described as "autonomous life."[12] The lifelike nature of Pleo is critical to understanding how humans react to robotic animals, as Rosenthal-von der Pütten et al. demonstrated in their study examining emotional reactions to robots.[13] In the study, the researchers showed subjects a series of

videos of someone interacting with the Pleo pet. One video showed someone in a friendly interaction with the robotic dinosaur, while a second showed the robot being abused. Study participants experienced negative feelings while viewing the abuse video, which suggests that it is possible for humans to have feelings for a robot they perceive as living.[14]

While the literature does not mention studies using robot pets as therapy for college students, robot pets have been commonly used in therapeutic applications. A study using the cat NeCoRo with dementia patients attempted to demonstrate that robotic pets could replace living pets in providing comfort through animated engagement instead of using a plush cat toy.[15] Another robot pet, the robotic harp seal PARO, was specifically designed for therapeutic uses.[16] In an Australian study, PARO, which can react to user movements via sensors, demonstrated the ability to improve perceptions of pleasure in dementia patients when compared to patients who participated in a reading group with other people.[17]

According to the Ageless Innovation's website, Hasbro introduced the Joy for All Companion Pets in 2015, first with a cat and then in a dog in 2016.[18] Similar to the PARO, the Joy for All robot pets use sensors to detect external movements and react with sounds and movements of their own. In his piece on the use of Joy for All robot pets at the Veterans Administration Palo Alto Health Care System (VAPAHCS) in Palo Alto, California, writer S. C. Stuart describes how some interviewed veterans ascribed feelings or associations from former pets onto the robotic dogs and cats.[19]

Several of the authors involved in this study participated in a previous project between the University Libraries and the COMBOTLABS in which usage of a telepresence robot (TR) on loan from the COMBOTLABS was piloted in the main library. The project consisted of several related studies: (1) COMBOTLABS and library student assistants invited patrons to interact with the robot, learn about the technology, and provide feedback; (2) use of the robot was tested by librarians for several public services applications; (3) perceptions were solicited from library staff and librarians regarding the usefulness of the technology and its applications in libraries before and after exposure to the robot and training in its operation. One of the project's findings was that "a TR can offer academic libraries a chance to showcase an emerging, engaging technology to its community."[20]

Planning

The authors met two months prior to the event to make decisions on dates, times, and location. The University Libraries offered to provide space, marketing support, and student staffing. COMBOTLABS provided the robotic pets, Ageless Innovation's Joy for All Companion Pets. Five cats and four dogs were obtained through funding provided by a Western Michigan University College of Arts and Sciences Discovery and Dissemination Award (CDDA). The School of Communication faculty took the lead on preparing a proposal and the participant consent form that the group submitted to the WMU Institutional Review Board (HSIRB). The Board granted approval as an expedited study given that the data was to be collected anonymously. Several meetings of two or more of the authors subsequently took place to address more detailed logistical issues and to address considerations that arose as the event days approached.

Librarians and the School of Communications faculty jointly created pre- and post-interaction surveys. The University Libraries provided supplies, such as hard copies of the surveys and HSIRB consent form, clipboards, and pens/pencils. The group staffing the events collected more than 100 paper surveys during the two nights the event was held at the library.

The authors created the coding for the survey prior to the first night and began the data entry process during the second night of the event. After the event, the authors finished entering the remaining data. The authors also recorded any informal observations about the event they had made while they were still fresh in their minds. COMBOTLABS student employees sorted through and input open-ended comments into an Excel spreadsheet. To ensure that everyone was able to access the various responses, all survey data was placed in a secure shared folder. The School of Communication faculty analyzed all recorded responses and reported the results at the conclusion.

A major advantage to the Communications faculty in working with the University Libraries on this project was the ability to utilize the University Libraries' marketing and social media options. The title and particulars regarding the event were given to the University Libraries' marketing team in order to create a campaign that would coincide with the advertising for the twenty-four-hour exam hours at the main library. Lead-time was important in order to advertise actively via social media, the University Libraries' calendar, the university's events calendar, and the campus newspaper. The marketing team created posters and flyers around the theme of a "petting zoo" of robotic animals. In line with the team's marketing strategy, the event was posted on Facebook and Instagram. Table tents and posters were also displayed throughout the main library a week prior to the event.

Figure 6.1
The animals on the promotional poster are appropriately portrayed in a robotic fashion, a la *The Day the Earth Stood Still*, with red eyes.

Methodology of the Study

The authors chose to hold the robot event between 8:00 p.m. and 10:00 p.m. during two consecutive nights, Sunday and Monday, of finals week. These nights fell toward the beginning of the libraries' twenty-four-hour Fall Finals schedule, where the main library typically stays open to students and staff until the end of exams. Based on an analysis of headcount and gate count statistics from previous finals weeks, Sunday and Monday seemed an opportune time to catch students looking for a break from studying. Evening hours are often high traffic in most academic libraries at that time of the semester, especially once regular classes have ended and just before scheduled exams begin.

A corner of the main library was chosen for the event location due to its high visibility and the ability for open interactions. Stanchions helped to designate the interaction space, as well as provide for crowd control in a mostly open area on the first floor of the library. The interaction space was staged with multiple tables, while comfortable lounge chairs and ottomans created a casual feel for the engaging interactions with the robot pets. Several chairs with desks were placed near the space for students to fill out the surveys. Photocopies of the HSIRB form, the research survey, clipboards, and pens were available for distribution. Counts of necessary materials had to be estimated as the University Libraries had not attempted a similar event previously.

Figure 6.2

Each robot has a unique pet name tag in order to personalize the units with typical dog and cat names, such as "Mittens," "Scout," "Patches," and "Bear."

Each of the authors staffed the event on both nights, along with two student employees from the main library's User Services department. Everyone was given brief training in welcoming participants and explaining the optional study. A critical key to the explanation was to avoid using terminology such as "stress reduction" with potential participants in order to prevent influencing the study results. (Similar language was also intentionally omitted from any materials or postings by the University Libraries' marketing team.)

While the event team all participated in various duties, the University Libraries faculty and students, and the Communications faculty, organically broke into two groups. University Libraries faculty and students welcomed participants, managed survey distribution and collection, and monitored the interaction space. Communications faculty took photos, engaged students in other parts of the library to encourage participation, and tallied data from the collected surveys. Student employees also maintained the interaction space, replacing batteries and re-arranging the pet robots after each interaction to ensure that pets looked available for the next group.

During the two nights the event was offered at the library, students were invited to interact with any of the nine battery-operated robots, which resembled and exhibited behavior like cats or dogs, including realistic heartbeat, purring and/or barking, and movement in response to touch and sound. Students were also invited to take part in the optional study consisting of informed consent, a pre-test prior to interaction, and a post-test at the conclusion of their visit. The surveys included a combination of closed-ended questions and open-ended prompts inquiring about participants' perceptions of the robot pets and their experiences interacting with them.

Results

Responses from students indicated the element of animal-like technology greatly enhanced the relaxation factor of the experience. Corresponding comments include, "I enjoyed the robots more than I thought I would. I really like [that] the cat purred and moved.… I felt like Biscuit and I had a special bond" and "I felt better about my finals after this event. I miss my dog at home now!"

The primary goal of this project was to reduce student stress during a challenging time of the semester. The results of the study indicated that a number of students appreciate library events designed to alleviate their stress. Students reported enjoying the opportunity to be "kids" again for a little while, something to keep in mind when planning activities. One student commented in the follow-up survey, "I was surprised by how much their interaction actually made me happy and excited. They responded the way I wanted them to and that was super fun." This study received more positive reviews than the previous study with the telepresence robot, which received mixed reviews from students.[21]

Despite mostly positive reactions, there were some mixed or negative comments, usually related to a sense of uncertainty about the robots' realism. "I have a puppy at my apartment, so this is rather close, but real animals would be better. It honestly kind of freaked me out" and "It was weird as I was very aware that it was not a real animal and did not find [I was] comforted or happy while petting them" were two of the comments

that stood out as questioning or rejecting the robot animals as substitutes for their living counterparts.

A subset of students focused their interactions on the robot as opposed to the pet experience. Students were observed inspecting joints, testing various responses by the robotic pets (for example, waiving arms to see if it would trigger the dogs to bark), and feeling for wires and sensors. While the event was not intended as a showcase for robotics, the event attracted a few enthusiasts that were simply curious rather than interested in gaining any relaxation from the experience.

Conclusion

Offering an innovative relaxation activity with the robot pets proved to be a positive experience for both the attendees and the authors. Enlisting a department outside of the library allowed the authors to take advantage of different skills and knowledge in terms of technology, research practices, and experience with students when creating events. Utilizing robot pets, in particular, did attract students for a variety of reasons, including curiosity, connection to something that reminds them of their own pet, or the experience of participating in an empirically driven study.

Working with people across the campus involves a cycle of creating, implementing, and refining. For the project outlined in this chapter, specifically, the authors regularly met as a team to envision the event parameters, and then all worked to carry out a shared plan. When there is collective involvement in the planning and execution of an event, it can generate more ownership over the outcomes and lead to genuine, transferable enthusiasm. This type of collaboration inspires group members to continue working together to improve their original idea. For example, for the robot petting zoo outlined in this chapter, the authors continued to collaborate after the event and are working to implement several changes for the next iteration.

Enhancement to the study's design is being considered. In addition to gauging attendance as an indicator of success, the authors plan to utilize another factor that can be employed when an event is offered multiple times, such as rate of enthusiasm from an initial visit to a repeat visit. Progress can be built on this project's research element by collecting physical markers of stress through pulse oximeters during the pre/post-test surveys. A secondary consideration to repeating the event is whether the close contact with an inanimate object will create additional anxiety for students because of perceived risks of coronavirus infection, even after effective treatments are developed and available. A study comparing this study's results to a similar experiment with a robot that could easily be sanitized might yield data that would indicate whether perceptions of relaxation have now been altered by the perception of a robot's potential as a virus vector. The authors would also like to explore how altering the location of the event in the library may influence students' perceptions of the event and/or affect their reported benefits.

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