Exploring the Experience Goals in the Context of University Student Mentoring Robot

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ABSTRACT
Recently, social robots have gained popularity worldwide, and some are sold commercially. Now-a-days, social robots are used as servants in public spaces. They are also used to assist elderly and kids. However, few implementations have been carried to assist university students. In fact, international students in the universities face great hurdles when they pursue their study abroad. This is often due to their shyness of language barriers. Often they avoid asking questions because they feel "too simple". Thus, we came up with the idea of designing a social robot to assist the newcomers in the university. However, designing an interactive system for public use requires in depth understanding about the user needs and expected experiences. The present study is about how to design a mentoring robot for international students in a university, utilizing the target experience goals. In this paper, we present our interview study with 20 international and 10 local students, describe their expectations towards the mentoring robot, and explain how we are going to utilize these findings in the future work.

Author Keywords
Social robots; human-robot interaction; human-centered robotics; student mentoring; user experience; experience-driven design.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION
International students face many challenges when they arrive in the university and foreign culture for the first time, especially because the education system is different from their home countries. This inspired us to design a social robot to provide guidance to the newcomers. Based on the related work, there is much potential on social robots as mentors and guides. For example, Onchi et al. [11] designed a female robot named IOmi, which interactively provides guidance to the people in public space. In their study, the robot introduced itself to students utilizing gestures, movement and speech as well as provided guidance on directions. According to their findings, a robot was preferred to getting guidance over a map. However, participants preferred guidance given by a person in general. According to the authors, this could be because of limited speech interaction. Kanda et al. [11] conducted a study on interactive shopping mall guidance robot whose task was to guide, advertise and show empathy towards the customers. According to them, the customers were satisfied because their experience with the robot was pleasant and it provided correct information. This gives us an impression that the target users have certain experience goal, which the robot needs to fulfil.

Lee et al. [5] developed a robot that provides snacks in the university premises. They defined the experience goals for their robot as holistic, natural and interactive. Komatsubara et al. [4] implemented a robot with the aim of helping students learn science during breaks. In order to avoid possible negative experiences such as subversion (breaking social rules and norms) and captivation (forgetting one's surrounding), the robot says that it is not allowed to talk when a class is going on. This helps the students not to break the rules or get distracted without making it obvious for them. Thus, we also need to take care of experiences, which should be avoided during the interaction.

In our research, we are designing a Pepper robot by Softbank Robotics to become a university mentor. Pepper is already interactive utilizing its body movement, voice and gestures (Who is Pepper, ei pvm). We investigate experience goals that might have a positive impact on students' interaction with the robot. It is important to consider which design choices influence such experiences while designing the robot's behaviour. This approach is known as experience-driven design [5]. Hassenzahl et al. [6] states that it is important to understand the needs of the users, along with defining functionalities and usability, in order to cause a positive experience. For this purpose, we have taken assistance of the PLEX cards [4]. PLEX cards include 22 categories of experiences including 13 pleasurable experiences. These categories inspired us define the possible target experiences for our design. Moreover, the process to experience goals determined by Ahtinen et.al. [3] gave us direction in defining our goals.

The aim of the present research is to design a social robot, Pepper, to guide new international and local students of university during their orientation week. The design is based On the experience goals and preferred functionalities extracted from the user interviews of the pre-study.

METHODS OF THE PRE-STUDY

On the pre-study, we interviewed 30 local and international university students (16 female and 14 male) in order to obtain qualitative data about their expectations and user needs towards the mentoring robot. These students were mainly degree students, who intended to live in the city for at least 2 years. The participants were mainly recruited on the voluntary basis from social media. We aimed to target students from different cultures to avoid biased results.

The interview consisted of three sets of questions. The first set was to *determine how familiar participants are with technology* (inspired by Technology acceptance model [12]), the second set was to *understand their experience on the first day of the university*, and the third set of questions were designed based on *scenarios where they might expect the Pepper robot to help them*. The scenarios were based on the first day of the students in the university where they do not have anyone to assist them. The scenarios included looking for directions, restaurant menus, recreational activities in the university and the city, finding new friends, etc. The interviews were recorded and transcribed and the data were analyzed with the affinity diagram technique [1]. This method was used in order to categorize the interview data and perceive the bigger picture of the data. From the data consisting of user needs and expectations, we analyzed *possible experiences the students would like to have while interacting with the mentoring robot*. Furthermore, we extracted the list of the *different functionalities that the students wished the mentoring robots to include*.

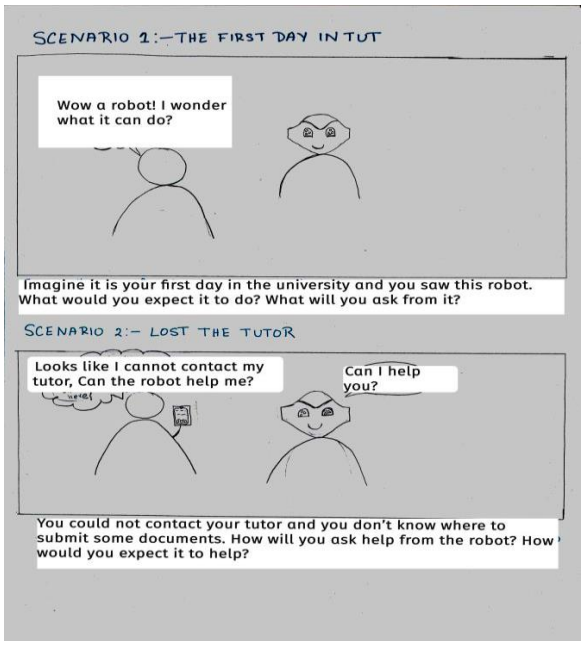

Figure 1. Example of the scenario presented to the students.

FINDINGS OF THE PRE-STUDY

In the following, we summarize the experience goals and functionalities that we identified based on the gathered data.

Experience Goals

Interestingly, some participants' answers reflected that they were expecting Pepper to interact like a human being, whereas some considered it as just a machine. Therefore, expectations varied from person to person. However, there were some common experience goals, which are *nurture* (taking care of oneself or other), *fellowship* (friendship, communality or intimacy), *natural* (to be human-like), *recreation* (break from stress), *humor* (fun, joy, jokes, amusements and gags). *Nurture* was one of the most interesting goals. In our case, "nurturing" means taking care of the participants and guiding them when they are in trouble. One of the participants also mentioned, "*Pepper could be the hero of the university*" (female, 29), which refers to the fact that Pepper can save them from trouble. Nurture also refers to the fact that the participants sometimes wanted to take Pepper with them if they had to go alone to strange situations or if they were not sure about where to go. Another interesting experience goal identified was *fellowship*. Many participants imagined that Pepper would be someone who has been in the university longer than they have. Thus, he can provide suggestions about events and restaurants and show directions to classroom in the same way a friend should have. The next experience goal, which is relevant with how Pepper should interact, is *natural*. Participants expressed that they would communicate with the robot, as they would communicate with humans. Few of the participants were doubtful about how they should initiate the interaction, but they suggested that it should be as natural as possible. The fourth experience goal we identified was *recreation*. Recreation often refers to a break from stress or tension.

Figure 2. Affinity wall that was built to categorize individual

Most of the participants expressed that they would like Pepper to sing and dance for entertainment. Few participants expected Pepper to play a small game with them .An experience goal related to recreation was *humor*. Few participants expected Pepper to have a humorous and joyful personality; "*She should be jolly in nature*" (Male, 24). Many participants were eager to see what kind of jokes Pepper

could crack. One participant mentioned that it would be funny to see how the robot avoids inappropriate questions.

FUNCTIONALITIES

From the affinity diagram, we identified five main categories of functionalities, which are: 1) information participants want to know (61 findings, 3 sub categories), 2) events and activities (97 findings, 3 sub categories), 3) direction (123 findings, 3 categories), 4) menu and restaurant (69 findings, 3 categories), and 5) Pepper connecting people (71 findings, 3 categories). Based on the findings and design implications, the main functionalities of the robot would be:

1) To show directions to students inside the campus

2) To inform them about the restaurants in the university

3) To provide information about different events happening inside and outside of the university

4) Connecting with other people in a playful manner

5) Basic information, for example, about hospital, gym etc

Based on the data from the study, we deduced the functionalities for the mentoring robot. We figured out that most of the international students are confused about the university system, opening hours of office, restaurant and gym, location and classrooms, study plans, events and activities happening in the city and general information about Tampere City. Three participants mentioned that they would like to check FAQs in different occasions; "*Inside the course you can have some kind of FAQ*" (Male, 25). Another participant mentioned that she would like to create her own events to know more friends. Most of the students expected Pepper to explain directions with an interactive map.

Figure 3. International student interacting with Pepper

THE DESIGN OF THE MENTORING ROBOT

After gathering information about the experience goals and meaningful functionalities, we intend to achieve these goals by designing the suitable functionalities of the mentoring robot. In order to achieve *nurture* and *fellowship*, we decided to portray Pepper as a mentor who will be in the lobby near the entrance gate answering to people's questions. Pepper will introduce itself just as a mentor when someone approaches it, explaining the things he can help with. In order to bring *humor* into the conversation, the error recovery messages will contain some funny replies. For example, if Pepper does not understand certain words, it could reply, *"I really need to see a doctor now for my ears, could you please repeat?"* To serve the purpose of *recreation*, Pepper will offer to play music or dance. Furthermore, to gamify the experience we introduced a language and "how well do you know the university" quiz, which is mainly informative and educational. Moreover, to evoke *fellowship*, Pepper will help students to know more people by giving them the choice to make an activity of their choice and advertise it. Furthermore, Pepper will ask the students if they want to see how many people it met and if they would like to contact these people as well. In addition to that, Pepper provides an option of interactive indoor map to find places around the university and restaurant menus of the university to serve the purpose of a caretaker or guide

Figure 34. Pepper interacting with a student.

FUTURE WORK

The next step of the research is to implement a mentoring robot prototype for Pepper as a platform. The new international students will try out the prototype on the field trial during their orientation week in fall 2018. The aim is to design the functionalities based on the described user study findings, so that the new students would get benefits for their orientation phase. Few of the functionalities will be fully functional. These functionalities will be initially tested with pilot participants before the field trial.

In the field trial, we plan to give out questionnaires, which the participants will fill. We also conduct theme interviews to understand their robotic mentoring experience better. The purpose of the study is to find out whether our design manages to achieve the identified experience goals and if there are any other experience goals emerging. Our aim is to include 30 to 40 students in the field study.

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