

Examining Human Values in Adopting Ubiquitous Technology in School

Minna Isomursu, Mari Ervasti
VTT
Kaitoväylä 1
FIN-90571 OULU
minna.isomursu@vtt.fi;
mari.ervasti@vtt.fi

Marianne Kinnula
Department of Information
Processing Science
FIN-90014 UNIVERSITY OF OULU
marianne.kinnula@oulu.fi

Pekka Isomursu
Oulu University of Applied Science
Kotkantie 1
FIN-90250 OULU
pekka.isomursu@oamk.fi

ABSTRACT

This paper summarizes value analysis of adopting technology-supported attendance control service in a primary school. The results are based on a case study that explored a 14-week trial where two classes of elementary school children used an attendance control system that was implemented using networked technology components, including smart cards, NFC enabled mobile phones and card readers, a web-portal, and SMS messaging. The findings from the trial are analyzed from the viewpoint of three end user groups, namely children, parents and teachers. Value modeling adopted from social psychology is used for interpreting the perceived value for each user group.

Categories and Subject Descriptors

D.4.2. [Computers and Society]: Social issues, H5.2 [Information interfaces and presentation]: User interfaces; Evaluation/methodology

General Terms

Design, Experimentation, Human Factors

Keywords

Value based design, evaluation methods, user experience evaluation, school attendance control

1. INTRODUCTION

This paper presents a case study that explores adoption of new technology in the school environment. The study took place in Finland, where the school system is based on public schools. The community administration is responsible for maintaining schools that adhere to the educational and operational requirements set by the state. Therefore, public authorities play an important role in adopting new technologies in the school environment. This means that investments are covered with public funding and decisions for adopting new technologies are done through public decision making processes. In the case of public services, goals and criteria for adopting may differ significantly from the private business environment, where the goals usually deal with maximizing profits and can be justified with economical reasons. With public services, it can be difficult or meaningless to show

the created value only through economical measures. Human values are often difficult to articulate unambiguously [1]. In this paper, we explore how Schwartz's [2] value model could be used in modeling and articulating the value created for the end users.

2. RESEARCH CONTEXT

As the focus of the project was on analyzing and exploring adoption of a novel technology-enabled service concept, we chose to use a case study method in order to access information about real-life context. We were able to follow and analyze the adoption of attendance control system at one Finnish primary school. The attendance control system was trialed in one school in Oulu, Finland on September 2008, continuing until December 2008. The trialing phase lasted 14 weeks. Trial was conducted at a local primary school, where two classes and total of 23 pupils between ages of six and eight (majority just starting at school), participated in the trial. Parents' permission for their children to participate in the trial and to the adjacent research had been asked in advance. One of the participating classes represented a 'normal' first grade class. In this class, 16 children out of 19 attended the trial. The other trial class was a special-need class consisting of special-need school children. All seven children at the special-need class were boys. Four of the boys were first-graders and three second-graders. All children at the special-need class attended the trial

Our research focus was two-folded. First, our goal was to evaluate the subjective user experience and value created for the end users. The results could then be used in making decisions on designing or adopting similar systems in other contexts. Secondly, our goal was to try out how Schwartz's value model [20] could be used in evaluation of value creation in these kinds of contexts. The methods we used for evaluating and modeling the value created by the new system to the user were based on collecting information on subjective user experience. Therefore, we assume that the value for the end user is composed of the perceived, subjective experience of the user in interaction with the service and technology. In this study, we concentrated solely on perceived value, i.e. the value the users themselves judged and experienced. Data describing the user experiences of children, their parents and teachers were collected through classroom observations, interviews, phone interviews and paper questionnaires.

Designed to simplify attendance monitoring and to replace manual roll calls, the trialed attendance control service does not require teachers to manually mark absences in the back-end system leaving thus more time for teaching. Similar supervision systems have been trialed, for example, in the USA [3, 4]. In the attendance supervision trial pupils were given contactless smart cards named “Robo” containing the pupil ID. The system was based on NFC (Near Field Communication) technology. This means that the identification embedded in the smart card cannot be read from distance. The user needs to physically touch, or bring the card very near to the reader device in order to allow the identification number to be read. Upon arriving at school children touched a smart card reader device or mobile phone of the teacher with their cards to mark that they have arrived at school. At the end of the school day children touched the reader devices again to mark their departure. The same attendance control system was also used in extended day care programs where some children went after school.

A log of arrivals and departures was automatically compiled by a background system, and could be read by a teacher in a classroom in real-time. If a login did not occur, the child was marked absent by default. If a child logged in late, the back-end system recorded the time when the child marked the arrival. Parents were able to get information of their children’s attendance details via an online ‘citizen’s portal’, and, in the later phase of the trial, also through text messages sent to their mobile phone.

3. ANALYSIS OF VALUE

Here, we apply Schwartz’s value modeling framework [2] for modeling and creating an understanding of the value created by the new system to the end users. We have defined the end users in this case to be: (1) the children using the attendance control service, (2) their parents, and (3) the teachers of the children who used the system.

3.1 Value for the Children

The value that came most profoundly visible when children described their experience with the service was that of Benevolence. The children appreciated that they could be helpful and use the service for positive interaction in order to assist and be of help for people they had close contact with, i.e. the parents and the teachers. The other value types that were identified relevant for the children in the context of attendance control service adoption are Achievement, Power, Conformity and Self-direction. The Achievement and Power value types seemed to be somewhat stronger than the last two. The children were proud to master the technology used for access control, and for the responsibility they were trusted in marking their comings and goings. The whole school did not participate in the trial, so it provided the trial users a means for status differentiation. Possession of the smart card was valued by children to be ‘cool’ and something to be proud of among their peers. As many children had seen their parents carrying similar identification cards because they needed them at work, they associated the card being a sign of power and authority.

3.2 Value for the Parents

Even though Security was the value type most visibly observed in the data collected from the parents, the trial service caused mixed feelings towards the value created for Security. The parents saw a possibility that the service could provide Benevolence value by giving them timely information that could be helpful if the child skips classes or is repeatedly late, but with children of this age this value was seen rather hypothetical. The parents valued the efforts the school put into trying to improve home-school communication and co-operation, and wanted to attend trials because they wanted to conform to the rules of the school. Of course, the fact that parents were aware that the trial lasted for a fixed period only, the experiences from adopting the service cannot be applied as such to the situation of adopting a service for long-term use

3.3 Value for the Teachers

The teachers experienced that the service could support them in fulfilling their responsibilities on marking the absences by automating the process and reporting and thus removing manual work and decreasing the chance of human error, thus contributing to Benevolence value type. The teachers taking part in the trial were voluntary. They valued Stimulation and were open for new ideas. However, if the service would be taken into wide-scale use, it cannot be expected that all the teachers would share the openness and readiness for exploring new practices that were observed with the teachers participating in this trial.

4. CONCLUSION

Schwartz’s value model [2] provided us with a framework for modeling and understanding the value created for end users in this trial. The model can help in articulating human values as it provides a structure and vocabulary for modeling and describing value. In our case study, the model helped understanding and communicating subjective user experience of different user groups through perceived value.

5. REFERENCES

- [1] Friedman, B. 1996. Value sensitive design. interactions. ACM press. November – December 1996. pp 17-23
- [2] Schwartz, S.H. 1992. Universals in the content and Structure of Values: Theoretical advances and empirical tests in 20 countries. Advances in experimental psychology, Vol. 25.
- [3] San Francisco Chronicle: Lucas, G. 2005. Students kept under supervision at school – Some parents angry over radio device, DOI = <http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2005/02/10/BADGES.TMP&type=printable>
- [4] Illuminati News. 2008. U.S. School District to Begin Microchipping Students. DOI = <http://www.illuminati-news.com/articles2/00231.html>