Evaluation of Software Tools with Deaf Children

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ABSTRACT

Evaluating software applications with deaf or hard of hearing children requires methods and procedures tuned to them. Indeed, they are unusual users with special communication needs. This paper proposes a list of guidelines for organizing effective evaluations of interactive tools with deaf children. The novelty of this work is that such guidelines are not based on theoretical thinking. Instead, they are built on data collected through questionnaires proposed to experts working with deaf children. The questionnaire's data are reinforced by my experience which was gained during usability tests with deaf children. In future work, the effectiveness of these guidelines will be checked during the evaluation of an e-learning tool for Italian deaf children.

Categories and Subject Descriptors

H.5.2. [**User Interfaces**] Evaluation/methodology

General Terms

Design, Experimentation, Human Factors, Security, Verification.

Keywords

Deaf children, unusual users, guidelines for testing.

1. INTRODUCTION

The evaluation of an interactive software tool is a relevant phase of its design and development process [1]. It is also a useful practice to determine if a commercial product is usable and pedagogically effective [2]. Several research studies demonstrated that it is essential to involve users in the design and evaluation processes [3]. This is particularly true when creating software devices for children [4]. Evaluating interactive tools with *deaf* children may be more challenging for researchers due to deaf children's special communication needs. Moreover, literacy deficiencies of deaf children [5] can complicate the situation. Traditional methods of evaluation, such as observation methods, the *Think-Aloud* method [6] or the *Survey* method [7], must be tuned to these special users.

This paper proposes some guidelines to support this tuning. They are built on data collected through a questionnaire, addressed to people who work or live with deaf children, and on personal experiences developed during usability tests with deaf children [8]. Section 2 presents the questionnaire. Section 3 illustrates my guidelines. Section 4 concludes this paper with a few words on my future work.

2. THE QUESTIONNAIRE

The idea behind this questionnaire is that the experts involved know the details of behaviors and necessities of deaf children, whereas researchers do not. The questionnaire was filled out by twenty-three people, comprising two teachers, two researchers and nineteen special teachers for deaf children. Twenty people (87%) were hearing, two were deaf and one hard of hearing. Fourteen people (61%) were 26 to 39 year old, three were older and six younger.

2.1 Questions

The questionnaire consisted of two main parts: the first part collected demographic information about the writer; the second part was composed of the eight questions listed in Table 1. These questions had the aim of determining the experts' opinion about some of the main aspects concerning the organization of an evaluation session, i.e. location, observers, duration, and instruction.

Table 1. Main questions.

1) Which is the best place to carry out the test, at home or in a public place?
2) Is it better for the child to test the tool by himself/herself or in a group with other children?
3) Do you think that is reasonable to ask the child, at the end of the experiment, the following three questions: a) what did you like about LODE? b) what did you dislike about LODE? and c) what would you change in LODE to make it easier to use or more entertaining?
4) Which is the optimal duration of the test (30 minutes, 1 hour, 1hour and an half, no time limit)?
5) How does the child consider the presence of a parent during the test (annoying, unimportant, useful)?
6) How does the child consider the presence of an unknown person during the test (annoying, unimportant, useful)?
7) How may the child behave in the presence of a video-camera recording him/her during the test session (e.g., annoyed, neutral, interested)?
8) Which is the best way for giving children instructions on the test (orally, with the assistance of a teacher using sign language, showing a video with a person who uses sign language, written instructions)?
8) Which is the best way for giving children instructions on the test (orally, with the assistance of a teacher using sign language, showing a video with a person who uses sign language, written instructions)?

2.2 Answers

Table 2 reports the collected answers. The majority of experts (70% - X^2=22,21) agree on the fact that the best place to have a test session is a public space, not home. My personal experience confirms this fact; children at home take the test less seriously. Petrie et al. [9] affirm that it is also better to avoid remote evaluation, because researchers can fully evaluate possible

interaction issues only by direct observation. Most experts (81%) say that it is best not to involve a child alone, but it is better to have sessions with more children. All the experts (100%) think that it is a good idea to ask children's opinion on the application they have tested; it is useful for the children's self-esteem and for researchers to evaluate the test impact. More generally, a cooperative inquiry approach [4] is recommended. However, my experience tell me that the child could also become nervous when confronted with this request, so it is better not to insist on it if the child does not know what to answer. The majority of the experts (65%) affirm that the optimal duration of a session is 30 minutes, because the attention span of children is short. My experience confirms this: longer sessions irritate the child. There is not a predominant answer on questions 5 and 6 concerning the presence of a parent or an unknown person during the session. Some of the experts think the presence of other persons is useful, others neutral, or annoying, in equal proportion. My experience says that the child is more concentrated if parents are not present. Concerning the use of a video camera, 48% of experts say that it is annoying for deaf children. The majority of experts (74%) say that a good way to give instruction is by means of a person who signs. Some (52%) think that oral instructions are also OK; some (48%) also propose the written instructions. The literacy of deaf children is limited [5]: they have problems with pronouns, clitics, relative clauses, and verb tenses. So, if written instructions are necessary, it is essential to write them in easy language. If a video with a signer is necessary, it must be of high quality and should capture in details the trunk, hands, eyes and mouth of the signer [10].

Table 2. Questionnaire's Answers

1) public space: 70%; home: 26%; doesn't matter: 4%
2) in public space, with other children: 81%; alone: 19%
3) yes: 100%
4) 30 minutes: 65%; 1 hour: 17.5%; 1 hour and a half: 0 %; free duration: 17.5%
5) annoying: 39%; neutral: 26%; useful: 31%; no answer: 4%
6) annoying: 35%; neutral: 48%; useful: 17%
7) annoyed: 48%; neutral: 43%; interested: 9%
8) (more than one answer was possible) orally: 52%; with a person who uses sign language: 74%; showing a video of a person who uses sign language: 13%; written instructions: 48%

3. GUIDELINES

This section presents my suggestions for organizing software evaluation sessions with deaf children, derived from questionnaire's answers and personal experiences.

1. **Organize the test session in public spaces, e.g., schools.**

2. **Tests should be carried out with a group of children.**

3. **No more than thirty minutes long**.

4. **No parents present**.

5. **Provide instructions both orally and with sign language.**

6. **If written instruction are necessary, pay attention to the language used** (see Section 2.2 for more information).

7. **After giving instructions to the child, ask her/him to repeat them** (deaf children often say to have understood even if it is not, they teachers affirm).

8. **At the end of the test, ask children about their impressions.**

4. CONCLUSIONS AND FUTURE WORK

Organizing test sessions with deaf children may seem an easy task. On the contrary, it requires special attention on several aspects (location, duration and instructions). Making mistakes fixing these aspects, can cancel the entire benefit deriving from the test. As future work, the effectiveness of these guidelines is going to be checked during the evaluation of LODE [11], an e-learning tool for Italian deaf children.

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