Simplifying User-Tuned Content Management in Assistive Software

Margarida LUCAS DA SILVA [a,b,1], Daniel GONÇALVES [a,b,2], and
Hugo PLÁCIDO DA SILVA [c,3],

[a] *Instituto Superior Técnico, Av. Rovisco Pais, 49, 1050-001 Lisbon, Portugal*
[b] *INESC-ID, R. Alves Redol, 9, 1000-029 Lisbon, Portugal*
[c] *Instituto de Telecomunicações, Av. Rovisco Pais, 1, 1049-001 Lisbon, Portugal*

Abstract. Information and Communication Technologies (ICT) are of
upmost importance in the field of assistive technologies. Previous re-
search from our group has proposed Troc@s, a multimedia tool to help
children with Autism Spectrum Disorders (ASD) in the development of
communication skills. A cornerstone of Troc@s is the ability that the
caregiver has to customize the tool according to the profile of each child,
creating the need to have streamlined procedures for the caregivers to
follow. In this paper we propose an approach for easy customization of
the tool, and present results of a usability study conducted with several
caregivers, which show that, although training is required, our approach
is considered to be a simple and adequate solution for routine use.

Keywords. User-tuned content, Rapid customization, Assistive technologies

Introduction

Content management in multimedia assistive technology software solutions, usu-
ally involves a back office, manual file upload and related procedures that require
a considerable amount of time when there are large sets of files to handle, and
generally have high learning curves since caregivers are often technologically in-
secure or non-proficient. Troc@s [1] is a software tool recently proposed by our
group for children with ASD; currently in use over 10 schools and with an over-
reach of nearly 50 children, customization has been a problem, because caregivers
have several children to look after and must prepare user-tuned content to better
address the individual needs of each child. In addition to not being computer
experts, the time that caregivers can spend to setup the tool is very scarce, and
in between customization sessions they tend to forget the procedures.

Still, user-tuned content is of paramount for children with ASD; as shown
by Boyd *et al.* [2], children that are stimulated with suitable content for their
circumscribed interests are more motivated and show better outcomes in their

[1] margarida.lucas.silva@ist.utl.pt
[2] daniel.goncalves@vimmi.inesc.pt
[3] hugo.silva@lx.it.pt
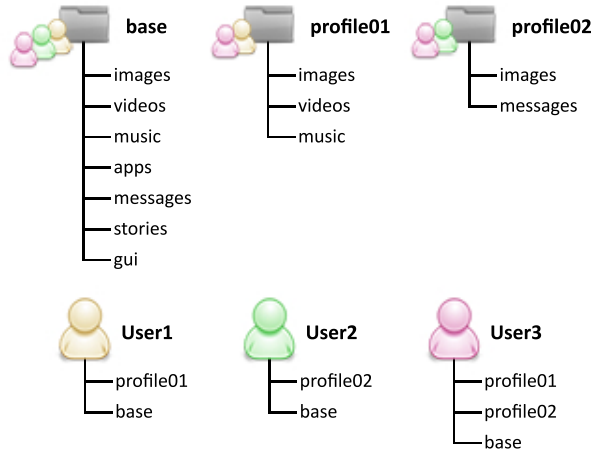
Figure 1. Example of a content folder tree with user assignment.

social and communication skills. Several recent studies on content customization for children with ASD explore the possibility to setup user-tuned content in order to address the children's interests, however, they lack the focus on how the system can be easily managed and prepared by the caregivers to address that interests [3, 4,5]. In this paper we propose a simplified approach to content management based on the File Management System (FMS), and present the results of a usability study conducted with several caregivers.

1. Proposed Approach

For Troc@s we adopted an approach where the caregivers use the FMS for content management. The underlying principle is that much like using the "My Documents" metaphor that is available in all Operating Systems, handling folders and files could be a more familiar operation for caregivers. We believe that the FMS is prone to break the initial challenge of using a new tool such as a dedicated back office.

Figure 1 shows an example of the FMS tree structure that supports this feature in Troc@s. The `base` profile is available as a default for all children, and `profile01` and `profile02` are profiles created by the caregiver and that can be assigned to individual children. Profiles are folders with lists of files (like musics, videos, images, etc) and can have any kind of content or layout. Custom profiles have priority over the `base` profile and there is no limit of profiles that can be created or assigned. Further details about the Troc@s system and framework can be found in [1].

2. Experimental Evaluation

To assess the feasibility of our approach as an easy-to-use method for the customization of Troc@s, a usability study was conducted in a real-world scenario.

In our test, each caregiver had to introduce user-tuned content for one child for all the multimedia features available in Troc@s, which help us in evaluating how caregivers perceive the ease-of-use of the FMS, and provides us a real understanding of the main problems of the method we followed. Before applying the test, all tutors attended a briefing, so they could get a basic insight about the FMS structures and underlying principles of our proposed approach, and learn how to use it, not only to be able to guide and support the children during the customization effectiveness tests, but also to learn how to master the customization process. This allowed us to prepare the users to conduct the real-worl tests with the children and perform correctly the user-tuned content adaptation autonomously. A total of 14 tutors were enrolled in this test, with ages ranging from 22 to 55 and with professional experience ranging between 0 and 29 years; 9 of the tutors were special education teachers, while the remaining 5 were speech therapists.

During the test we gathered the time that caregivers took to perform the tasks and the number of errors performed. After they took the test, we asked them to fill the System Usability Scale (SUS) form so we could assess the effectiveness, efficiency and satisfaction regarding this system. Figure 2 presents the main results; we believe the median time of 7.35 minutes to be more representative of the population, since three users were older and less proficient using the computer, requiring twice the median time to finish the test. In the end of the test, we asked users to evaluate the system using the SUS scale. The final score was 74, which according to [6] is ranked as a B- and a positive results given that a score above 68 was obtained.

3. Conclusions

Results have shown our approach to be adequate for regular use, as shown by the average completion time and low number of errors; an experienced user takes 3 to 4 minutes in the customization task. Figure 2 highlights that even with the FMS method some users don't feel confortable using the computer as shown by the 3 cases with higher completion times. When inquired about their computer proficiency, most caregivers said that they were accustomed to using the computer, but they did a very limited usage of it in their routines. Results let us conclude that the FMS is a natural process, completely familiar to most caregivers.

During the test, we observed the caregivers difficulties, and most of them were related with the concept of user profiles. All participants knew how to navigate in the folders, handle the files. Still, all of them struggled when dealing with the profiles. Most seemed to easily forget the differences in the purpose of each profile folder, and how to operate them. The results in the SUS lead us to believe that the biggest problem is bound with the training and motivation towards the use of the platform, which requires some apprenticeship.

This was especially noticeable in the older users. While observing and talking with them, we realized that they had their routines with the children settled for some time, and despite agreeing with the lack of appropriate tools, when confronted with one, did not seem interested enough. Most of the users reported that the system is not complex, but they need some training to use the tool. In
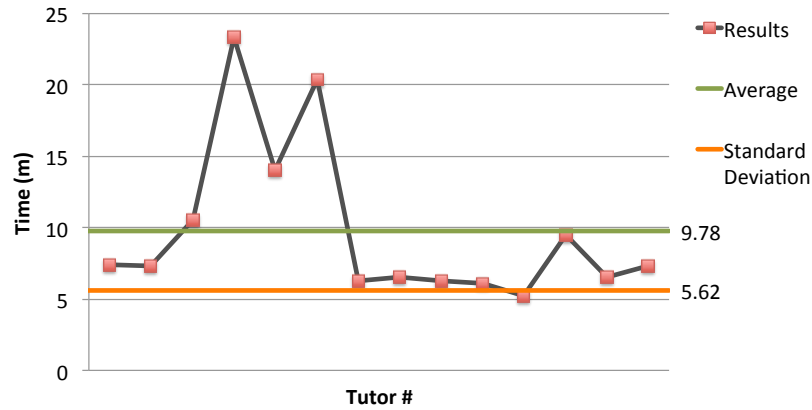
(a) Time results of the task, with Mean, Median and Standard Deviation
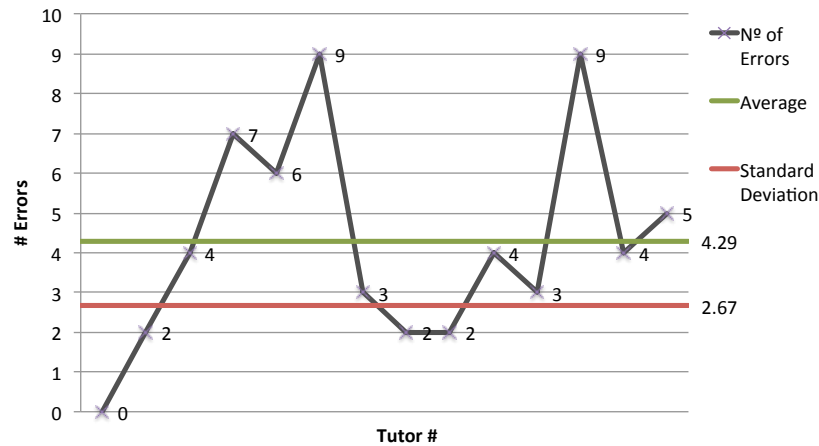
(b) Error results of the task, with Mean and Standard Deviation

Figure 2. Results of the tests

the overall the results are positive, showing that most users find the system is well-integrated and simple to use and would consider using it frequently, which is a good indicator of their satisfaction towards this approach. Future work will focus on simplifying the folders structure for profile management in a way that better promotes the ability remember the process and organization.

Acknowledgements

References

[1] M. L. da Silva, D. Gonçalves, T. Guerreiro, and H. Silva, "A Web-based Application to Address Individual Interests of Children with Autism Spectrum Disorders," *Procedia Computer Science*, vol. 14, pp. 20–27, Jan. 2012.

[2] B. A. Boyd, M. A. Conroy, G. R. Mancil, T. Nakao, and P. J. Alter, "Effects of Circumscribed Interests on the Social Behaviors of Children with Autism Spectrum Disorders," *Journal of Autism and Developmental Disorders*, vol. 37, pp. 1550–1561, Sept. 2007.

[3] A. Ismail, N. Omar, and A. Mohd Zin, "Developing learning software for children with learning disabilities through Block-Based development approach," in *IEEE Int'l Conf. on Electrical Engineering and Informatics (ICEEI)*, vol. 01, pp. 299–303, IEEE, 2009.

[4] R. R. Morris, C. R. Kirschbaum, and R. W. Picard, "Broadening accessibility through special interests: a new approach for software customization," in *Proc. of the 12th ACM SIGACCESS Int'l Conf. on Computers and Accessibility (ASSETS)*, pp. 171–178, 2010.

[5] M. R. Rahman, S. Naha, P. C. Roy, I. Ahmed, S. Samrose, M. M. Rahman, and S. I. Ahmed, "A-class: A classroom software with the support for diversity in aptitudes of autistic children," in *IEEE Symp. on Computers & Informatics (ISCI)*, pp. 727–731, 2011.

[6] J. Sauro, "Measuring Usability With The System Usability Scale (SUS)." Web, Feb. 2011.