

HygieneHelper: Promoting Awareness and Teaching Life Skills to Youth with Autism Spectrum Disorder

Gillian R. Hayes
Bren School of ICS
University of California, Irvine
Irvine, CA 92697-3440
gillianrh@ics.uci.edu

Stephen W. Hosaflook
Tiwahe Technology
Irvine, CA 92617
steve@tiwahetech.com

ABSTRACT

In this paper, we describe a mobile system to support youth with autism spectrum disorder (ASD) learn about and track healthy hygiene behaviors, HygieneHelper. This mobile application was developed as the result of a multi-year action research project with six school districts and two county agencies all focused on using mobile technologies to help teens and young adults develop skills for independent living and employment. HygieneHelper includes multi-media learning modules, an interactive customizable interface for tracking and monitoring progress on hygiene routines, and prompting and feedback from a virtual coach.

Categories and Subject Descriptors

H.5.2. Information Interfaces and Presentation (e.g., HCI), User Interfaces; J.3. Computer Applications, Life and Medical Sciences; K.3 Computers and Education

General Terms

Design, Human Factors.

Keywords

Autism Spectrum Disorder, Life Skills, Hygiene, Ubicomp, Mobile, Assistive Technology, Teens

1. INTRODUCTION

Patrick, a twelve year old with Asperger's Syndrome, has begun to experience a variety of challenges around health and hygiene as he grows up. He is no longer comfortable being bathed by his parents each day, but left on his own, Patrick often goes days without showering or brushing his teeth. He has always been included in regular education classrooms in addition to his center-based courses, but his teachers and classmates have begun to complain about his poor hygiene. Patrick and his parents have been extremely pleased with his overall progress in becoming independent and participating in school activities. However, they are all concerned about Patrick's health and hygiene.

Using HygieneHelper, Patrick works with his parents and teachers to set goals around independently developing healthy

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

IDC '13, Jun 24-27 2013, New York, NY, USA
ACM 978-1-4503-1918-8/13/06

hygiene habits. He also uses the application to learn about hygiene related issues, remind himself what he should be doing as part of healthy daily routines, and track his progress. Because he is using his smartphone, instead of traditional instruction from his parents or teachers, Patrick feels more independent. Additionally, the smartphone is something his peers find "cool," unlike other assistive technologies he has rejected over the years.

As children with autism spectrum disorders (ASD) transition into adulthood, they face substantial challenges [9, 10, 12]. Youth with disabilities report greater feelings of isolation as well as more limited engagement in community activities and social relationships [11, 13]. Proper hygiene habits are essential for the short and long-term health benefits they provide. They are also key independent living skills for full integration within modern society and improvements in social relationships. Being a part of peer groups can help with transition into adult activities and improve quality of life overall. Unfortunately, the majority of youth with disabilities do not expect their quality of life to improve, and 40% of them expect life to get worse [13].

A variety of books have been written for teaching children and teens about healthy hygiene habits [4, 5], particularly for children with autism or other related disabilities [8, 14]. However, these do not provide instruction and prompting when and where students need the help the most—during their hygiene activities. Likewise, they cannot track progress over time. Technological interventions can help students with ASD become more independent and better prepared for adulthood by learning a variety of life skills [1, 2, 7]. Thus, in this work, we were interested in exploring how mobile technologies can provide more interactive and motivating content than simple paper-based tools and face-to-face instruction currently in use. Likewise, we wanted to explore a more mature design aimed at teens and young adults who might struggle with hygiene related issues for which there are currently only applications to support young children (e.g., [3]).

2. Methods

This work was produced as part of a three-year collaborative action research project [6] with six major school districts and two county agencies in the greater geographical area surrounding UC Irvine. This collaborative work is primarily centered on a curricular program focused on a work transition program for students with disabilities [7]. The Technology in the Workplace (TiW) program was designed to use relatively low-cost off-the-shelf technologies, such as iPods, iPads, and Android mobile devices. Additionally, the effort focuses on trying to use as many free or low cost applications already available in the associated device "stores" as possible. Students in the program all have action plans centered on goals for technology skills and use of technology in job preparation and work itself. Additionally, they all participate in monthly workshops focused on teaching them

technology skills related to transition planning and transition activities. Each year, all students and staff in the program participate in a survey about the program. Additionally, the research team takes extensive field notes during monthly workshops and conducts interviews with a subset of participants at the end of each year. In the first two years of the program, 61 students participated in the program and between 27 and 43 staff participated in any given month. Approximately 20% of these participants also joined in research interviews.

The results of these empirical studies are reported in part elsewhere [7], but this work also served as a venue for design inspiration and collaborative design practices. Over the course of the last 18 months, we have also met with staff outside of the workshops to discuss and design a series of applications focused on life skills. As part of this work, hygiene quickly arose as a key area of interest due to the connection between a lack of healthy hygiene habits and challenges to socialization and employment. Additionally, existing tools were simply not meeting the needs of the students enrolled in our workshops, as demonstrated repeatedly over the years of working with them.

3. The HygieneHelper System

Drawing on both the literature on teaching life skills and on our experiences in the TiW workshops and through working with students, staff, and parents to design a system to support healthy hygiene habits, we created the HygieneHelper system. Built on Android mobile devices, HygieneHelper provides audio, video, and text-based tools to support learning and practicing healthy hygiene habits.

3.1 Teaching Healthy Hygiene Skills

Finding hygiene information can be challenging and sometimes embarrassing for students. In our work, we have found that those who become embarrassed when asking hygiene questions of their parents, siblings, peers, or teachers, often turn to online sources to

research question anonymously. However, parents and teachers alike often worry that information is not credible online or at least that youth cannot determine what information is and what is not credible. Additionally, concerns often arise about who can track what is being accessed online—either through shoulder surfing in a school internet lab or at home or by cookies, tracking software, and other electronic means of monitoring data transmission. Finally, questions often arise when students are away from their computers. Although they can access the internet through smartphones, iPods, and other mobile devices, browsing online through these devices for hygiene specific information can be cumbersome to children and teens trying to learn about key concepts when and where they most need the information (e.g., in the bathroom).

HygieneHelper focuses on delivery of educational content on a small, mobile, personal device. The educational modules provide information about a variety of hygiene related topics, such as brushing teeth, flossing, washing hands, getting dressed and wearing weather appropriate clothing, washing regularly, using deodorant, and so on. The HygieneHelper curriculum builds on established literature (e.g. [8, 14]) as well as custom materials developed as part of a series of workshops focused on technologies for transition [7]. The educational modules in HygieneHelper use text, images, and videos (see Figure 1) to provide information about important skills and habits related to healthy hygiene behaviors. Some modules also include a helpful hints or an FAQ section to remind students about important details once the main lesson has been completed. Student access of the individual modules is all logged to allow for analysis later by a researcher, parent, teacher, or even the students themselves.

3.2 Tracking and Monitoring Hygiene Activities

While it may be significant to grasp the importance and the basics

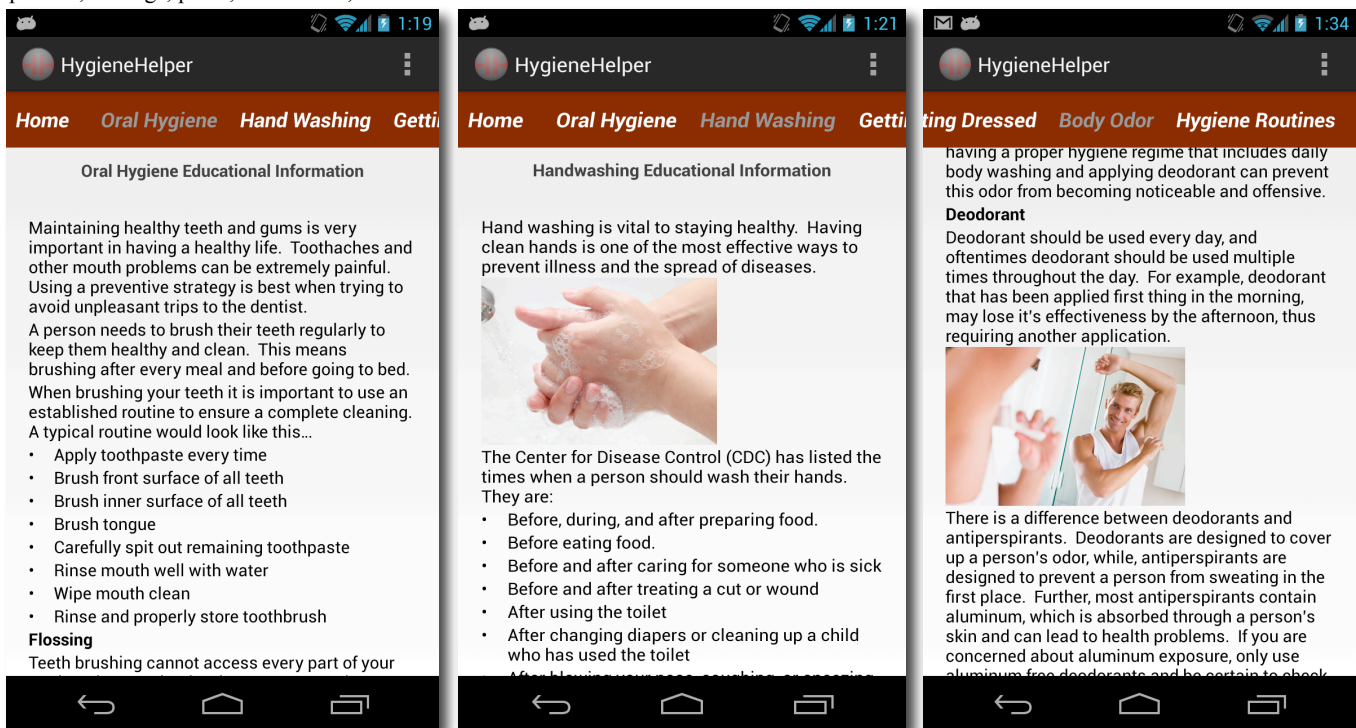


Figure 1: HygieneHelper contains a variety of educational modules covering major topics related to healthy hygiene habits, including both text and multi-media.

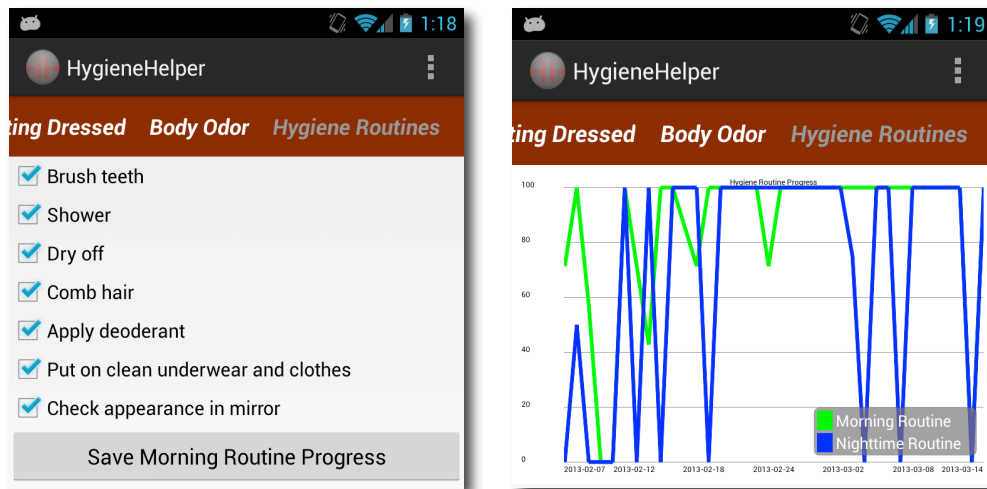


Figure 3: (left) Sample Morning Hygiene Routine (Right) Visualization of progress on morning and nighttime routines over the preceding two-week period.

of hygiene through educational materials, it is equally important to implement a verifiable routine focused around hygiene activities. A documented routine can in and of itself remind individuals who struggle with hygiene issues to complete these activities. It can also be used as the basis for tracking progress on the routine and providing reminders for the completion of key activities.

Of course, before one can begin receiving reminders, a proper hygiene routine must first be established. HygieneHelper

provides two sample routines, one appropriate for morning and one for evening (see Figure 2, left). Customization of these routines allows for tailoring of the activities to the particular needs of the user, as well as providing for the appropriate level of granularity in those activities. For example, some youth with ASD may need routines that include detailed steps for brushing teeth (e.g. take out toothbrush, open toothpaste, etc.) while others can have brush teeth as a step of its own at a higher level.

On the screen for each routine, students can check off the activities as they complete them, serving as both a reminder of what has been done—or needs to be finished—and a means for monitoring progress over time (see Figure 2, left). Likewise, students can view their progress graphically or share this information with a parent, teacher, or anyone else who might be interested (see Figure 2, right).

3.3 Feedback and Support

Supporting adoption and completion of appropriate hygiene routines includes providing prompts to encourage users to accomplish their goals and to learn about hygiene-related topics beyond any initial core instruction they receive. Additionally, feedback about the completion of these routines can encourage users to improve their performance or to celebrate their accomplishments when they have been doing particularly well.

HygieneHelper can be configured to support alerting about specific hygiene tasks at appropriate times (e.g., a reminder each morning to brush teeth and put on clean clothes). Additionally, timers enable support for ensuring that an activity takes an appropriate amount of time (e.g., brushing teeth for at least two minutes or showering for no more than fifteen minutes).

Each day, HygieneHelper delivers an educational message in the way that an in person therapist or coach might share helpful hints each day (see Figure 3). Additionally, once a week, this message is tailored depending on the level of completion for specific hygiene routines for that week. For example, when all activities are completed, the message is entirely praising. When most of the routines have been completed, the message encourages the user to improve their performance, and so on. HygieneHelper can also be configured to deliver an alert to someone else (e.g., a parent or teacher) if no data has been logged or some threshold for activity completion has not been met.

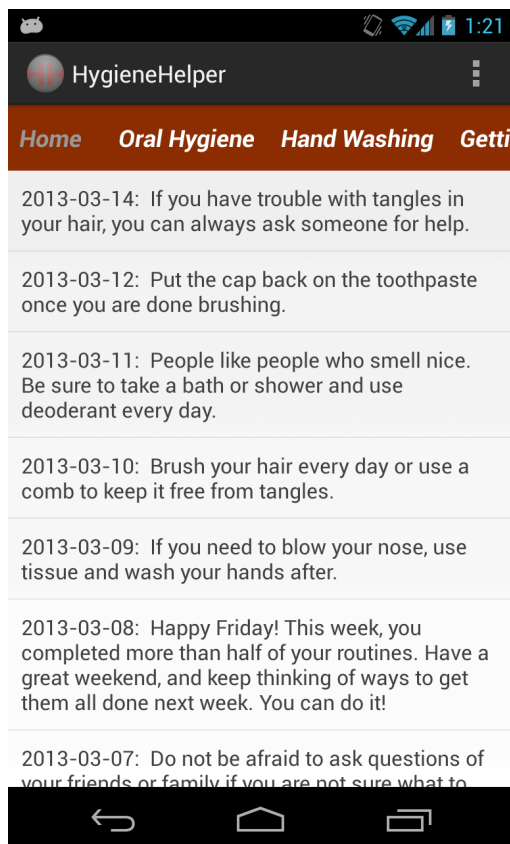


Figure 2: The HygieneHelper homescreen displays a message each day sharing additional educational tips or motivational messages.

4. Conclusion and Future Work

Smartphones and other mobile devices have the potential to support children and teens with a variety of disabilities, without carrying with them the stigma of traditional assistive technologies. In particular, for students planning to transition into independent living, secondary education, and the workplace, support for life skills on mobile devices can be central to supporting education, training, and monitoring of these skills. HygieneHelper is a representative application of a suite of tools we found to be needed by children and teens who are high functioning but have ASD or other barriers to employment and independent living. By using a combination of educational modules and prompting and tracking functionality, we can support a variety of needs in one simple application.

We are still in the process of iteratively designing, developing, and evaluating HygieneHelper. We continue to engage with the community partners in our local schools and clinics to adjust the design of this system as well as to coordinate evaluate in real life settings. Additionally, we recently released HygieneHelper for free in the Google Play store and will collect data from users at a distance who have downloaded and used the app.

Health hygiene habits are an essential part of inclusion into modern society. Children and teens with a variety of disabilities struggle to develop these routines and implement them consistently. HygieneHelper, and other tools like it, can be a central part of an integrated curriculum for supporting students with disabilities and challenges for life skills.

5. ACKNOWLEDGMENTS

Thanks to Linda O'Neal and the rest of the Technology in the Workplace program team for their support and engagement in the design of this application. Erick Custodio, Kathy Nguyen, Rachel Rose Ulgado, Aaron Waterhouse, Rachel Weiner, and Kerri McKanna have been essential in supporting our overall understanding of the need for and design of technologies for youth in transition programs. Khai Truong and Sen Hirano were substantial supports throughout the development and deployment of the HygieneHelper application.

6. REFERENCES

- [1] Bellini, S. and Akullian, J. A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children*, 73, (2007), 261–284.
- [2] Burke, M., Kraut, R., and Williams, D. Social use of computer-mediated communication by adults on the autism spectrum. *In Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work* (Savannah, Georgia, USA, Feb 06 - 10, 2010). ACM, New York, NY, 425-434.
- [3] Chang, Y., Lo, J., Huang, C., Hsu, N., Chu, H., Wang, H., Chi, P., and Hsieh, Y. 2008. Playful toothbrush: ubicomp technology for teaching tooth brushing to kindergarten children. *In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08)*. ACM, New York, NY, USA, 363-372.
- [4] Crissey, P. 2004. *Personal Hygiene? What's that Got to Do with Me?* Jessica Kingsley Publishers Ltd.
- [5] Crump, M. 2002. *No B.O.!: The Head-to-Toe Book of Hygiene for Preteens*. Free Spirit Publishing.
- [6] Hayes, G.R. 2011. The Relationship of Action Research to Human-Computer Interaction. *ACM Transactions on Computer-Human Interaction*. 18(3): 15.
- [7] Hayes, G.R., Yeganyan, M.T., Brubaker, J.R., O'Neal, L., and Hosaflook, S.W. 2013 Using Mobile Technologies to Support Students in Work Transition Programs. *Twenty-First Century Skills for Students with Autism*. Katharina Boser and Matthew Goodwin, Eds. Brooke's Publishing. In Press.
- [8] Mahler, K.J. 2009. *Hygiene and Related Behaviors for Children and Adolescents with Autism Spectrum and Related Disorders: A Fun Curriculum with a Focus on Social Understanding*. Autism Asperger Publishing Company.
- [9] Schall, C. and Wehman, P. Understanding the transition from school to adulthood for students with autism. In P. Wehman, M. D. Smith, & C. Schall (Eds.) *Autism and the transition to adulthood: Success beyond the classroom (pp. 1–14)*. Baltimore, MD: Paul H Brookes, 2008.
- [10] Sitlington, P. L. and Clark, G. M. *Transition education and services for students with disabilities* (4th ed.). Boston: Allyn & Bacon, 2006.
- [11] Stancliffe, R.J., Lakin, C., Doljanace, R., Byun, S.Y., Taub, S., & Chiri, G. Loneliness and Living arrangements. *Intellectual and Developmental Disabilities*, 45, (2007), 380-390.
- [12] Tomas, SB and Dykes, F. Promoting Successful Transitions: What Can We Learn from RTI to Enhance Outcomes for All students? *Preventing school failure*, 55(1), (2011), 1-9.
- [13] Wehman, P., Inge, K.J., Ravelle, W.G., Brooke, V.A. (Eds). *Real work for real pay: Inclusive employment for people with disabilities*. Baltimore: Brookes, 2006
- [14] Wrobel, M. 2003. *Taking Care of Myself: A Hygiene, Puberty, and Personal Curriculum for Young People with Autism*. Future Horizons.