













## ACKNOWLEDGMENTS

The work is supported by the National Science Foundation under Grant numbers 1738259 and 1738252. We would like to especially thank Baker Franke at code.org for his kind and helpful comments throughout this project.

## REFERENCES

- [1] NV Access. [n. d.]. NV Access: Empowering Lives through Non-Visual Access to Technology. Retrieved August 28, 2018 from <https://www.nvaccess.org/>
- [2] AccessCollegeBoard 2018. AP SSD Guidelines. Retrieved October 30, 2018 from <https://apcentral.collegeboard.org/pdf/ap-ssd-guidelines-2017-18.pdf>
- [3] AccessCSforAll. [n. d.]. AccessCSforAll Website. Retrieved August 31, 2018 from <https://www.washington.edu/accesscomputing/accesscsforall>
- [4] Access CS For All. [n. d.]. AssisTech. Retrieved August 31, 2018 from <http://assistech.iitd.ernet.in/smartcane.php>
- [5] Inc. American Printing House for the Blind. [n. d.]. Graphiti refreshable tactile graphics display. Retrieved August 31, 2018 from <https://www.aph.org/graphiti/>
- [6] Apple. [n. d.]. Accessibility. Retrieved August 28, 2018 from <https://www.apple.com/accessibility/mac/vision/>
- [7] Catherine M. Baker. 2017. Increasing Access to Computer Science for Blind Students. *SIGACCESS Access. Comput.* 117 (Feb. 2017), 19–22. <https://doi.org/10.1145/3051519.3051523>
- [8] Bernhard Beck-Winchatz and Mark A. Riccobono. 2008. Advancing participation of blind students in Science, Technology, Engineering, and Math. *Advances in Space Research* 42, 11 (2008), 1855–1858.
- [9] Jeffrey P. Bigham, Maxwell B. Aller, Jeremy T. Brudvik, Jessica O. Leung, Lindsay A. Yazzolino, and Richard E. Ladner. 2008. Inspiring Blind High School Students to Pursue Computer Science with Instant Messaging Chatbots. *SIGCSE Bull.* 40, 1 (March 2008), 449–453. <https://doi.org/10.1145/1352322.1352287>
- [10] The College Board. [n. d.]. AP Computer Science Principles. Retrieved August 28, 2018 from <https://apcentral.collegeboard.org/courses/ap-computer-science-principles>
- [11] The College Board. [n. d.]. Number of Girls and Underrepresented Students Taking AP Computer Courses Spikes Again. Retrieved August 31, 2018 from <https://www.collegeboard.org/membership/all-access/counseling-admissions-financial-aid-academic/number-girls-and-underrepresented>
- [12] Code.org. [n. d.]. Computer Science Principles. Retrieved August 28, 2018 from <https://code.org/educate/csp>
- [13] Code.org. [n. d.]. Lesson 5: Binary Numbers. Retrieved August 28, 2018 from <https://curriculum.code.org/csp-18/unit1/5/>
- [14] LLC Flying Blind. [n. d.]. Flying Blind Empowerment Through Technology. Retrieved August 31, 2018 from <http://www.flying-blind.com/>
- [15] National Center for Education Statistics. [n. d.]. Fast Facts, Students with Disabilities. Retrieved August 28, 2018 from <https://nces.ed.gov/fastfacts/display.asp?id=64>
- [16] American Federation for the Blind. [n. d.]. Instructional Resource Centers for the Blind and Visually Impaired. Retrieved August 31, 2018 from <http://www.afb.org/info/afb-national-education-program/national-instructional-materials-accessibility-standard-nimas/instructional-resource-centers/235>
- [17] Shaun K. Kane and Jeffrey P. Bigham. 2014. Tracking @Stemxcomet: Teaching Programming to Blind Students via 3D Printing, Crisis Management, and Twitter. In *Proceedings of the 45th ACM Technical Symposium on Computer Science Education (SIGCSE '14)*. ACM, New York, NY, USA, 247–252. <https://doi.org/10.1145/2538862.2538975>
- [18] Jane K. Lartec and Felina P. Espique. 2012. Communication Strategies of Teachers Educating Students Who Are Legally Blind in the General Education Setting. *Insight* 5, 2 (2012), 70.
- [19] Stephanie Ludi and Tom Reichlmayr. 2011. The Use of Robotics to Promote Computing to Pre-College Students with Visual Impairments. *Trans. Comput. Educ.* 11, 3, Article 20 (Oct. 2011), 20 pages. <https://doi.org/10.1145/2037276.2037284>
- [20] Lauren R. Milne and Richard E. Ladner. 2018. Blocks4All: Overcoming Accessibility Barriers to Blocks Programming for Children with Visual Impairments. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 69, 10 pages. <https://doi.org/10.1145/3173574.3173643>
- [21] U.S. Department of Education. [n. d.]. Protecting Students With Disabilities, Frequently Asked Questions About Section 504 and the Education of Children with Disabilities. Retrieved August 28, 2018 from <https://www2.ed.gov/about/offices/list/ocr/504faq.html>
- [22] Braille Authority of North America. [n. d.]. Unified English Braille (UEB). Retrieved August 28, 2018 from <http://brailleauthority.org/ueb.html#plans>
- [23] OrCam. [n. d.]. OrCam MyReader 2 Website. Retrieved August 31, 2018 from <https://www.orcam.com/en/myreader2/>
- [24] SAS. [n. d.]. SAS Graphics Accelerator for data analysis. Retrieved August 31, 2018 from <http://support.sas.com/software/products/graphics-accelerator/index.html>
- [25] Freedom Scientific. [n. d.]. Freedom Scientific's JAWS home page. Retrieved August 28, 2018 from <https://www.freedomscientific.com/Products/Blindness/JAWS>
- [26] "Senators Woodhouse; Denis; Ford; Spearman; Cancela; Carlton; Frierson; Atkinson; Cannizzaro; Gansert; Manendo; Parks; Ratti; Segerblom; and Fumo". [n. d.]. Senate Bill No. 200. Retrieved August 28, 2018 from <https://www.leg.state.nv.us/App/NELIS/REL/79th2017/Bill/5073/Text>
- [27] Ai Squared. [n. d.]. Zoom Text. Retrieved August 28, 2018 from <https://www.zoomtext.com/>
- [28] Andreas Stefik, Bonita Sharif, Brad. A. Myers, and Stefan Hanenberg. 2018. Evidence About Programmers for Programming Language Design (Dagstuhl Seminar 18061). *Dagstuhl Reports* 8, 2 (2018), 1–25. <https://doi.org/10.4230/DagRep.8.2.1>
- [29] Andreas Stefik and Susanna Siebert. 2013. An Empirical Investigation into Programming Language Syntax. *Trans. Comput. Educ.* 13, 4, Article 19 (Nov. 2013), 40 pages. <https://doi.org/10.1145/2534973>
- [30] Andreas M. Stefik, Christopher Hundhausen, and Derrick Smith. 2011. On the Design of an Educational Infrastructure for the Blind and Visually Impaired in Computer Science. In *Proceedings of the 42Nd ACM Technical Symposium on Computer Science Education (SIGCSE '11)*. ACM, New York, NY, USA, 571–576. <https://doi.org/10.1145/1953163.1953323>
- [31] Sunu. [n. d.]. The Sunu Band. Retrieved August 31, 2018 from <https://www.sunu.io/index.html>
- [32] Tap. [n. d.]. Tap Wearable Keyboard, Mouse and Controller. Retrieved August 31, 2018 from [www.tapwithus.com](http://www.tapwithus.com)
- [33] Quorum Development Team. [n. d.]. The Quorum Language. Retrieved August 31, 2018 from <https://quorumlanguage.com/>
- [34] Idalis Villanueva and Marialuisa Di Stefano. 2017. Narrative Inquiry on the Teaching of STEM to Blind High School Students. *Education Sciences* 7, 4 (2017), 89.
- [35] W3C. [n. d.]. Accessible Rich Internet Applications (WAI-ARIA) 1.1. Retrieved August 28, 2018 from <https://www.w3.org/TR/wai-aria-1.1/>
- [36] W3C. [n. d.]. Web Content Accessibility Guidelines (WCAG) 2.1. Retrieved August 28, 2018 from <https://www.w3.org/TR/WCAG21/>
- [37] Henry B. Wedler, Lee Boyes, Rebecca L. Davis, Dan Flynn, Annaliese Franz, Christian S. Hamann, Jason G. Harrison, Michael W. Lodewyk, Kristin A. Milinkevich, Jared T. Shaw, Dean J. Tantillo, and Selina C. Wang. 2014. Nobody Can See Atoms: Science Camps Highlighting Approaches for Making Chemistry Accessible to Blind and Visually Impaired Students. *Journal of Chemical Education* 91, 2 (2014), 188–194.
- [38] David Weintrop. 2015. Comparing Text-based, Blocks-based, and Hybrid Blocks/Text Programming Tools. In *Proceedings of the Eleventh Annual International Conference on International Computing Education Research (ICER '15)*. ACM, New York, NY, USA, 283–284. <https://doi.org/10.1145/2787622.2787752>
- [39] David Weintrop and Nathan Holbert. 2017. From Blocks to Text and Back: Programming Patterns in a Dual-Modality Environment. In *Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE '17)*. ACM, New York, NY, USA, 633–638. <https://doi.org/10.1145/3017680.3017707>