



Sacred Heart  
UNIVERSITY

Sacred Heart University  
DigitalCommons@SHU

---

School of Computer Science & Engineering  
Faculty Publications

School of Computer Science and Engineering

---

4-2022

## Discovering Ways to Increase Inclusivity for Dyslexic Students in Computing Education

Felicia Hellems

Sajal Bhatia

Follow this and additional works at: [https://digitalcommons.sacredheart.edu/computersci\\_fac](https://digitalcommons.sacredheart.edu/computersci_fac)



Part of the [Computer Engineering Commons](#), [Computer Sciences Commons](#), and the [Higher Education Commons](#)

---

# Discovering Ways to Increase Inclusivity for Dyslexic Students in Computing Education\*

## Poster Session

*Felicia Hellems and Sajal Bhatia*  
*School of Computer Science and Engineering*  
*Jack Welch College of Business and Technology*  
*Sacred Heart University*  
*Fairfield, CT 06825*

*hellemsf@mail.sacredheart.edu, bhatias@sacredheart.edu*

The years accompanying entrance into the university system are often characterized by a period of great transformation. These years can also be wrought with difficulties for many students, difficulties which are often compounded in students with disabilities (SWD). Reports from the U.S. Department of Education show that as recently as 2015-16, 19% of undergraduate students experienced some form of disability<sup>1</sup>. Additionally, statistics show that SWD tend to have lower post secondary completion rates than their counterparts [3]. A review of pertinent literature has shown that there still exist gaps within the field of computing education (CE) for teaching cybersecurity concepts to SWD. This poster is a continuation of the author's research into both the identification and analysis of the current educational methods in use within the field of CE for teaching concepts of cybersecurity to SWD. This poster aims at narrowing the scope of that research by performing a specific analysis of CE through the lens of the post secondary dyslexic SWD demographic.

This work began with a broad review consisting of an analysis of each chosen disability, followed by a focused literature review in the field of CE with emphasis placed on identifying current educational methods in use for teaching cybersecurity concepts to SWD. The criteria for the disabilities chosen for review was predicated upon the greatest impact on a students ability to both learn and perform tasks fundamental to cybersecurity. The following

---

\*Copyright is held by the author/owner.

<sup>1</sup><https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2021009>

four disabilities were selected based on this criteria: Visually Impaired and Blind (VIB), Intellectual disabilities (ID), Autism, and Dyslexia. The initial review of literature identified two main patterns. The first identified pattern was related to how the materials were *integrated* into the curriculum, with methods falling largely into a short term or a long term model. Short term models were characterized by the delivery of methods in the form of camps or workshops that were short in temporal duration. Long term models delivered materials through amendments to current curriculum, creations of guidelines aimed at inclusivity, or adaptations to traditional teaching methods. The second identified pattern was related to how the materials were *implemented* into the curriculum, with prior work largely delivering these methods through the use of programming/coding or the use of tools. Emphasis in the discovered work related to teaching SWD concepts of cybersecurity has thus far largely been placed on VIB individuals with materials being delivered through short term integration models [2].

The review of literature revealed minimal work done within the field of CE in relation to methods for teaching dyslexic SWD concepts of cybersecurity. While there has been research performed in the fields of computing sciences relating to authentication and dyslexia, there has been little found in direct relation to CE for teaching SWD concepts of cybersecurity, indicating an existent gap in research focusing specifically on dyslexic SWD. Dyslexia can cause negative feelings for students surrounding academic self worth which may in turn negatively affect graduation rates [1]. Considering that traits of dyslexia may pose textual comprehension issues and difficulties decoding words, dyslexic SWD may shy away from cybersecurity studies that are largely textual in nature, such as cryptography [4]. These facts coupled with a need to increase inclusivity in CE underlines the necessity for further research regarding educational methods for teaching dyslexic SWD concepts of cybersecurity.

This noted gap in research spurs the authors goal for continued research aimed at increasing inclusivity for this demographic. Next steps include a study involving dyslexic SWD to gather statistical data regarding experiences in learning cybersecurity concepts. Having identified research performed in CE for teaching SWD involving the use of gamification through programming, the creation of a program focusing on a gamified assisted acquisition of cryptographical concepts that takes into account traits of dyslexia is underway. Integration of this gathered data will assist in producing an adequate reflection of the specific needs of dyslexic SWD in learning cybersecurity concepts. The adoption of this program in CE delivered through a long term integration model to ensure continuity of education will aid in not only increasing the presence of dyslexic SWD within the computing science field, but in maintaining higher rates of retention for this demographic in post secondary education.

## References

- [1] Maro Doikou-Avlidou. The educational, social and emotional experiences of students with dyslexia: The perspective of postsecondary education students. *International Journal of Special Education*, 30(1):132–145, 2015.
- [2] Jesse R Hairston, Derrick W Smith, Tania Williams, William T Sabados, and Steven Forney. Teaching cybersecurity to students with visual impairments and blindness. *Journal of Science Education for Students with Disabilities*, 23(1), 2020.
- [3] Lynn Newman, Mary Wagner, Anne-Marie Knokey, Camille Marder, Katherine Nagle, Debra Shaver, and Xin Wei. The Post-High School Outcomes of Young Adults with Disabilities up to 8 Years after High School: A Report from the National Longitudinal Transition Study-2 (NLTS2). *National Center for Special Education Research*, 2011.
- [4] Linda S Siegel. Perspectives on Dyslexia. *Paediatrics & Child Health*, 11(9):581–587, 2006.