Energizing Exploring Computer Science

Sam Mazzone, Dr. Dennis Brylow

Marquette University

Introduction

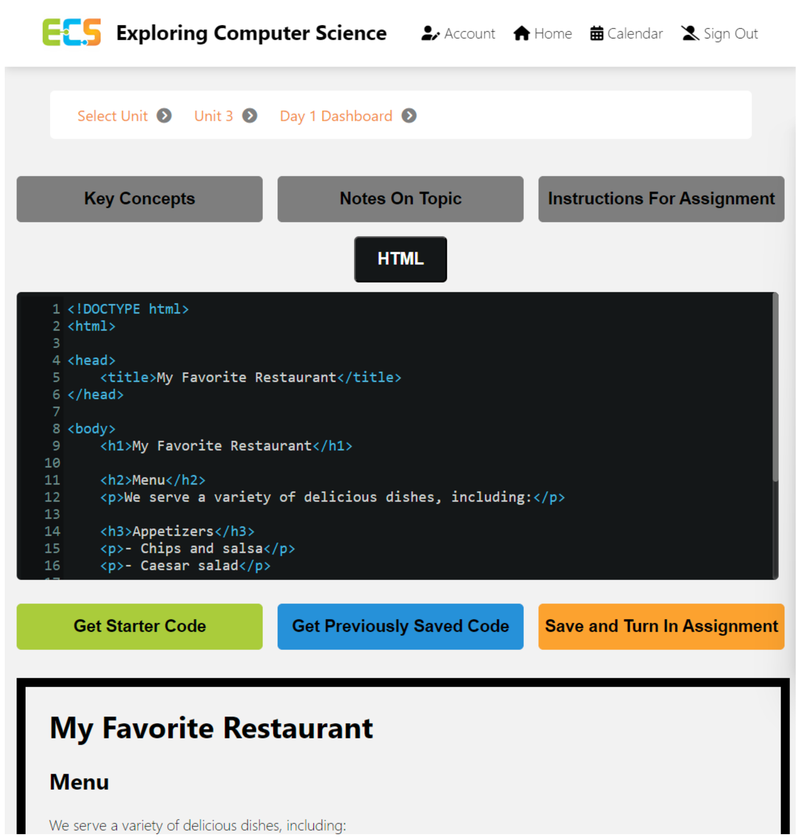
- Exploring Computer Science (ECS):
  - Introductory computer science curriculum for high school students, focusing on accessibility for all.
  - Teacher professional development: Supports curriculum implementation and builds confidence in computing concepts.
- The three pillars of ECS are:
  - CS Concepts (foundational knowledge),
  - Inquiry (collaboration, problem-solving, abstract thinking),
  - Equity (meaningful opportunities despite barriers).

- Pandemic revealed issues with ECS curriculum:
  - No centralized document storage.
  - Unit 3: Web Development faced major file submission issues.
  - Inconsistent teaching methods used, like file zipping and W3Schools.
  - Unit 3 curriculum was unclear, overlapped topics or was too exploratory.
- These issues prompted a search for improvement.

Related Work

- Why ECS?
  - ECS increased computer science interest among students from 17% to 43% (1).
  - 91% of teachers found ECS PD sessions useful, with high value placed on networking within the ECS community (2).
  - ECS introductory students were twice as likely to pursue further coursework compared to traditional class students (3).
- Why utilize HTML and CSS?
  - HTML and CSS teaching is endorsed due to job prospects, web design skills, and creative freedom (4).

Study Method



Study Method (cont.)

- Unit 3's Curriculum has been adapted for the ECS Website.
  - The ECS website enables HTML and CSS coding, uses Firebase for logins.
  - Students access daily notes about web design and a specific webpage to build.
  - Teachers have a separate account for feedback on student-built websites.
- The ECS website rollout is planned for this Fall to about 10 teachers.

Results (to be collected)

- Data will be collected from student-created websites.
  - Website uniqueness and cultural inclusivity will be analyzed.
  - Student engagement will be gauged via assignment submissions.
- Teacher feedback will be gathered.

Future Work

- Data will be used to refine the ECS website's teaching of computer science concepts, inquiry, and equity.

References

1. Goode, Joanna, et al. “Beyond Curriculum.” ACM Inroads, vol. 3, no. 2, 2012, pp. 47–53, https://doi.org/10.1145/2189835.2189851.
2. Goode, Joanna, Jane Margolis, et al. “Curriculum Is Not Enough.” Proceedings of the 45th ACM Technical Symposium on Computer Science Education, 2014, https://doi.org/10.1145/2538862.2538948.
3. Park, Thomas H., et al. “Towards a Taxonomy of Errors in HTML and CSS.” Proceedings of the Ninth Annual International ACM Conference on International Computing Education Research, 2013, https://doi.org/10.1145/2493394.2493405.
4. McGee, Steven et al. “Does Exploring Computer Science Increase Computer Science Enrollment.” (2018).

Acknowledgments

- This material is based upon work supported by the National Science Foundation under Grant #1950826 and by National Science Foundation RPP grant #CNS-1923597, "Preparing Urban Milwaukee for Pathways in Computer Science," at Marquette University.