WEB-BASED INTERACTIVE SONG ACTIVITIES FOR INTRO STATISTICS

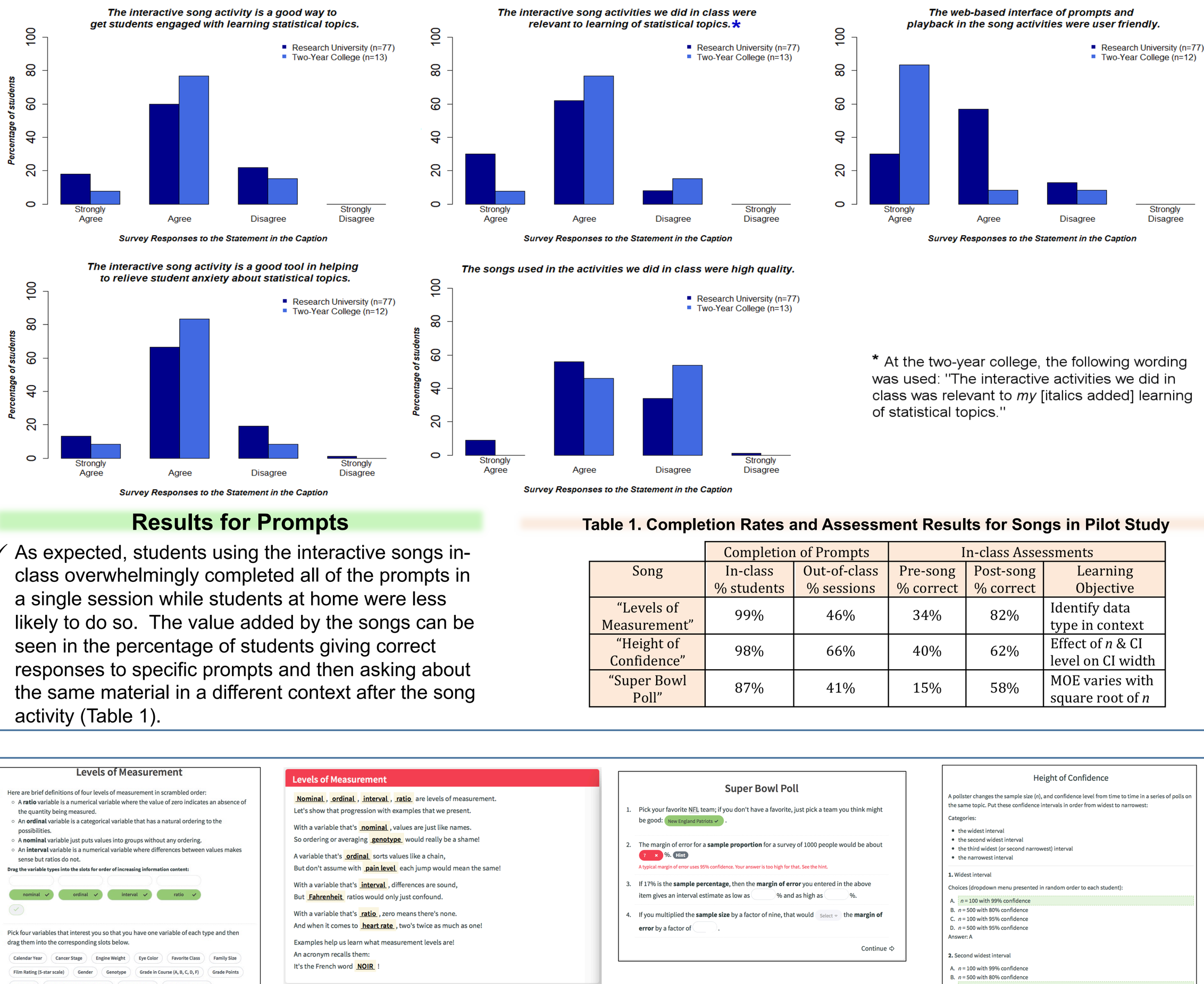
Dennis K Pearl, John J Weber, and Lawrence M Lesser
Penn State University, Georgia State University Perimeter College, and University of Texas at El Paso

CIVEEST
III Congreso Internacional Virtual de Educación Estadística

Using song in higher education spans many scientific disciplines (e.g. www.CAUSEweb.org/voices) and has many putative benefits, including reduced stress or anxiety, improved recall, and increased motivation or engagement (Crowther et al., 2016; Crowther, 2016; Lesser, 2014). Based on prior findings (Lesser et al., 2016), we have developed a new web-based resource for teaching with song where students interact with online prompts to make conceptual connections and provide examples that become part of a song highlighting their contributions (www.CAUSEweb.org/smiles). Twenty-seven songs covering many introductory statistics topics were developed along with the associated prompts and assessment items to test their efficacy for learning.

Ninety students from two institutions (one research university and one two-year college) were asked to respond to Likert scale items on agreement with key project goals. Students self-reported the tool was helpful in reducing anxiety, increasing engagement with the material, being relevant to their learning, and having a user-friendly interface.

Figure 1. Student Responses to Likert Items in Student Feedback Study



* At the two-year college, the following wording was used: "The interactive activities we did in class was relevant to *my* [italics added] learning of statistical topics."

Results for Prompts

✓ As expected, students using the interactive songs in-class overwhelmingly completed all of the prompts in a single session while students at home were less likely to do so. The value added by the songs can be seen in the percentage of students giving correct responses to specific prompts and then asking about the same material in a different context after the song activity (Table 1).

Table 1. Completion Rates and Assessment Results for Songs in Pilot Study

Song	Completion of Prompts		In-class Assessments		
	In-class % students	Out-of-class % sessions	Pre-song % correct	Post-song % correct	Learning Objective
"Levels of Measurement"	99%	46%	34%	82%	Identify data type in context
"Height of Confidence"	98%	66%	40%	62%	Effect of *n* & CI level on CI width
"Super Bowl Poll"	87%	41%	15%	58%	MOE varies with square root of *n*

The screenshots above and to the left show a song's pre-song prompts interface and the playback interface (with student inserts highlighted).

The screenshot above shows another song's prompts interface, which has an example of machine-generated feedback and a hint button. The screenshot to the right shows a song's matching assessment item.

Acknowledgements. This work is supported by the U.S. National Science Foundation grants #1544426, #154437, and #1544243. We are also grateful for the many contributions from other members of our team (see: www.CAUSEweb.org/smiles/team)

REFERENCES

Crowther, G.J. (2016). Educating with music: Relevant reading. http://singaboutscience.org/wp/educating/research

Crowther, G., McFadden, T., Fleming, J. & David, K. (2016). Leveraging the power of music to improve science education. *International Journal of Science Education*, 38(1), 73-95.

Lesser, L. (2014). Mathematical lyrics: Noteworthy endeavours in science education. *Journal of Mathematics and the Arts*, 8(1-2), 46-53.

Lesser, L.M., Pearl, D.K., & Weber, J.J. (2016). Assessing fun items' effectiveness in increasing learning of college introductory statistics students: Results of a randomized experiment. *Journal of Statistics Education*, 24(2), 54-62.