IASE Free October Webinar

Designing positive first experiences with coding for introductory level statistics and data science students

22 October 2024; 20:00 UTC (click here for localized date/time)

Webinar duration: 90 minutes

Presenter: **Anna Fergusson**, **University of Auckland | Waipapa Taumata Rau, New Zealand**

Teaching recommendations for implementing statistics and data science at the introductory level often promote coding (computer programming) as a tool for learning from data. However, there is minimal research concerned with how to design tasks that balance the demands of learning new code-driven tools at the same time as learning new statistical concepts. Using a design-based research approach, I developed four structured tasks for teaching statistical modelling at the same time as introducing the programming language R, which were implemented with high school statistics teachers. A main consideration in designing these tasks was to ensure that learners' first experiences with coding were positive and inclusive. A task design framework for introducing code-driven tools was produced by using retrospective analysis on the four tasks to identify, evaluate, and refine key design principles and processes.

Concurrently with my research, I designed and implemented a new introductory level statistics course (STATS100) that introduced the programming language R alongside GUI-driven tools. The task design framework developed from my research explicates important features of the tasks used in the research, which include: using unplugged and GUI-driven tools before code-driven tools; extending the familiar into the unfamiliar; using the informal before the formal; and carefully targeting, sequencing and connecting specific human-computer interactions for statistical modelling. These features are also present in the tasks developed for STATS100. In this webinar, I will summarise my research approach, present the task design framework, and demonstrate some of the tasks and data technologies used with learners in both research and teaching contexts to further illustrate the task design principles. I will also discuss key conceptual and practical design considerations for creating and hosting web-based tasks that include videos, progressive revealing of task components, code exercises, and quiz questions.

Anna Fergusson is passionate about teaching, data technologies, and developing inclusive, engaging, accessible, effective and fun ways to introduce people to learning statistics and data science. She has over 20 years teaching experience, 12 years at the high school level and nearly 10 years at the university level. Anna has worked with the New Zealand Ministry of Education and the New Zealand Qualifications Authority on the development of national curriculum frameworks, assessment standards, examination papers, project-based tasks, and teaching resources for statistics. At the university level, she has led several statistics and data science curriculum design projects, including the rewrite of the very large introductory-level statistics course (over 4000 students per year).

Anna completed her PhD in 2022, with a thesis focused on task design for introducing computer programming as part of data science at the high school level. She supports and advances her teaching, research and data analysis activities by creating new software tools and educational technologies. Her research specialty is data science and statistics education, with a focus on technology-based and technology-informed pedagogy, including but not limited to: large-scale teaching and assessment practices and tools; introduction of computer programming for data science and associated design principles for tool and task design; tool-mediated development of statistical concepts and reasoning, such as graphical and visual inference; frameworks for observable integrated statistical and computational thinking practices.

Register here

IASE Free November Webinar

A collection of SERJ papers by new researchers - 2024
12 November 2024; 19:00 UTC (click here for localized date/time)
Webinar duration: 90 minutes
Presenters: Sarah Huber, Sayali Phadke, Yannik Fleischer

Sarah Huber - Technical University of Munich
Teaching statistics with positive orientations but little knowledge? Teachers' professional competence in statistics⬈
Research suggests teachers have positive motivational and emotional orientations regarding statistics but little statistical knowledge. How does this fit together? Since

teachers' professional competence in statistics has not been well explored, we asked 88 in-service mathematics teachers about their orientations regarding teaching statistics and tested their statistical content knowledge. First, we investigated how "positive" their orientations were by comparing them to their orientations regarding teaching fractions. Then, we analyzed relationships between teachers' orientations and content knowledge in statistics using mixed-effects logistic regression models. The results showed that teachers' orientations regarding teaching statistics were: (1) poorer than those regarding teaching fractions and (2) related to their statistical knowledge. Teachers with high self-efficacy showed higher knowledge than teachers with low self-efficacy, and anxious female teachers had higher knowledge than less anxious female teachers. We also found that knowledge decreased with increasing age of the teachers. The findings underscore the need to strengthen statistics in teacher education, including both content knowledge and the development of positive orientations.

Sayali Phadke - Pennsylvania State University

[Examining the role of context in statistical literacy assessment⤴](#)

The Guidelines for Assessment and Instruction in Statistics Education (GAISE) College Report advocates for use of real data with context and purpose. This work contributes to the growing literature on assessing statistical literacy by investigating the influence of context as it relates to assessment performance among post-secondary introductory statistics students. We discuss the development of an isomorphic form of an existing assessment instrument, and report results which concluded that test takers demonstrated lower statistical literacy scores when assessment tasks incorporated real data from published studies as context when compared with functionally similar tasks such as those with a contrived data set and a realistic context.

Yannik Fleischer - Paderborn University

[Teaching and learning to construct data-based decision trees using data cards as the first introduction to machine learning in middle school⤴](#)

This study investigates how 11- to 12-year-old students construct data-based decision trees using data cards for classification purposes. We examine the students' heuristics and reasoning during this process. The research is based on an eight-week teaching unit during which students labeled data, built decision trees, and assessed them using test data. They learned to manually construct decision trees to classify food items as recommendable or not. They utilized data cards with a heuristic that is a simplified form of a machine learning algorithm. We report on evidence that this topic is teachable to middle school students, along with insights for refining our

teaching approach and broader implications for teaching machine learning at the school level.

Register here

Previous Webinar

Conversation about statistics education in Asia

10 September 2024; 01:00 UTC
Webinar duration: 90 minutes
Presenters: Boon Wooi Yeo, Yun Joo Yoo, Lisa Grace Bersales, Kazuhiro Aoyama

This was a conversation about statistics education in Asia from four speakers. By clicking on their names you have access to their slides.
[YEO Boon Wooi Joseph](#) from Singapore, [Yun Joo Yoo](#) from South Korea, [Lisa Grace Bersales](#) from the Philippines and [Kazuhiro AOYAMA](#) from Japan.

Webinar Recording

News from IASE Community

National Numeracy Network
2024 Annual Meeting

The National Numeracy Network (USA/Canada) is inviting the statistics education community to attend the upcoming NNN 2024 Annual Meeting in Toronto, Canada. The conference is **Friday, November 8 - Sunday, November 10, 2024**. Folks are welcome to attend remotely, as all presentations will be available live via Zoom. To learn more about the program, see session abstracts, or to register, please visit the

link here: https://nnn-us.org/Annual-Meeting. Registration fees are lower for those participating remotely.

With a focus on tertiary (college-level) education that promotes the development of numeracy, quantitative literacy and quantitative reasoning, the 2024 NNN program includes keynote talks and multiple presentations and sessions that touch on issues of much relevance to statistical literacy and data literacy, broadly viewed.

Join IASE!

There are many benefits to joining IASE!

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