

Supporting Undergraduate Scientific Literacy Skills Using Custom Web Apps

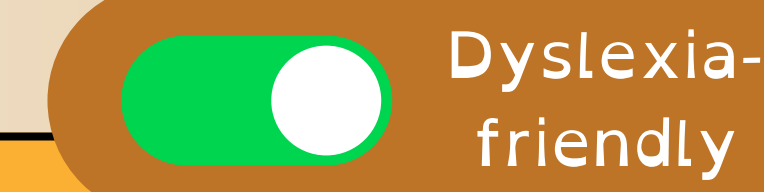
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Background

- Undergraduates in science programmes often struggle to engage with foundational scientific literacy skills:
 - reading primary scientific literature¹ & data analysis/ bioinformatics²
- Barriers to learning these skills → anxiety & disengagement
- Students who read PSL¹:
 - ↑ understanding of the scientific process
 - ↑ comprehension in developing research questions
- Students who learn bioinformatics³:
 - ↑ employment opportunities available to them
 - ↑ preparation for graduate studies in life sciences fields



PARSIBLE

Reading Primary Scientific Literature



- Structured reading support
- Background of Scientific Publishing
- Structure of a Paper & Reading Advice
- Interactive Reading Strategies
- Practice Quizzes
- Practice Papers
- Resources: Statistics, Searching Databases, Citing, Research Management & Processes

jargon & language barrier

fear perceived challenge

educator time limitations

lack of educator training

Aims:

- foster student agency
- create accessible, scaffolded learning resources
- emphasise the intrinsic value of learning SLS (vs using GenAI)



limited coding experience

fear of coding

lack of appropriate devices

language barriers

Addressing Barriers to Data Analysis & Bioinformatics

Research-informed scaffolded approach²

Background Literature Searching & Reading

Hypothesis Development

Taking measurements

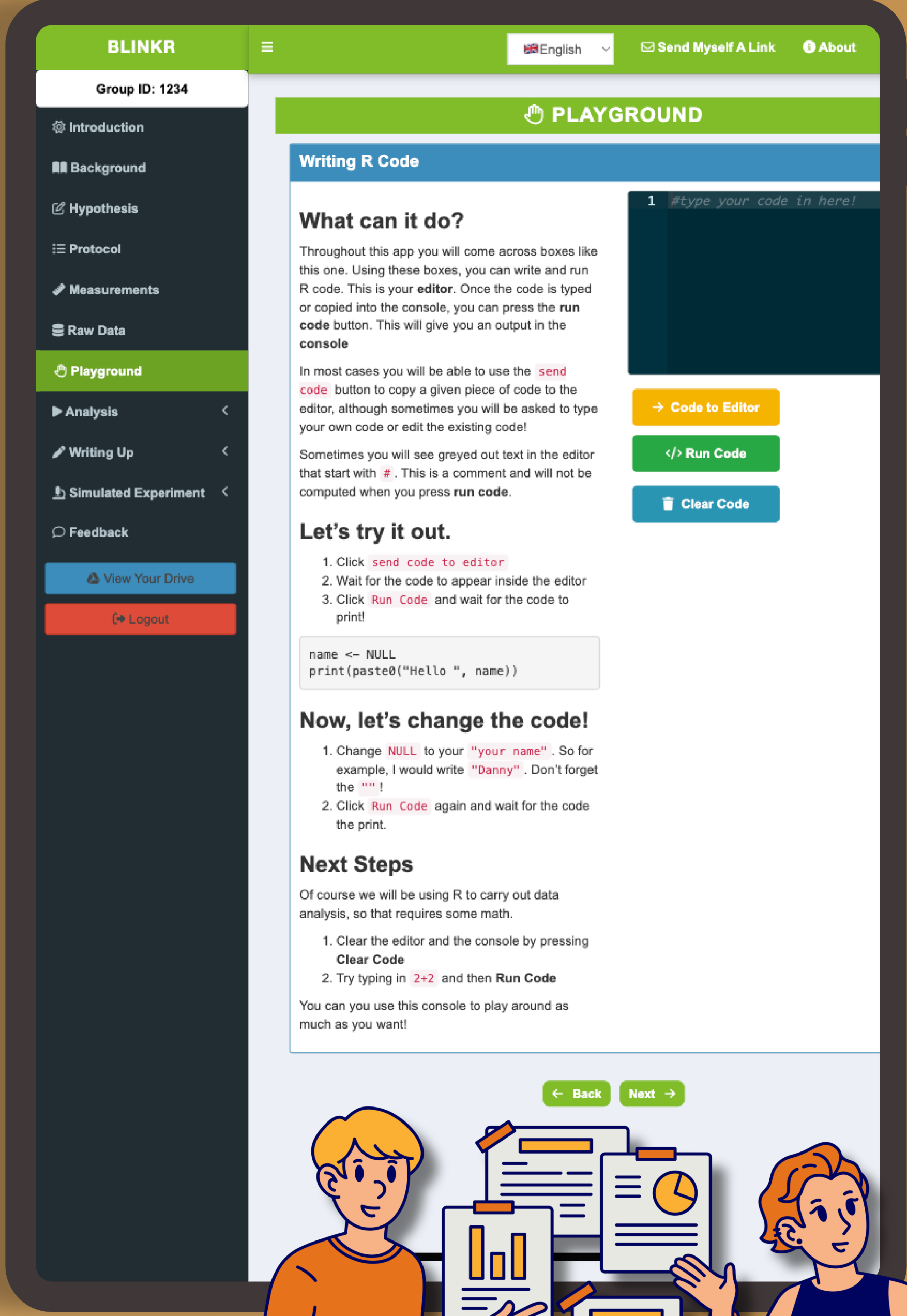
Data & Statistical Analysis in R

Figure generation in R

Write-up advice

BLINKR

Experimental Design, Execution & Analysis



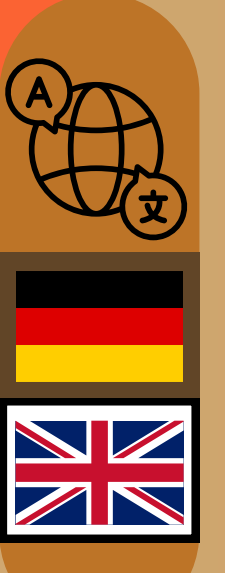
Step-by-step instructions, low-code options, simulated R environment

Interactive feedback, quizzes, and prompts

Accessible entry to R and data analysis

Browser-based, device agnostic

English & German



resource accessible outside of class

step-by-step scaffolding & reading advice

specific reading advice for jargon & language barriers

no additional educator training required

Methods

- > Shiny for R
- > open-source framework with good documentation + support
- > Google drive backend = enhanced accessibility for educators
- > iterative development with undergraduate students

Paperstars
paperstars.org



scan for the interactive version

References:

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- Paci, E., Swainson, A., Cerminara, N.L., 2025. <https://doi.org/10.3389/feduc.2024.1504877>
- Williams, J.J., Drew, J.C., Galindo-Gonzalez, S., Robic, S., Dinsdale, E., Morgan, W.R., Triplett, E.W., Burnette, J.M., Donovan, S.S., Fowles, E.R., Goodman, A.L., Grandgenett, N.F., Goller, C.C., Hauser, C., Jungck, J.R., Newman, J.D., Pearson, W.R., Ryder, E.F., Sierk, M., Smith, T.M., Tosado-Acevedo, R., Tappich, W., Tobin, T.C., Toro-Martinez, A., Welch, L.R., Wilson, M.A., Ebenbach, D., McWilliams, M., Rosenwald, A.G., Pauley, M.A., 2019. <https://doi.org/10.1371/journal.pone.0224288>