Developing *Shiny* web applications to facilitate research-informed learning and teaching

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Aims

- Use the *Shiny* web-based application framework for the popular statistical programming language R to build "***Shiny* apps**", to promote student interaction / engagement with a hot research topic in Statistics
- Use the *Shiny* apps to help incorporate **research-informed learning and teaching** (**RILT**) activities into the undergraduate classroom / outreach sessions
- In undergraduate teaching, support the use of *Shiny* apps with **dedicated research tutorials**
- **Evaluate** the success of our *Shiny* apps, and RILT activities more generally
- **Dissemination** at conferences and through publications in the Statistics Education literature

RILT

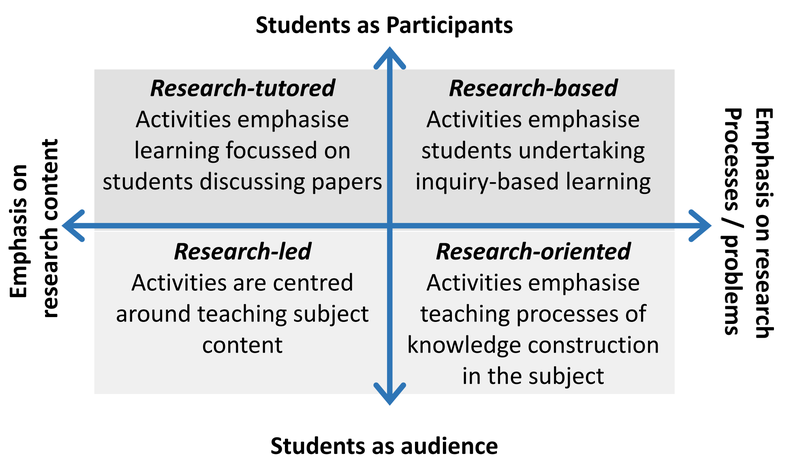

Fig. 1: *Interpretation of research-informed learning and teaching and the research/teaching nexus; after Levy and Petrulis (2007)*

The storm of the century!

- **Main goal**: Estimate the hurricane-induced sea-surge we'd expect to see once every 100 years
- Hurricane Katrina: "**Storm of the Century**"
- Extreme Value Theory (EVT): taught in **module MAS8306** and demonstrated in school **outreach activities**

MAS8306

- **Stage 4** Statistics course
- One lecture per week replaced with research tutorial – **no formal teaching**, students work in groups reading papers/implementing methods with *Shiny* apps
- **Assessed project** – Part A: open-ended data response; Part B: critique of a paper

Outreach

- **Various activities** based on EVT/Katrina
- **Year 6** activity: plotting
- **Year 8** Royal Institute Masterclass series: simple modelling ideas
- **Year 12** outreach: Basics of EVT
- *Shiny* apps allow **quick interaction** with techniques

Our *Shiny* applications

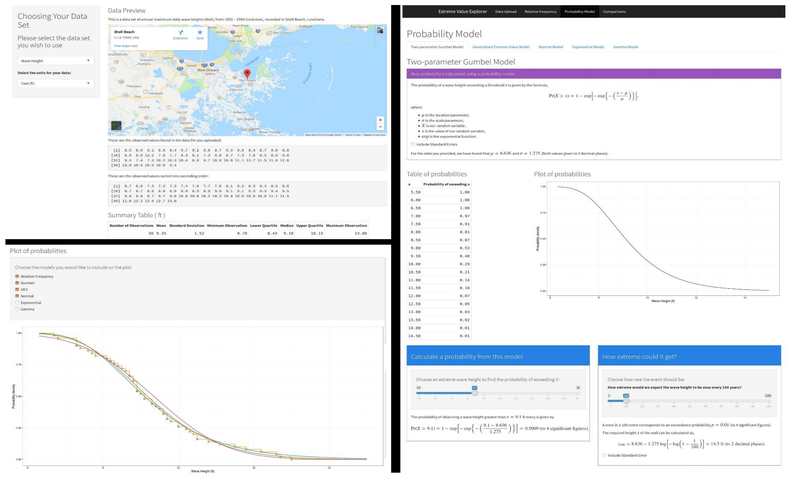

Fig. 2: *Screenshots taken from the "Extreme Value Explorer"* Shiny *app*

Evaluation and dissemination

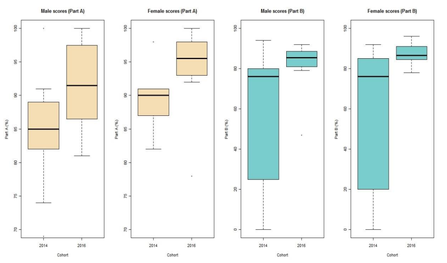

Fig. 3: *MAS8306 project grades in 2016, c.f. 2014 (no* Shiny *apps)*

- MAS8306: **Significant improvement in project grades** *c.f.* students from 2014
- Students showed an appreciation for current literature in **exam responses**

- *"Without* Shiny *I wouldn't have been confident enough to try non-lecture stuff in my project"* **(MAS8306 STUDENT)**
- *"We were able to do cutting edge stuff with the apps which was really cool"* **(YEAR 12 STUDENT)**
- Presented at the **RSS 2017 Conference**
- Published in Fawcett (2018), **Journal of Statistics Education**