

# Effect of Feedback in Support of Scientific Writing Skills for Technical Reports

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# Undergraduate Learning Outcomes Assessment Program

- \* Semester length learning community
- \* Prepare future faculty to assess undergraduate learning, a skill that extends from classroom pedagogy to course and program planning
- \* Activities:
  - Annotated Syllabus
  - Needs Assessment Survey
  - Mid-Course Feedback Survey
  - Rubric Design
  - **Signature Assignment**

# Undergraduate Learning Outcomes Assessment Program

- \* Signature Assignment
  - \* Should address learning outcomes (Rubric)
  - \* Should exemplify student performance in the course
  - \* Assessment should show the efficacy of some kind of pedagogy/ “teaching intervention”
  - \* Technical Report, Modern Physics Lab

# Physics Program-Level Outcome: Communication

- \* *“...students will be able to clearly explain their mathematical and physical reasoning, both orally and in writing.”*
- \* Supported in the upper division curriculum through technical reporting in the Modern Physics Laboratory course, Physics 160.
- \* From Syllabus:

<u>Learning Objectives</u>	<u>Outcomes</u>
I will present a structure for reporting results and help each student improve their ability to communicate scientific results.	You will be able to formally present scientific results as a technical report and oral presentation.

# Dense, Detailed Feedback

- \* Intervention: provide students with specific feedback on writing in technical reports
- \* Efficacy:
  - \* Monitor utilization of feedback (Turnitin.com, Office hour attendance, etc.)
  - \* Compare writing improvement with feedback utilization
  - \* Single-student normalized gain,

$$g = \frac{\% \text{ Gain}}{\% \text{ Gain}_{max}}$$

Hake, R.R. [[PERC2002h-Hake.pdf](#)],  
Physics Education Research Conference  
(PERC2002); Boise, Idaho; August 2002.

# Example of Feedback

## Abstract

Our goal is to prove that when we have an electrical current we will observe a background noise known as Johnson noise. In order to prove that such noise is apparent we used a High Level Electronic machine (HLE), Preamplifier Module, Low Level Electronic machine (LLE), Oscilloscope and a digital voltmeter (DMM). When we then set up the apparatus by making sure that all our components are set to their default settings. We hook up the Preamplifier Module to the HLE to the Oscilloscope to the digital voltmeter. Doing so will allow us to visually see through the Oscilloscope that background noise known as Johnson noise. By increasing the gain or our resistance ( $\Omega$ ) we should see a correlation and a change in "extra noise" and we should also see a dependence of bandwidth.

**Comment [LK1]:** Unclear problem statement. Try choosing the main verb that describes what your data achieves and writing your problem statement around that verb.

**Comment [LK2]:** This information is more appropriate in the methods section. The abstract is usually just the problem statement, any distinctive characteristics of the setup (unusual/critical components) and quantitative results (and conclusions)!!!!

**Comment [LK3]:** Good information for an abstract!!!

**Comment [LK4]:** Historical information is not necessary.

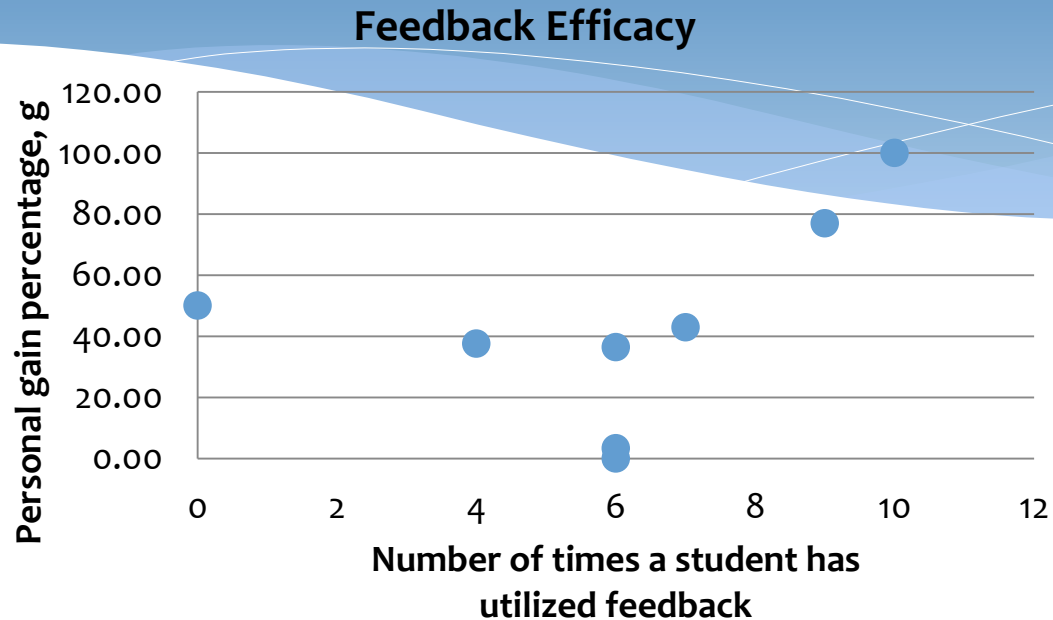
**Comment [LK5]:** Use a resource that is a trusted authority on electrical noise. The error analysis book probably cites a different source for this information!!

**Comment [LK6]:** Why do you expect this? Can you show this with the relevant equations?

## 1 Background

A Swedish-born American physicist John Bertrand Johnson first observed Johnson noise. Johnson noise is caused by the thermal fluctuations and dissipations of stationary charge carriers (applies at any voltage). Voltage "is the electromotive force or potential difference expressed in volts" [1]. Voltage has a correlation with bandwidth, which is the difference between upper and lower frequencies in a continuous set of frequencies ( $\Delta f$ ). Bandwidth should influence our noise voltage since at low frequencies we should get high noise voltage and at high frequencies we would get a weaker noise voltage. When voltage is influenced by bandwidth it's been known to radiate a current sound that is

# Some Correlation, Small Sample Set



- \* Sample size: eight students
- \* Correlation after a threshold of six feedback opportunities are utilized.
- \* All students receive feedback in class

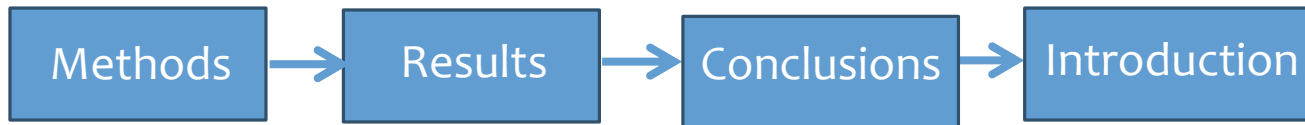
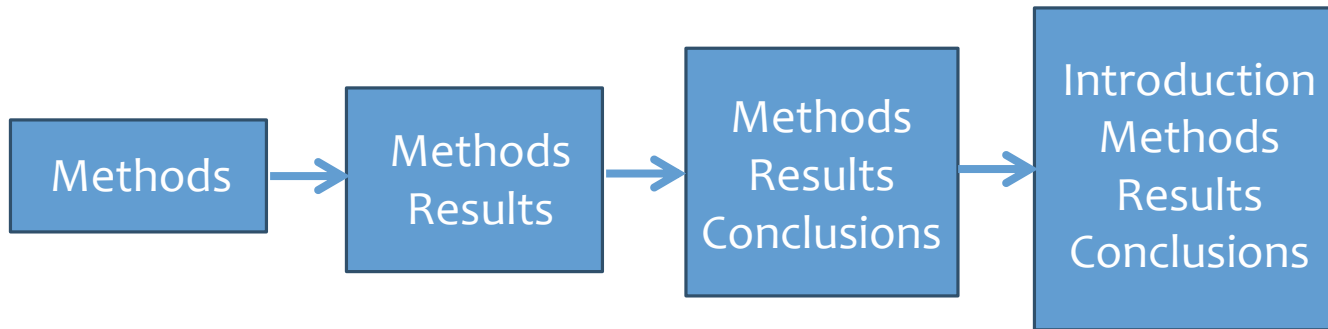
# Discussion

- \* We find that student review of dense feedback is effective in supporting scientific writing skills.
- \* Small class size make this data difficult to generalize.
- \* This feedback method is tedious for larger class sizes.



# Future work

- \* Developing one section of the technical report at a time.



# Acknowledgments

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Thank You!