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Providing Annotated Examples Increases Science Learning

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Providing Annotated Examples Increases Science Learning

UNLV Best Teaching Practices Expo, 2017

Elana A. Paladino, Assistant Professor-in-Residence

College of Sciences, First-Year Seminars

The practice and the need it addresses

Background & Goals

Background:

- Science 101 (SCI 101) is a first year seminar class that incorporates UNLV's 5 University Undergraduate Learning Outcomes (UULOs) (See Resources for link)
- A "high stakes" poster project (worth 33% of total grade) addressing an ethical question in the sciences (of the student's choice) is assigned to improve scientific information literacy and achieve multiple UULOs
- Students consistently score low in the areas of application of scientific results, critical analysis of results, proper citation usage, and poster design (See Figure 1)
- I developed an example poster (Figure 2) to increase the transparency of assignment instructions (Winkelmes, 2014)

Evidence this practice benefits UNLV Students

Methods & Results

Methods:

- Transparent instructions (Purpose/Task/Criteria) given on Webcampus in 2014 without example poster (See Resources for more information)
- Developed and verbally annotated example poster (See Figure 2) in Fall 2015
- Compared Fall 2012 posters (n=50) to Spring 2014 posters (n=24) and Fall 2015 (n=50) using a 5 point scale
- 5 (Mastered) to 1 (Failed)



Figure 2. Example poster that was annotated verbally. Some key features are the use of bulleted text, APA-style in-text citations, scientific results with citations, and a discussion that refers directly to the results and links results to the ethical question.

Results:

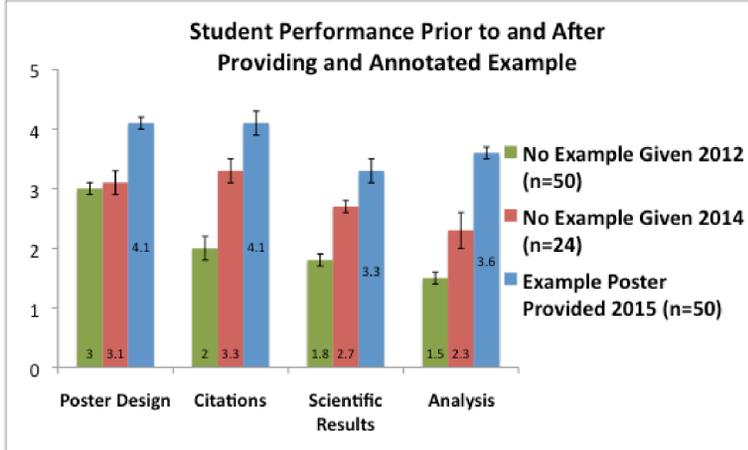


Figure 3. Student scores increased in the areas of citation use and format, scientific results, and analysis in 2014 (with transparent instructions online) and in 2015 (with transparent instructions and annotated example poster). Poster design was improved only after providing the example poster. Bars represent SE.

Resources and where to find them

Results & Resources

Results:

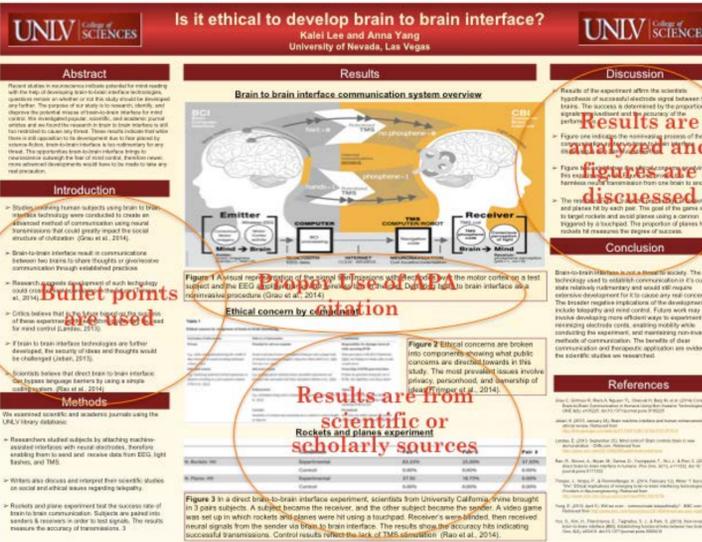


Figure 4. Actual students' poster after the annotated example was given. Poster is a typical representation, with areas of improvement circled.

Resources:



Winkelmes, Bernacki, Butler et al. (2016). [A Teaching Intervention that Increases Underserved College Students' Success.](http://www.unlv.edu/provost/teachingandlearning) Peer Review (Winter/Spring 2016).

Example of an annotated STEM paper: <http://www.unlv.edu/provost/transparency>

UULOs: generated.unlv.edu/uulo.html

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Much appreciation to my colleagues Drs. Alison Sloat and Aubrey Bonde and my mentor Dr. Javier Rodriguez. Special thanks to Dr. Mary-Ann Winkelmes for bringing the Transparency Project to UNLV.

How other UNLV teachers might adopt this practice

Potential Challenges & Applicability

Benefits:

Providing freshman-level students with a verbally annotated example of a high stakes assignment:

1. Expanded the application of scientific, peer-reviewed results
2. Improved thoughtful analysis of results
3. Increased proper usage and formatting of citations
4. Reduced design flaws like the use of large blocks of text (Figure 4)

Potential Challenges:

Plagiarism

- With emphasis on only 1 example, 10% of students copied the design &/ wording too closely in 2015
- Providing students with a printed annotated example in the Fall 2016 resulted in even more students using it as a template (42% or 15 of 35 groups copied parts of the wording)

Limits on Intellectual Breadth/Creativity

- Unknown whether the annotated example would negatively impact critical thinking in higher level course assignments

Other Pedagogical Tools Are Necessary

- The example poster was only one piece of increasing the transparency of the assignment – transparent instructions (See Resources) and verbal feedback on rough drafts also improved scores

Future Directions and Suggestions:

- Do not emphasize a single, printed example
- Use at least 2 annotated examples
- Allow online access to the examples

- It will be useful to evaluate the effectiveness of providing more than one annotated example poster – Will plagiarism decline?

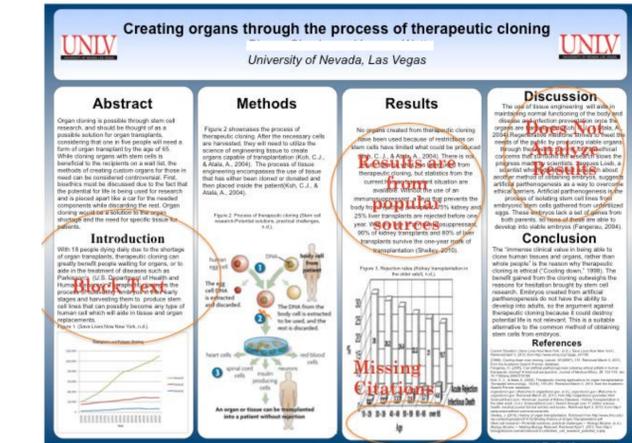


Figure 1. Student poster that illustrates many of the problems students have with the SCI 101 poster project including poster design, citation use or format, scientific results, and critical analysis of results.

Goals:

- Compare freshman-level student performance prior to and after providing the annotated example to assess its effectiveness
- Evaluate the following areas:
 1. Poster Design (UULO 3.5) "Produce effective visuals using different media"
 2. Citations and References (UULO 3.2) "Effectively use the common genres and conventions for writing within a particular discipline or profession"
 3. Scholarly/Peer-Reviewed Results (UULO 1.3) "Apply research methods to solve and evaluate problems"
 4. Analysis of Results (UULO 2.5) "Evaluate and report on conclusions, including discussing the basis for and strength of findings, and identify areas where further inquiry is needed"