How to Create and Deliver Effective Research Poster Presentations
What is a research poster?

- Means of presenting research in a public setting, such as a symposium.
What are the **important elements of an effective research poster presentation?**

- Main points are delivered quickly

- Text is readable from a distance
  - What is the difference between serif and sans-serif fonts?
    - Serif fonts like *Times New Roman*, *Courier New* and *Garamond* have little “feet” for easier reading.
    - Sans-serif fonts like *Arial*, *Calibri* and *Verdana* have no (sans) “feet” and are considered better for titles.

- Language is clear and understandable by non-specialists
  - Avoid jargon (field-specific words)
What are the important elements of an effective research poster presentation?

- Data is in figures and/or tables—not the middle of text
  - Don’t expect people to read the text.

- Design catches your eye
  - Use attractive colors and compelling pictures/figures.
  - Don’t forget the colorblind.

- Can generate and drive a conversation
  - You should include enough information to invite people to ask questions.
General Formatting Tips

- Titles should be straight to the point
  - Think about your audience as you create your title, avoiding jargon as needed.

- Use bullet points wherever possible

- Avoid creating too many sections (abstract, introduction, etc.)
  - Combine elements to keep your headings to a minimum.

- Maintain a consistent style (fonts, etc.) and even columns
Research Poster Layout

- The following is only one of many layouts you may use:

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+----------------+----------------+----------------+----------------+
| Abstract       | Methodology -   | Results         | Analysis and   |
|                | in brief        | e.g. Table 2    | interpretation |
|                |                 |                 | of results     |
|                |                 | More Results    |                |
| Statement of   | Results         | Impact of       | Acknowledgements |
| research       | e.g. Table 1    | findings        | of faculty      |
| question       |                 |                 | guidance,      |
|                |                 |                 | technical       |
|                | Illustration    |                 | assistance,    |
|                | Illustration    |                 | funding, etc.  |
+----------------+----------------+----------------+----------------+
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Research Poster Templates

- Many templates are available online:
  - http://www.posterpresentations.com
Impact of a Science Methods Course on Pre-Service Science Teachers’ Understanding of Nature of Science

Macy Gleason and Dr. Julie Angle
Oklahoma State University

Abstract

It was hypothesized that a pre-service science teachers’ (PST) understanding of nature of science would increase in a Science Methods course incorporated at Oklahoma State University. To identify the changes in understanding of NOS, a VNO5-5 instrument was used in the study. Results indicated that a majority of students demonstrated an increase in understanding of NOS, the measure was reliable. This leads support to expand on the inclusion of NOS in science methods courses.

Introduction

The goal of science education is to produce a scientifically literate populace (AAAS, 1993; NRC, 1996; NRC, 2012). Science literacy is defined by the National Research Council (1996, p.22) as “the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and the ability to recognize and evaluate the influence of science on society.” Knowledge of the nature of science is an essential component of scientific literacy. Understanding the nature of science is critical for developing reflective and critical science teachers (AAAS, 2000; NRC, 1996; NRC, 2012).

Data

Nature of Science was assessed through a pre-post test at the beginning and end of the course. The nature of science instrument was designed specifically for this study. The instrument was designed to assess participants’ understanding of the nature of science content knowledge, the methods or practices of science, and the nature of science.

Results

Data indicates that PSTs increased in their understanding of NOS based on the results of posttest NOS scores. However, while student scores increased, the instrument was modified. Pre-test scores indicated that most students had Akin to Emerging or Illusory a majority of the test (NOS). This VNO5-5 scores indicated that most students increased to a more valid Emerging NOS PST developed Inferential model.

Conclusion

Based on pretest VNO5-5 scores, PST’s understanding of NOS increased overall. Thus supporting the hypotheses, but varied among individual PSTs. According to the results of the Science Methods courses, NOS was significantly addressed. For these results, the PST’s VNO5-5 scores were assessed and the items were address during discussions. The course did not limit the PSTs to reflect on how to develop lessons that address these tenets. It is often assumed that PSTs do not understand or see the importance of NOS in use their teaching. However, results of this research. The study supports research that suggest a valid NOS instruction leads to significantly increase PSTs understanding of NOS.

Implications

It is recommended that teacher education programs provide PST with science methods courses that thoroughly address the importance and role of NOS instruction. It is not enough for PSTs to conduct some research or know some lessons or to engage in inquiry activities without NOS being explicitly addressed. Teacher preparation programs should engage PST in class discussions and personal reflections where NOS is addressed.
Introduction

Mice at Work: Comparative Burrow Architecture in Sympatric Species of Mus

Samantha J. Gridler and Polly Campbell
Department of Zoology, Oklahoma State University

Results

- Behavioral/functional behavior in M. apiculata does not offer easy prediction in the field.
- M. spicilegus burrows are significantly more complex than M. musculus burrows.

Discussion & Future Work

Left panel illustrates both M. musculus and M. spicilegus without normal burrowing behavior in the lab and field. These results highlight the need in predicting behavior at the field level. Further analysis of the relationship between behavior and natural selection will require further study.

Acknowledgments

- Authors thank the Oklahoma State University for the use of the lab facilities and equipment.
- Funding provided by the USDA-NIFA.
ABSTRACT

Traditional methods of swine castration have brought up questions of animal welfare in the stress and pain of the procedure and recovery time. The present research focused on observing the effects of 2% v/v ethyl alcohol as a potential anaesthetic for castration in young pigs. Behavior and health-related measures were taken during and after analgesic treatments were administered from 3 to 30 days of age. Preliminary findings show a potential disruption of testicular development, leading to the possibility of ethyl alcohol improving the pain and stress associated with castration procedure. Further analysis on pig behaviors and wound healing are needed to better understand ethyl alcohol’s effectiveness.

INTRODUCTION

In the American swine industry, piglets are typically castrated around 3 days of age. This procedure removes testicles from male piglets to prevent boar taint in pork products and reduce their aggressive and sexual behaviors. Castration is commonly done without any form of pain relief. Animal welfare researchers today are working to find practical, cost effective, and stress- and pain-reducing methods to address this issue. The present research looks into the effectiveness of ethyl alcohol as an anaesthetic for castration. The null hypothesis tested was that ethyl alcohol would not provide any effective pain-reducing analgesic properties for pigs during castration.

OBJECTIVE

- Observe the effects of ethyl alcohol on pig behaviors and physiology during and after injection and castration.
- Compare the analgesic effects of ethyl alcohol to lidocaine.

METHODS & MATERIALS

- The experiment was conducted at the OSU Swine Research & Teaching Facility from February 25 - March 26, 2014.
- 5 sows farrowed over the course of 2 days (Feb. 25-26, 2014).
- Experimental male pigs were 1 day old at the start of the study.
- 4 males from each of 5 litters were randomly assigned to a treatment. (Table 1)
- Each were marked with 1 of 4 color paints for treatment identification.

<table>
<thead>
<tr>
<th>Table 1: Injection Treatments and Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saline Control group for injections; 1ml saline per testicle</td>
</tr>
<tr>
<td>Sham Control group for handling and restraint; handling with no Injection</td>
</tr>
<tr>
<td>Lidocaine 1ml lidocaine injected per testicle</td>
</tr>
<tr>
<td>Ethyl Alcohol 1ml 2% v/v ethyl alcohol injected per testicle</td>
</tr>
</tbody>
</table>

- Behavioral observers were blinded to the treatments.
- Initial body weights (BW) were recorded at 3 days of age.

PHASE 1

- At 14 days of age, pigs received their treatments from a Veterinarian.
- Vocalizations, Resistance movements, Struggle and handling Durations (VRSO) were recorded during injections.
- Vocalization (microphone and decibel meter).
- Resistance Movements (video recording and Visual Analogue Scale, VAS).
- Struggle and handling Duration (video recording and stopwatch).
- Pig BW were measured daily for 14 days.

PHASE 2

- At 14 days of age, pigs were castrated by the OSU swine herd manager.
- VASO was recorded during castration.
- Testicles were microscopically inspected for future analysis.
- From 14 to 30 days of age:
  - Testicle wounds were photographed twice daily to track healing.
  - Continuous video recordings of each pen were collected to monitor pig behaviors.
  - Pig BW were measured daily.

PRELIMINARY FINDINGS

Pigs in one treatment had skin necrosis and testicular morphology that was significantly different from other treatments. The scrotum of these pigs were initially swollen and raw, but the skin quickly died and sloughed off at the injection site. It appeared that pig behaviors were not altered by these unexpected effects (signs of pain or discomfort were not present), but further analysis is needed to determine this response. In two pigs of this treatment, the testes never developed after injection.

WHAT’S NEXT?

Data analysis needs to be completed to determine if ethyl alcohol had any positive or negative effects compared to other common analgesics, such as lidocaine. Comparing vocalization measures, resistance movements, abnormal postures and pain-related behaviors and posture will provide information on the pain experienced from each treatment, as well as during and after castration. In addition, testicular morphology analysis will be needed to understand the effects that treatments had on testicular development.

ACKNOWLEDGMENTS

I would like to thank Dr. Michelle S. Calvo-Lorenzo, Mr. Justin Lyles, the Oklahoma State Animal Science Department and the OSU Freshman Research Scholars Program for this opportunity to experience research first hand.
Engineering Exposure
Public Schools vs. Technical Schools
Ashton Walton, Dr. Karen High
College of Engineering, Architecture, and Technology

ABSTRACT
Using engineering education literature, teacher interviews, survey teachers, and student surveys, I have studied what types of high schools mention, teach, or apply engineering more often in their classrooms. Students attending schools that do not expose them to engineering may never know the exciting opportunities available to them as an engineer. The goal of this project is to give the field of engineering education more insight into whether students are being encouraged to be engineers depending on which high school they attend.

OBJECTIVES
The definition of engineering exposure in this project is how often students hear about, learn about, or use engineering in their classroom.
I. Ask teachers if/how they are exposing their students to engineering.
II. Ask students what they are taking away from the classroom about engineering.
III. Determine whether students at technical schools or public high schools are more exposed to engineering.
IV. Use results to make a change in the schools that are not exposing their students to engineering.

METHODS
After interviewing teachers from different schools around Northeast Oklahoma, I chose three technical schools and three class A public schools. Large schools were chosen because their resources are similar to those of technical schools. The technical schools selected were Meridian Technology Center, Green Country Technology Center, and Francis-Tuttle Technology Center. The public schools selected were Stillwater High School, Tulsa Union High School, and Edmond North High School.

Teacher surveys were created to collect information from every Science, Technology, Engineering, or Mathematics teacher at each school. Questions cover demographics, teacher’s degrees, and if the teacher has any knowledge about engineering. The survey asks how often the teacher mentions, teaches, and applies engineering in their classroom.

RESULTS
Once the surveys are administered, data will be analyzed to determine which school’s teachers are giving their students the most exposure to engineering. Scores will be awarded to each school for the number of times its teachers: mentioned (1 point), taught (2 points), or applied (3 points) engineering in their classroom during the previous school year. The same methodology would be followed with students on how often they say they heard about (1 point), learned about (2 points), or used (3 points) engineering in their classrooms during the previous school year. My hypothesis is that technical schools will have higher scores than public schools. Survey dispersal and data collection will be completed over the Summer of 2014.

IMPACT OF FINDINGS
This project will help the field of engineering education by giving insight on where to allocate efforts in exposing more high school students to engineering.
Eventually, we may be able to use our results to make positive changes in the schools that are not giving their students as much engineering exposure. This could lead to more interest in engineering from high school students in Northeast Oklahoma.

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What's a cycle? What's a Vertex Cover? And Who Cares?

A cycle is a collection of vertices connected together by edges in the shape of a ring. A cycle is a cycle with vertices. Think of people standing in a circle holding hands with the person on either side of them to form a disbanding. Each person is a vertex and the arms are the edges. A vertex cover is a collection of vertices of the cycle such that for each edge of the cycle, at least one of its endpoints is in the cover. In minimal covers, removing one vertex from the cover yields a set that no longer "covers" the cycle. Examining the propery of vertex covers reveals a list about "perfect graphs" which in turn reveals models applicable to everyday life.

Understanding Algebraic Structures Related to Graphs

Research Question

What is the structure of the minimal free resolution of cover ideals?

Why a monomial ideal is an algebraic object built from a collection of monomials, in a cover ideal, these monomials represent minimal covers of the graph. Syzygies of the ideal are relations between the generators of the ideal and illustrate how the covers are related to each other. Higher syzygies give relations on relations. We can compute these relations geometrically using simplicial complexes.

First Proof

Using a computer program called Macaulay2, we generated algebraic structures associated to cycles of covers. The most important information is the set of Betti numbers which revealed not about the cycle relative in the ring, the corresponding row of matrix numbers, but on the step, k, of the cycle. This particular row gives the number of minimal syzygies of the highest degree corresponding to each step in the free resolution. We first proved that the number of minimal free syzygies will always be δ for a cycle of γ.

Second Proof

We then prove that there exist γ minimal syzygies of degree δ by utilizing the same technique from the previous proof. This proof is a basic steps. First we proved that there exist at least γ minimal free syzygies, then we proved that there are only δ. A theorem of Bayer-Chardin-Leuschke may be used to the Betti numbers by counting the components of a complex.
Scholar Development Undergraduate Research Symposium Guidelines

MAXIMUM DIMENSIONS

WIDTH: 48 inches (4 feet)

HEIGHT: 36 inches (3 feet)
Presenting Your Poster

- Let people browse your poster and start the conversation.
- Most people will ask for a general summary of your project.
  - Answer with a 3-5 minute statement—often similar to your abstract—that explains:
    - Why you asked your research question
    - What methodology you used (Be general and concise.)
    - What results you found and what you think they mean
- Be ready to answer questions.
  - Remember the sentence: “That is beyond the scope of this study.”
- Be gracious and accept criticism as intellectual stimulation.
Printing Research Posters

- **Current Freshman Research Scholars and Wentz Research Grant recipients** may print their symposium poster in the Office of Scholar Development (334 Student Union):

- **Pricing**
  - Matte
    - Black/White or Grayscale: $5
    - Spot or Full Color: $7
  - Glossy
    - Black/White or Grayscale: $7
    - Spot or Full Color: $10

- **Formatting**
  - One side must be no more than 36 inches (3 feet).

- Scholar Development will print posters in the order they’re received
  - Until 5 p.m. on Monday, April 20
Dress Guidelines

Business Attire

Women
- Solid color, conservative suit with coordinated blouse, moderate shoes, tan or light pantyhose, limited jewelry
- Neat, professional hairstyle, manicured nails, light make-up, little or no perfume

Men
- Solid color, conservative suit, long sleeve shirt, conservative tie, dark socks, professional shoes
- Neat hairstyle, trimmed nails, little or no cologne

Business Casual Attire

Women
- Neat khaki, corduroy, twill or cotton pants or skirts
- Sweaters, twinsets, cardigans, polo/knit shirts
- Solid colors work better than bright patterns

Men
- Neat khaki, gabardine or cotton pants
- Cotton long-sleeved button-down shirts, pressed, polo shirts or knit shirts with a collar; tie optional
- Leather shoes and belt
Symposium Schedule | Friday, April 24, 2015
Edmon Low Library Browsing Room

1:00 to 1:30 p.m. **Poster Setup** | Presentation boards will be available to display posters, but presenters should bring their own tacks.

1:30 to 3:00 p.m. **Poster Evaluation** | Presenters should be standing by their posters ready to answer questions from the judges by 1:30 p.m.

3:00 to 5:00 p.m. **Program** |

3:00 – 3:30 p.m. Welcome

3:30 – 4:30 p.m. Poster Browsing Session

**Note:** Presenters will be assigned to one of two groups; one group will need to stand with their posters to answer questions from 3:30 to 4:00 p.m. while the other group will be allowed to browse. From 4:00 to 4:30 p.m. the groups will swap roles to allow everyone at chance to browse.

4:30 – 5:00 p.m. Presentation of Awards
Scholar Development
UNDERGRADUATE RESEARCH SYMPOSIUM
FEATURING THE FRESHMAN AND WENTZ RESEARCH SCHOLARS

SAVE THE DATE
EDMON LOW LIBRARY BROWSING ROOM · 2-5 PM · APRIL 24, 2015