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# Experiences Comparison Between Female and Male Students in Laboratories

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# Introduction

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**State of the  
Art**

- **Marshman et al. (2018)**  
Physics self-efficacy in  
introductory courses – female  
vs male students

- **Sokoloff et al. (2007)**  
Traditional physics labs-  
unengaging and tedious

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**State of the  
Art**

- **Kalman et al. (2020)**  
Laboratorials - labs and  
tutorials vs conceptual  
understanding and  
engagement.

- **Huang & Kalman (2012)**  
Reflective writing aids in  
deeper understanding

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**Goal and  
Objectives**

**Goal**

Explore differences in experiences between male and female students during laboratorials in CU and MRU.

**Objectives**

Compare learning experiences of male and female students in laboratorials & Identify factors contributing to effective and engaging lab learning.

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**Definitions:  
Laborials  
Overview**

**Laborials**

**Particularities**



3 female & 2 male students

Reference: <https://freerangestock.com/photos/147854/group-of-students-doing-science.html>



3 male & 2 female students

Reference: [https://www.freepik.com/premium-ai-image/group-students-working-together-science-project-using-lab-equipment-sharing-ideas\\_318563444.htm](https://www.freepik.com/premium-ai-image/group-students-working-together-science-project-using-lab-equipment-sharing-ideas_318563444.htm)

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**Definitions  
& Theoretical  
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**Labatorials**

**Benefits**

**Theoretical  
Framework**

**Social  
Interactionist  
Theory**

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# Methodology

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**Mixed  
Methods Design**

**Participants**

**PHYS 224  
Students (CU)**

**Classical  
Physics 1 Lab  
Sections  
Students (MRU)**

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**Mixed  
Methods Design**

**Qualitative  
Methods**

Semi-structured  
interviews  
(students and  
TAs)

Observations and  
reflective writing  
analysis

Coding and  
content analysis  
(Nvivo software)

**Quantitative  
Methods**

Conceptual quiz,  
pre- and post-  
tests

Surveys

Statistical  
analysis (SPSS)

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**T1:** -Course design (PHYS 224 & Classical Physics 1 Lab)  
-Interview questions & survey design

**For Female Vs Male Students:**

- Social interactions in laboratories vs the learning experience?
- Elements of laboratories vs a satisfying experience?
- Laboratories vs students' perspectives on physics?
- Self-efficacy development vs laboratories?
- Laboratories vs conceptual understanding?

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**T2:** -Pilot study  
-Study review  
-Main study

**T3:** -Data analysis

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Reference: <https://www.acs.org/education/policies/middle-and-high-school-chemistry/laboratory/laboratory-experience.html>

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# Challenges

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**Research  
Challenges**

- Diverse and balanced student participation

- Qualitative and quantitative data collection.

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**Research  
Challenges**

- Reliability and validity in coding and analysis.

- Logistical challenges in implementation - scheduling and TA involvement.

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# Current Findings

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**Observations**

# Female Students

- High & early interaction
- Apparatus manipulation:  
interest vs gender-mix  
groups
- Increasing activity over time
- High engagement: male vs  
Female peers

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# Male Students

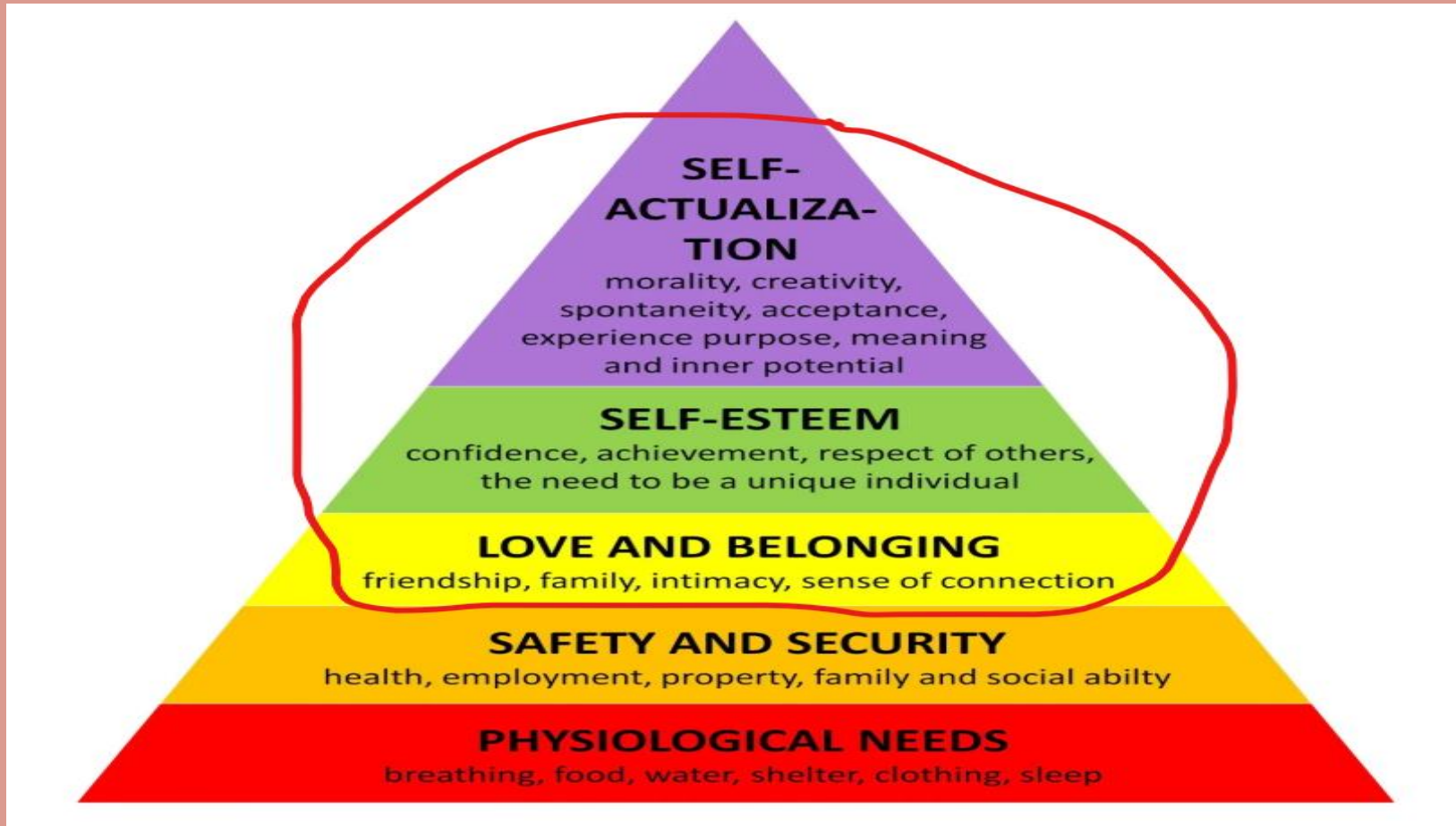
- Tend to take the lead
- Prefer working alone
- Increased interaction overtime
- High interest in apparatus manipulation & computations

# Female TA

- Provides assistance
- More structured
- Probing and direct answers
- More questions from female students
- More questions from younger vs older male students

# Male TAs

- Provide assistance
- Probing and direct answers
- More questions from male students
- Less inquiries from female students



Reference: <https://www.simplypsychology.org/maslow.html>

# Female Students

- Male peers - grasp faster and work alone
- Discrimination and stereotyping - male TA
- Comfortable - lab female dominated
- Follow-up questions: female TA vs male TA

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Pre-Interviews

# Male Students

- Female peers - more shy
- No difference in gender
- Experience-  
background & studies  
vs gender

# Female Students

- Interactions - built trust & conceptual understanding
- More confidence - more interactions & validation for female students
- Less rapport/questions - male TA vs female TA

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Post-Interviews

# Male Students

- Interpersonal chats
- Pre-Readings vs deepen understanding
- Increased confidence: gender mix-up vs female peers

# Female TA

- Female students - asked more questions
- Organized RW products: female vs male students
- Group assistance vs 1:1 - male vs female students

# Male TAs

- Female students – increased confidence & conceptual understanding
- Female students - more follow-up questions
- Male students vs teamwork overtime

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# Conclusion

- Laboratories enhance engagement and inclusivity.
- Address gender-based learning differences.
- Research to guide future educational policies.

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Thank You!

Questions?