

# Blended Research Curriculum for Interprofessional Learners: A Pilot Study

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## Conflict of Interest

Nothing to disclose



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# Objectives

Describe the process of a research curriculum development.

Explore potential for IPE opportunities within curriculum.



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# Background

Few health professions programs have direct policy for mandatory or structured student research experiences.<sup>1-4</sup>

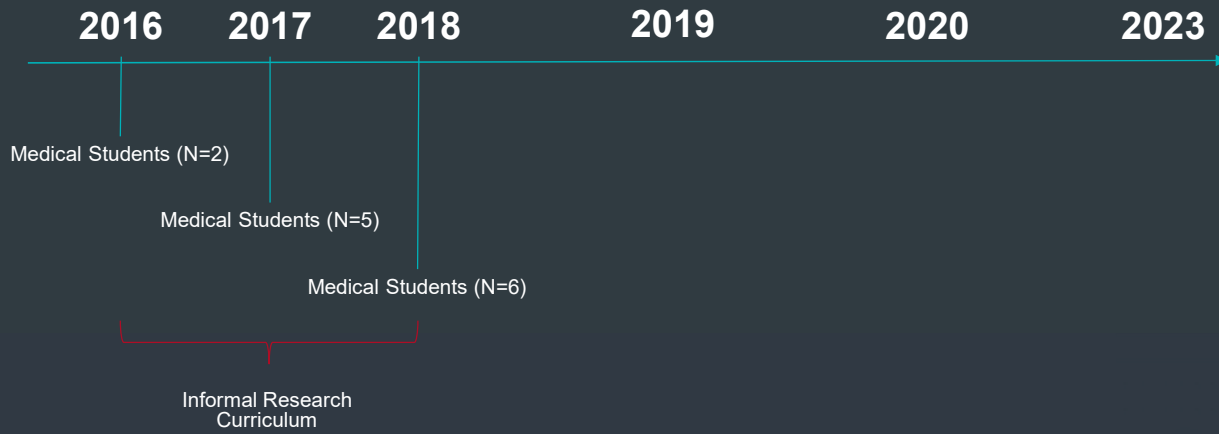
Data on student research participant productivity, academic trajectory, or perspective on their research experience is not widely available.<sup>1-4</sup>

1. Chang, Y. and C.J. Ramnanan, A review of literature on medical students and scholarly research: experiences, attitudes, and outcomes. *Acad Med*, 2015. 90(8): p. 1162-73.
2. Pathipati, A.S. and N. Taleghani, Research in Medical School: A Survey Evaluating Why Medical Students Take Research Years. *Cureus*, 2016. 8(8): p. e741-e741
3. Jafree, D.J. and K. Koshy, How to apply to a summer undergraduate research program. *Int J Surg Oncol (N Y)*, 2017. 2(5): p. e29.
4. Laskowitz, D.T., et al., Engaging students in dedicated research and scholarship during medical school: the long-term experiences at Duke and Stanford. *Acad Med*, 2010. 85(3): p. 419-28.



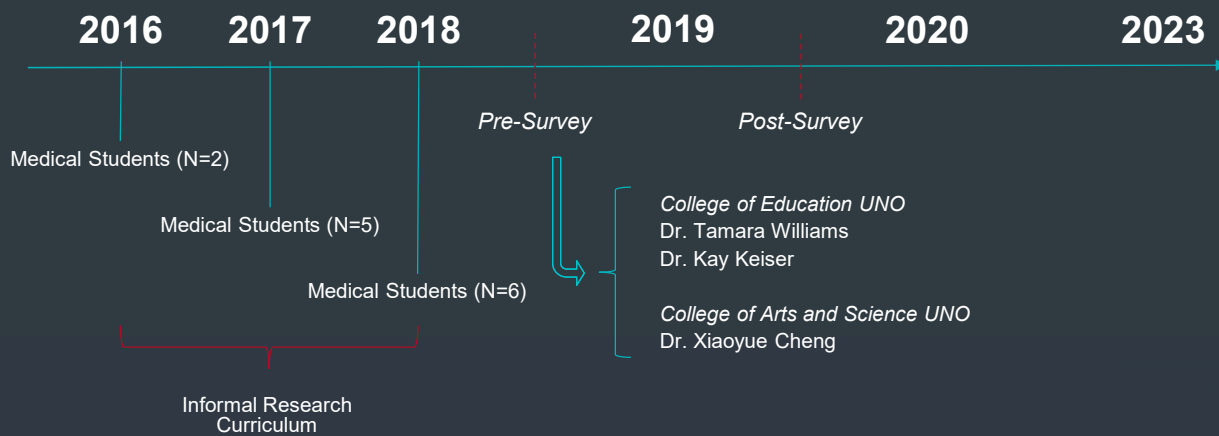
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# Timeline



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# Timeline



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# Research Project: Impact

Undergraduate Students (N=59)  
Medical Students (N=31)

## Pre-Survey

- Demographics
- Goals
- Likert-scale questions
  - Confidence
  - Experience
  - Knowledge

## Research Experience

## Post-Survey

- Open-ended questions
- Goals
- Likert-scale questions
  - Confidence
  - Experience
  - Knowledge
  - Agreement



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# Results

## UNDERGRADUTE

*Caucasian* 71.19% (N=42)



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## GRADUATE

83.87% (N=26)



64.53% (N=20)



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# Results

## UNDERGRADUTE

*Caucasian*

71.19% (N=42)



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Hands-on research experience (94.9%)  
 Science and research process (89.8%)  
 Interest in subject matter (86.4%)

## GRADUATE

83.87% (N=26)



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Interest in subject matter (54.8%)  
 Instructor has a good reputation (45.2%)  
 Need for employment after medical school (32.3%)



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16% changed the residency specialty  
 13% goal: private → academic practice  
 9.7% pursue an additional graduate degree



# Post- vs pre-survey

UNDERGRADUATE STUDENTS		
	Task	p-value
<i>Confidence</i>	Keeping track of scientific literature	<0.001
	Organizing scientific literature	<0.001
	Writing a research proposal	<0.001
	Collecting data for quality improvement	0.001
<i>Experience</i>	Recognizing, discussing, and preventing scientific misconduct	0.005
	Adding my research experience to my curriculum vitae	<.0001
	Presenting research result in posters	<.0001
<i>Knowledge</i>	Writing a research proposal	0.013
	Completing research in a clinical lab	<.0001
	Designing research protocols using hypothesis testing	<.0001
	Evaluating research protocols using hypothesis testing	<.0001
	Executing research protocols using hypothesis testing	<.0001
	Presentation of research results to community members	<.0001
	Using statistical software (either quantitative or qualitative)	<0.001
	Recruiting participants for research study	0.001
	Sampling for study	0.002
	Completing research in a basic science lab	0.031

MEDICAL STUDENTS		
	Task	p-value
<i>Confidence</i>	Collecting data for quality improvement	0.005
	Presenting my research data to supervisors	<0.001
<i>Experience</i>	Presenting my research data to peers	0.001
	Presenting research results orally	0.001
	Presenting research result in posters	0.003
	Writing a research abstract	0.004
	Presenting research results in written papers or written reports	0.007
	Writing a research hypothesis	0.022
<i>Knowledge</i>	Completing research in a university setting	<0.001
	Evaluating research protocols using hypothesis testing	<0.001
	Explaining quantitative techniques for data gathering	<0.001
	Presentation of research results to community members	<0.001
	Completing research in a clinical lab	0.001
	Designing research protocols using hypothesis testing	0.001
	Executing research protocols using hypothesis testing	0.001
	Creating laboratory procedures	0.002
	Explaining qualitative techniques for data gathering	0.002
	Completing laboratory procedures	0.022



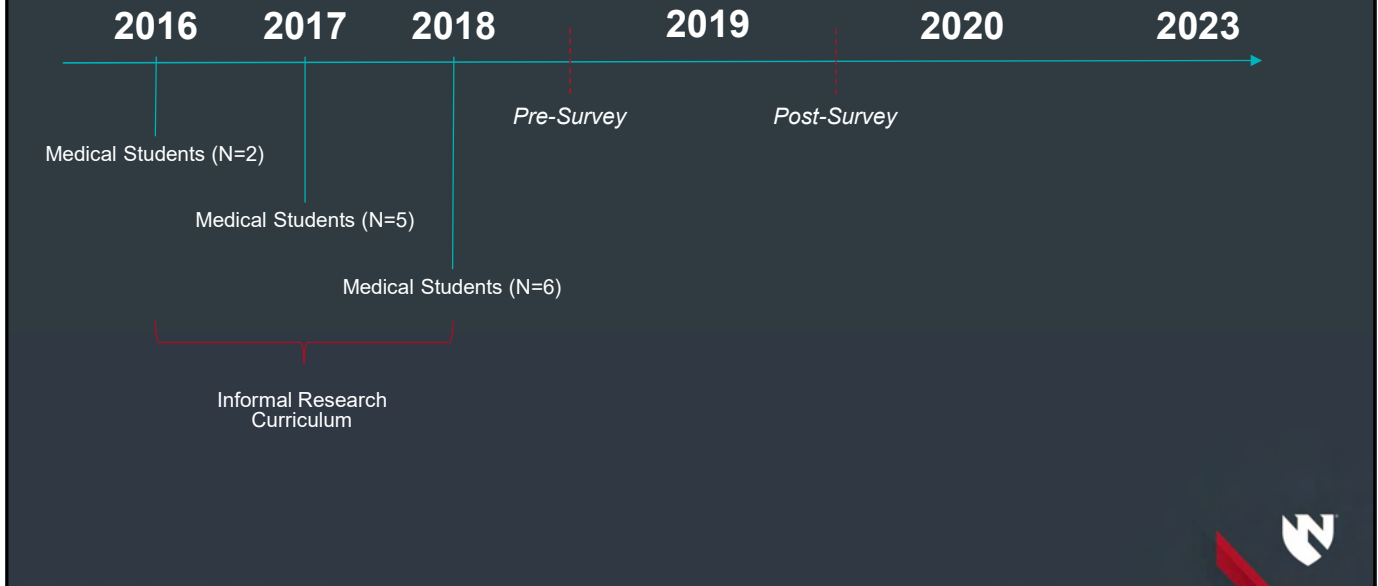
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# Research Curriculum



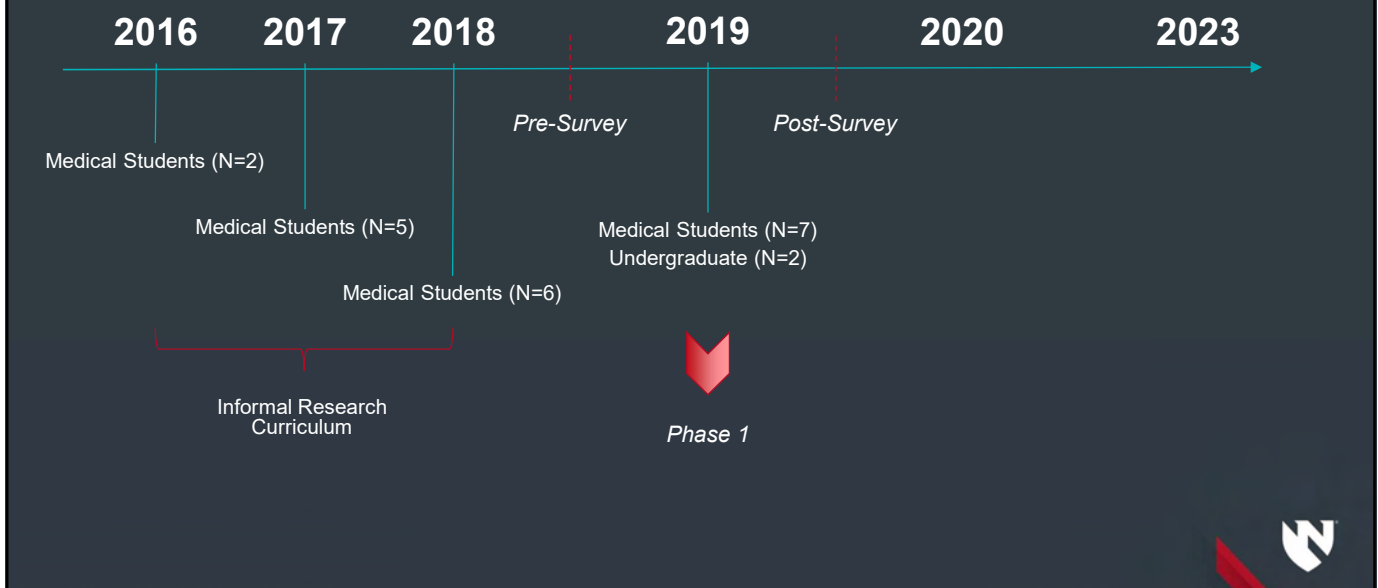
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# Timeline



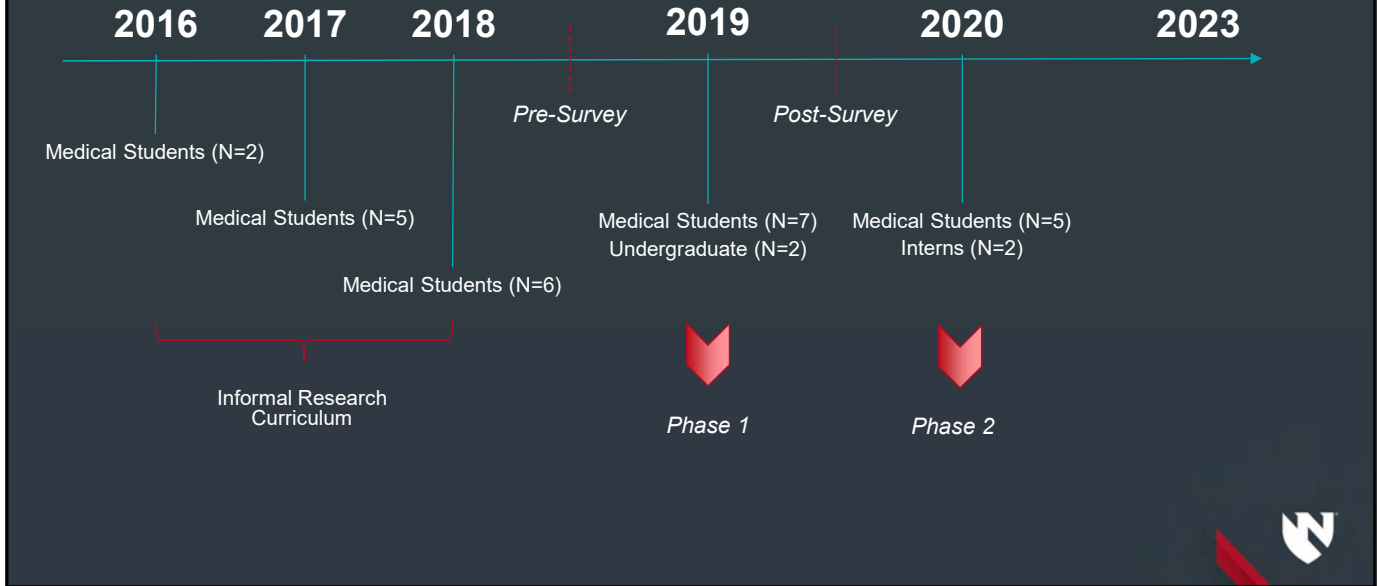
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# Timeline



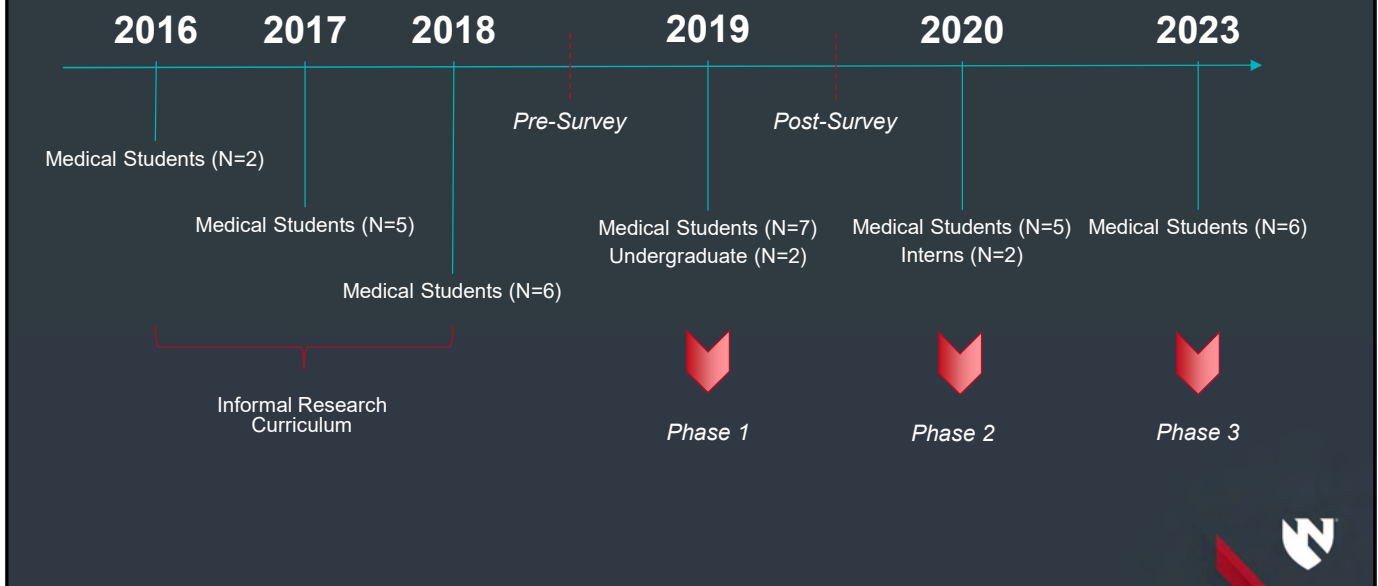
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# Timeline



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# Timeline



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# Cohorts

## Phase 1

2019

10-week rotation

Medical Students (N=7)

Undergraduate Students (N=2)

MSSRP, SURP



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# Phase 1

Week	Research	Clinical
0	CITI training , IRB, Ethics	-
1	Course Orientation	Assignment of Clinical Topics
2	Literature Review	Disparities in access to care
3	Study Design	Social Determinants of Health
4	Data Collection	GERD
5	Biostatistics	Hiatal Hernia Repair
6	Data Analysis	Fundoplication
7	Data Visualization	Sleeve Gastrectomy
8	Abstract	Roux-en-Y
9	Oral Presentation	Cholecystectomy
10	Manuscript Writing	Colectomy

## Research topics

- Group weekly meeting
- Instructor-led lectures

## Clinical Presentations

- Group weekly meeting
- Student-led lectures
- Relevance to research

## Research Project

- 1:1 weekly meeting



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# Cohorts

Phase 1

Phase 2

2019

2020

10-week rotation

10-week rotation / 1 year

Medical Students (N=7)

Medical Students (N=5)

Undergraduate Students (N=2)

Anesthesiology Interns (N=6)

MSSRP, SURP

MSSRP, Anesthesiology Residency



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# Phase 2

Module	Medical Students	Anesthesiology Interns
0	Ethics, Regulatory	Ethics, Regulatory
1	Course Orientation	Scientific Methodology
2	Literature Review	Literature Review
3	Study Design	Manuscripts / Research
4	Data Collection	Biostatistics / Data Collection
5	Biostatistics	Interpretation of results
6	Data Analysis	Data Debate
7	Data Visualization	Data Visualization
8	Abstract	Research Abstract
9	Oral Presentation	Poster/e-Poster
10	Manuscript Writing	Oral Presentation

Phase 1

E-learning modules

- Biostatistics Primer

Remote vs In person

Workbook vs Data Debate



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# E-learning modules

Office of Interactive E-Learning

Funded Awards Program ▾ uBEATS ▾ Resource Center ▾ EZStudio ▾ E-Gallery

EDUCATION, RESEARCH, WELLNESS

**Biostatistics Primer – Study Design**

In this module, concepts relating to study design are covered. This includes types of experimental and observational studies, and strengths and limitations of different designs.

May 1, 2014

EDUCATION, RESEARCH, WELLNESS

**Biostatistics Primer – Risk**

In this module, concepts related to summarizing risk will be discussed, including risk and odds, relative risk and odds ratios, risk reduction, and numbers needed to treat and to harm.

May 1, 2014

EDUCATION, RESEARCH, WELLNESS

**Biostatistics Primer – Inference Basics**

In this module, concepts related to statistical inference will be discussed, including the basic concepts behind hypothesis testing, common statistical tests, and when to use each type of test.

May 1, 2014

Summary

Module	Topic	Completion
Study Design	Study Design	Completed
Risk	Risk	Completed
Inference Basics	Inference Basics	Completed

Let's conduct the experiment

- Draw 1:  $\frac{1}{2}$  (1/2) (1/2) (1/2) (1/2) (1/2) (1/2) (1/2) (1/2) (1/2) (1/2)
- Draw 2:  $\frac{1}{4}$  (1/4) (1/4) (1/4) (1/4) (1/4) (1/4) (1/4) (1/4) (1/4) (1/4)
- Draw 3:  $\frac{1}{8}$  (1/8) (1/8) (1/8) (1/8) (1/8) (1/8) (1/8) (1/8) (1/8) (1/8)
- Draw 4:  $\frac{1}{16}$  (1/16) (1/16) (1/16) (1/16) (1/16) (1/16) (1/16) (1/16) (1/16) (1/16)
- Draw 5:  $\frac{1}{32}$  (1/32) (1/32) (1/32) (1/32) (1/32) (1/32) (1/32) (1/32) (1/32) (1/32)
- Draw 6:  $\frac{1}{64}$  (1/64) (1/64) (1/64) (1/64) (1/64) (1/64) (1/64) (1/64) (1/64) (1/64)
- Draw 7:  $\frac{1}{128}$  (1/128) (1/128) (1/128) (1/128) (1/128) (1/128) (1/128) (1/128) (1/128) (1/128)
- Draw 8:  $\frac{1}{256}$  (1/256) (1/256) (1/256) (1/256) (1/256) (1/256) (1/256) (1/256) (1/256) (1/256)

<https://www.unmc.edu/elearning/egallery/?s=biostatistics+primer>

## Biostatistics Primer

- Inference Basics
- Risk
- Summarizing Data
- Study Design
- Variability

More Practice: additional questions

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# Workbook

**University of Nebraska Medical Center**  
BREAKTHROUGHS FOR LIFE

## Research Project Planning Workbook

Kristy J. Carlson, PhD  
Jason Shiffermiller, MD, MPH

**THE PROCESS OF RESEARCH**

Science is an iterative process. Truly "paradigm-shifting studies" are rare, and even those studies stand on the shoulders of prior research. On the surface, this iterative process may be misconstrued as duplicative. However, repeated studies are necessary to confirm — or refute — hypotheses and to refine our understanding of the truth. In publishing the results of research, investigators have an obligation to not only articulate their methods and their findings, but to highlight the limitations of their research — thus enabling future studies to improve upon past work and move the field forward.<sup>1</sup>

Wiggles, et. al. (2017) Science is an iterative process. [medRxiv:01697](#)

Flowchart: Literature → **Guiding Hypotheses** → Research Plan → **Clear Ethical Definitions** → Consult → **Question** → Design → Data Collection → **Explanations** → Data Analysis → **Interpretation** → Assess Questions → Repeat the Process

*If we knew what it was we were doing, it would not be called research, would it?*  
—Albert Einstein

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# Data Debate – Anesthesiology Interns

Topic: convalescent plasma therapy for COVID-19

SCHEDULE		
10 min	Supporting group – 1 <sup>st</sup> speaker	Present arguments
10 min	Opposing group – 1 <sup>st</sup> speaker	Present arguments
5 min	Supporting group – 2 <sup>nd</sup> speaker	Additional arguments, answer questions.
5 min	Opposing group – 2 <sup>nd</sup> speaker	Additional arguments, answer questions.
10 min	<i>RECESSION</i>	Prepare arguments.
5 min	Opposing group – 3 <sup>rd</sup> speaker	Rebuttal. No new data.
5 min	Supporting group – 3 <sup>rd</sup> speaker	Rebuttal. No new data.
5 min	<i>RECESSION</i>	Prepare final rebuttal.
5 min	Opposing group – any speaker	Rebuttal. No new data.
5 min	Supporting group – any speaker	Rebuttal. No new data.
15 min	<i>DEBRIEF</i>	Q&A from judges

Supporting      Opposing



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# Data Debate – Anesthesiology Interns

**Scientific Research Debate – Assessment**

Faculty: Judges (N=3) Date: 05 / 05 / 2021

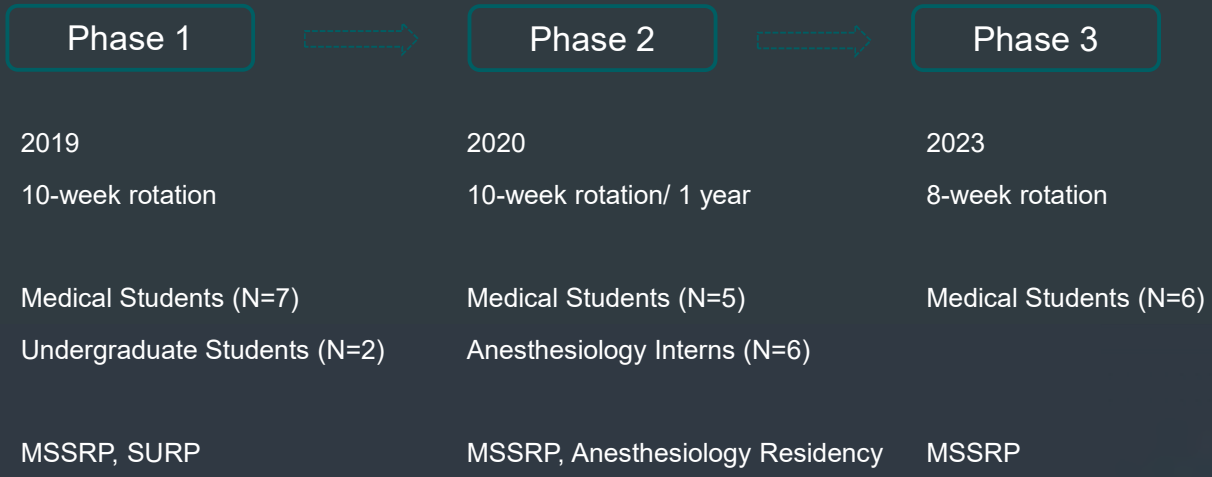
SUPPORTING GROUP	Poor 1	Below Average 2	Average 3	Above Average 4	Excellent 5
<b>CONTENT<sup>a</sup></b>					
Identify and critically evaluate primary literature including strengths/weaknesses					
Develop a concise, evidence-based, argument defending their viewpoint					
Anticipate opposing arguments and successfully identify limitations in them					
Effectively answer questions defending their argument and Develop challenging questions probing an opposing argument					
Convince an audience with credibility and evidence-based rationale (rather than just opinion)					
<b>DELIVERY</b>					
Speak clearly with enthusiasm and confidence					
Give concise and well-organized presentations					
Deliver all arguments with a high degree of professionalism					
Complete presentations within allotted time					
<b>OVERALL ASSESSMENT</b>					
Deliver an argument and presentation of overall quality					
<b>Comments.</b>	_____				

Viswesh, V., Yang, H., & Gupta, V. (2018). Evaluation of a modified debate exercise adapted to the pedagogy of team-based learning. *American journal of pharmaceutical education*, 82(4).



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## Cohorts



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# Phase 3

Module	Content	Research Project
0	Ethics, Regulatory	Ethics, Regulatory
1	Literature Review / Biostatistics	Literature Review
2	Biostatistics/ Study Design	Study Design
3	Fundamentals SBE	Tool Development
4	Patient Safety & Simulation	Data Collection
5	Human and Systems Performance	Data Collection
6	Assessment & Evaluation	Results
7	Abstract Writing	Abstract
8	Oral Presentations	Oral Presentations

Selected Phase 1 + Phase 2

## E-learning modules

- Escape Room

## Simulation-based sessions

- Fundamentals of SBE
- Assessment & Evaluation

## Peer-assessment

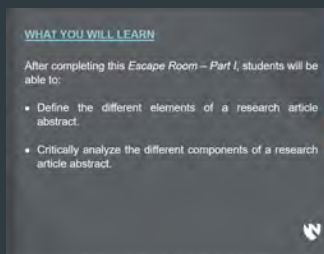
- Clinical presentations

## Patient safety & Human factors



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# Escape Room



[https://webmedia.unmc.edu/eLearning\\_open/HPTT2022/PriscilaRodrigues/](https://webmedia.unmc.edu/eLearning_open/HPTT2022/PriscilaRodrigues/)



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# Escape Room

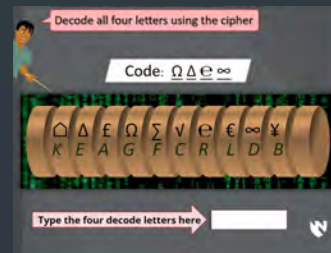


## WHAT YOU WILL LEARN

After completing this *Escape Room – Part I*, students will be able to:

- Define the different elements of a research article abstract.
- Critically analyze the different components of a research article abstract.

Mission 1: Identify the patient's diagnosis and treatment received.



[https://webmedia.unmc.edu/eLearning\\_open/HPTT2022/PriscilaRodrigues/](https://webmedia.unmc.edu/eLearning_open/HPTT2022/PriscilaRodrigues/)



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# SBE sessions



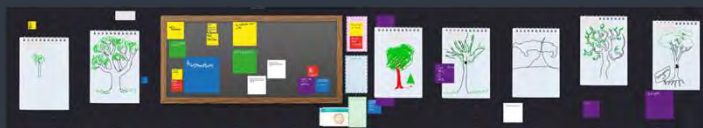
Overall, everyone agreed:

- Increased engagement
- Conducive to learning
- Felt Included



Substantial improve in scores

All would recommend session



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# Clinical Presentations

**Peer Feedback Form for Presentations**

Speaker: \_\_\_\_\_

Mark items using this system:  
 + (excellent/very good)    ✓ (adequate)    - (needs attention)

Write comments that will help the speaker:

- Be specific (for example, not "Good job" but "Excellent opening gesture")
- Be helpful (one idea in a helpful way: "my observations"/"I like to see a visual aid")
- Give suggestions (write down one or two suggestions for long terms)
- Give praise (write down things the speaker did well in this speech)

**Introduction**  
 \_\_\_ Grabbed attention \_\_\_ Revealed topic \_\_\_ Related to audience  
 \_\_\_ Established credibility/reliability \_\_\_ Previewed main theme or points

**Body**  
 \_\_\_ Clear main point's \_\_\_ Easy to follow \_\_\_ Used clear transitions  
 \_\_\_ Clear explanation of process \_\_\_ Adapted to audience

**Visual Aids / Presentations**  
 \_\_\_ Visible \_\_\_ Interesting \_\_\_ Effective \_\_\_ Used

**Delivery**  
 \_\_\_ Sounded conversational \_\_\_ Used appropriate language \_\_\_ Used effective gestures \_\_\_ Eye contact \_\_\_ Relaxed \_\_\_ Avoided distractions

**Conclusion**  
 \_\_\_ Signaled ending \_\_\_ Summarized speech \_\_\_ Related to audience  
 \_\_\_ Missed ending

What about this speech did you appreciate?  
 \_\_\_\_\_

What suggestions for improvement would you give?  
 \_\_\_\_\_

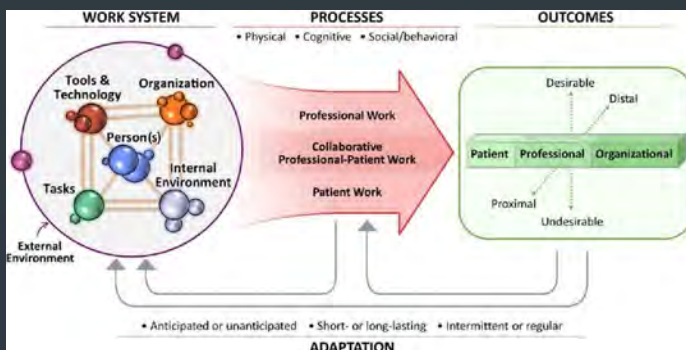
Courtesy of UNMC Graduate Studies



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# Patient Safety & Human/System Performance

Healthcare → complex system



Systems thinking/systems behavior mitigate risk of patient harm



Requires Interprofessional collaboration and practice

Holden, Richard J., et al. "SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients." *Ergonomics* 56.11 (2013): 1669-1686.



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# Conclusion

Curriculum → common ground

## Adaptable Content

- Undergraduate Students
- Medical Students
- Medical Residents



*Interprofessional  
Education*



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