

Transition to online labs at ECU

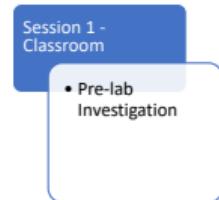
Mark W. Sprague and Steven F. Wolf

East Carolina University

November 16, 2020



ADI Investigation Cycle

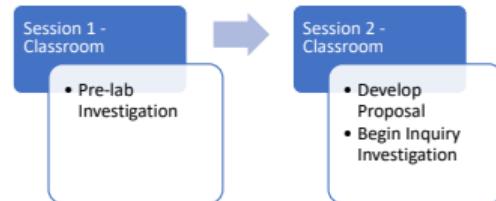


Studying science practice transfer between disciplines



Physics labs at ECU in BC days

ADI Investigation Cycle

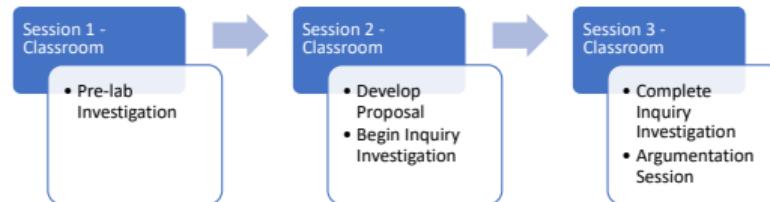


Studying science practice transfer between disciplines



Physics labs at ECU in BC days

ADI Investigation Cycle

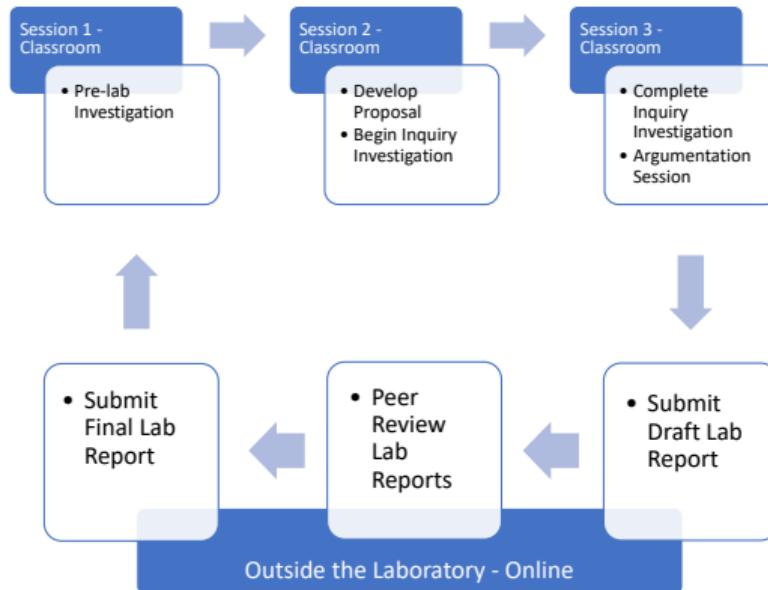


Studying science practice transfer between disciplines



Physics labs at ECU in BC days

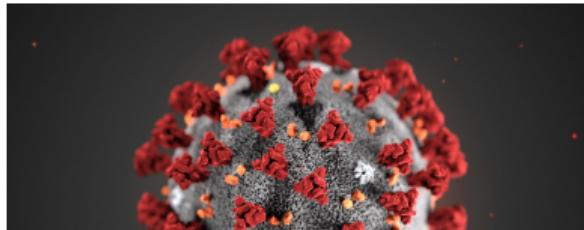
ADI Investigation Cycle



Studying science practice transfer between disciplines



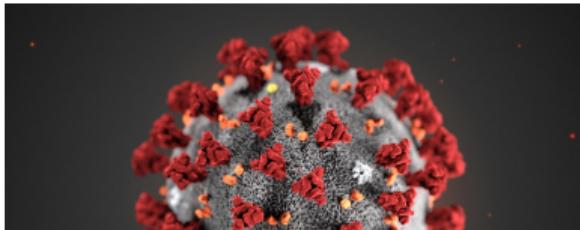
Change of plans: Labs are online now.



- Preserve ADI format for last two investigations



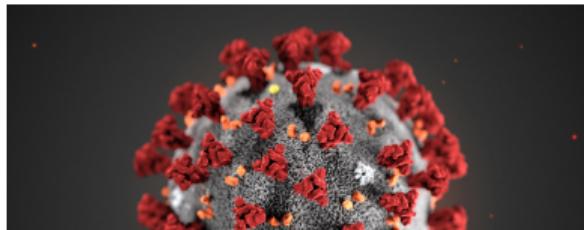
Change of plans: Labs are online now.



- Preserve ADI format for last two investigations
- How can we change our delivery while maintaining our focus on science practices?



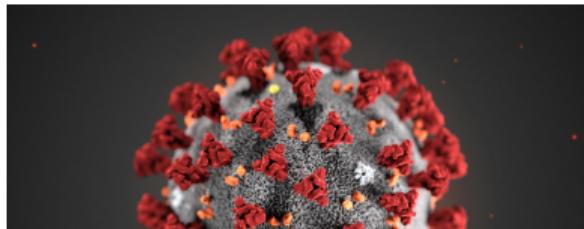
Change of plans: Labs are online now.



- Preserve ADI format for last two investigations
- How can we change our delivery while maintaining our focus on science practices?
- What do we need to do together?
 - ① Proposal approval
 - ② Argumentation session



Change of plans: Labs are online now.



- Preserve ADI format for last two investigations
- How can we change our delivery while maintaining our focus on science practices?
- What do we need to do together?
 - ① Proposal approval
 - ② Argumentation session
- What can we do apart?
 - ① Data collection (Both Prelab and Inquiry Investigation)
 - ② Data analysis
 - ③ Peer review/lab report revision



Implementing an ADI cycle—online delivery

The screenshot shows a WebEx interface with four participants in the top bar: EE, JR, WG, and AM. Below the bar is a presentation slide titled "Argument". The slide contains a text block and a table.

While exact values may vary, when percent errors are taken into account, the differences in diameter of hairs from different people are non-significant; therefore, hairs from different people have the same diameter.

Hair/ Laser	Diameter (mm)	Error	Range
HOR	0.094	±0.0306	(.0636- 1246)
HSG	0.130	±0.0424	(.0876- 1724)
H7R	0.111	±0.0027	(.1083- 1137)
H7G	0.108	±0.0026	(.1056- 1108)

Figure 1.2 A table containing calculated diameter, error, and range of diameter. Since range values overlap, no significant difference can be seen within the data set. It has to be concluded that that the differences in diameters of hairs from different people are non-significant.

Student presentation in WebEx argumentation session.

- Students complete pre-lab before proposal session



Implementing an ADI cycle—online delivery

The screenshot shows a WebEx interface with four participants in the top bar: EE (green), JR (blue), WG (orange), and AM (red). Below the bar, a presentation slide is displayed. The slide has a title 'Argument' and a subtitle: 'While exact values may vary, when percent errors are taken into account, the differences in diameter of hairs from different people are non-significant; therefore, hairs from different people have the same diameter.' Below the subtitle is a table with the following data:

Hair/Laser	Diameter (mm)	Error	Range
HOR	0.094	±0.0306	(.0636- 1246)
HSG	0.130	±0.0424	(.0876- 1724)
H7R	0.111	±0.0027	(.1083- 1137)
H7G	0.108	±0.0026	(.1056- 1108)

Figure 1.2 A table containing data on diameter, error, and range of diameter. Since range values overlap, no significant difference can be seen within the data set. It has to be concluded that that the differences in diameters of hairs from different people are non-significant.

Student presentation in WebEx argumentation session.

- Students complete pre-lab before proposal session
- Proposal session—WebEx/Discussion Boards; approval by end of class time



Implementing an ADI cycle—online delivery

The screenshot shows a WebEx interface with four participants in the top bar: EE (green), JR (blue), WG (orange), and AM (red). Below the bar is a presentation slide titled "Argument". The slide contains a text block and a table.

While exact values may vary, when percent errors are taken into account, the differences in diameter of hairs from different people are non-significant; therefore, hairs from different people have the same diameter.

Hair/ Laser	Diameter (mm)	Error	Range
HOR	0.094	±0.0306	(.0636- 1246)
HSG	0.130	±0.0424	(.0876- 1724)
H7R	0.111	±0.0027	(.1083- 1137)
H7G	0.108	±0.0026	(.1056- 1108)

Figure 1.2 A table containing data of diameter, error, and range of diameter. Since range values overlap, no significant difference can be seen within the data set. It has to be concluded that that the differences in diameters of hairs from different people are non-significant.

Student presentation in WebEx argumentation session.

- Students complete pre-lab before proposal session
- Proposal session—WebEx/Discussion Boards; approval by end of class time
- Measurements/Analysis—Group completes before next lab session



Implementing an ADI cycle—online delivery

The screenshot shows a WebEx interface with four participants in the top bar: EE, JR, WG, and AM. Below the bar is a presentation slide titled "Argument". The slide contains a text block: "While exact values may vary, when percent errors are taken into account, the differences in diameter of hairs from different people are non-significant; therefore, hairs from different people have the same diameter." Below this is a table:

Hair/ Laser	Diameter (mm)	Error	Range
HOR	0.094	±0.0006	(.0636- 1246)
HSG	0.130	±0.0424	(.0876- 1724)
H7R	0.111	±0.0027	(.1083- 1137)
H7G	0.108	±0.0026	(.1056- 1108)

Figure 1.2 A table containing data on diameter, error, and range of diameter. Since range values overlap, no significant difference can be seen within the data set. It has to be concluded that that the differences in diameters of hairs from different people are non-significant.

Student presentation in WebEx argumentation session.

- Students complete pre-lab before proposal session
- Proposal session—WebEx/Discussion Boards; approval by end of class time
- Measurements/Analysis—Group completes before next lab session
- Argumentation—3 slide PPT on WebEx during class time



Implementing an ADI cycle—online delivery

The screenshot shows a WebEx interface with four participants in the top bar: EE, JR, WG, and AM. Below the bar, a presentation slide is displayed. The slide has a title 'Argument' and a subtitle: 'While exact values may vary, when percent errors are taken into account, the differences in diameter of hairs from different people are non-significant; therefore, hairs from different people have the same diameter.' A table follows:

Hair/ Laser	Diameter (mm)	Error	Range
HOR	0.094	±0.0306	(.0636- 1246)
HSG	0.130	±0.0424	(.0876- 1724)
H7R	0.111	±0.0027	(.1083- 1137)
H7G	0.108	±0.0026	(.1056- 1108)

Figure 1.2 A table containing data on diameter, error, and range of diameter. Since range values overlap, no significant difference can be seen within the data set. It has to be concluded that that the differences in diameters of hairs from different people are non-significant.

Student presentation in WebEx argumentation session.

- Students complete pre-lab before proposal session
- Proposal session—WebEx/Discussion Boards; approval by end of class time
- Measurements/Analysis—Group completes before next lab session
- Argumentation—3 slide PPT on WebEx during class time
- Peer Review—asynchronous, online (same as in BC times)



Measurements and Simulations



Image of diffraction pattern for student measurement.

- Measurements online using photos and video
- Simulations on Trinket



Tools used in online lab delivery

Tool	Use	Rationale
Canvas	Material, Assignments, Quizzes, Discussions	University LMS
WebEx	Class introduction, argumentation, group interactions (???)	University supported
Canvas	Online peer review	Anonymous reviews and feedback
Trinket.io	Simulations embedded in Canvas	Fine-grained control