
www.evalu-ate.org/webinars/dec-19

ATE PI Conference 2019
Impact Evaluation
Why, What, and How

www.atecentral.net

SUPPORTING ADVANCED TECHNOLOGICAL EDUCATION

www.atecentral.net
Materials

Slides

Additional Resources

Recording


Defining characteristics of impact evaluation

Measures the long-term effects of a project's activities

Attends to causality and the project's role in bringing about these effects

Assesses intended and unintended impacts

Requirements for determining causality

Temporal precedence
The potential cause happened before the effect.

Covariation of the cause and effect
When the potential cause is present, so is the effect; when the cause is absent, the effect is also absent.

No plausible alternative explanations
Nothing else could have explained the effect.

Which statement do you find more convincing and why?

98% of participants reported being satisfied or very satisfied with the new lab materials. 90% of them said they would recommend the course to a friend.

Students who used the new lab materials were three times more likely to pass the licensing exam than those who used the old lab materials in their preparatory courses.

1,500 students used the new lab materials in 2018.

Introductions

Mike Lesiecki
Lyssa Wilson Becho

Behind the Scenes

Lori Wingate
Ana Councell
Emma Leeburg
Cynthia Williams
Janet Pinhorn
Shannon Payne
Kelly Robertson
Val Marshall

EvaluATE Webinar Series
December 11, 2019

Slides and recording:
www.evalu-ate.org/webinars/dec-19
ADVANCED TECHNOLOGICAL EDUCATION PROGRAM
www.nsf.gov/ate

This material is based upon work supported by the National Science Foundation under grant no. 1600992 and 1841783. The content reflects the views of the authors and not necessarily those of NSF.

Lyssa Wilson Becho

AGENDA

1. Defining impact
   What makes impact evaluation different?

   Question Break

2. Determining causality
   What are the three requirements for determining causality?

   Question Break

3. Strategies for practice
   What strategies can you use for impact evaluation?
Which statement presents the most compelling evidence of project success? And why?

**A**
98% of students reported being satisfied or very satisfied with the new lab materials. 90% said they would recommend the course to a friend.

**B**
Students who used the new lab material were three times more likely to pass the licensing exam than those who used the old lab materials in their preparatory courses.

**C**
1,500 students used the new lab materials in 2018.
**IMPACT EVALUATION**

- Measures the long-term effects of a project’s activities
- Attends to causality and the project’s role in bringing about these effects
- Assesses intended and unintended effects

**TERMINOLOGY**

**Outcomes**

“The likely or achieved short-term and medium-term effects of an intervention’s outputs”

(OECD, 2002)

**Impact**

“Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, and intended or unintended”

(OECD, 2002)

**Impact Evaluation:**
Who, What, and How

**TERMINOLOGY**

Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6
--- | --- | --- | --- | --- | ---

Impact

**CASE EXAMPLE**
Wood Hollow Community College

**CYBERSECURITY FOR ALL**

- Internship opportunities
- Number of Black, Hispanic, and female students
- Credentials in cybersecurity
- Employment in cybersecurity
- National security

Slides and recording:
www.evalu-ate.org/webinars/dec-19
CASE EXAMPLE
Wood Hollow Community College

Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6

Internship opportunities | Number of Black, Hispanic, and female receiving credentials | Employment in cybersecurity | National security

Process | Impact

IMPACT OR PROCESS?

Are these evaluation questions asking about process or impact?

1. To what extent did the demographics of those placed in internships match those of the target population?
Are these evaluation questions asking about process or impact?

1. To what extent did the demographics of those placed in internships match those of the target population? **PROCESS**

2. To what extent did the number of students credentialed in cybersecurity change because of the project activities?
IMPACT OR PROCESS?

Are these evaluation questions asking about process or impact?

2 To what extent did the number of students credentialed in cybersecurity change because of the project activities?

IMPACT OR PROCESS?

Are these evaluation questions asking about process or impact?

3 To what extent were students satisfied with their internship experience?
Are these evaluation questions asking about process or impact?

3. To what extent were students satisfied with their internship experience?

IMPACT OR PROCESS?

QUESTIONS?

Lyssa
Mike
Lyssa

Slides and recording: www.evalu-ate.org/webinars/dec-19
PART TWO
DETERMINING CAUSALITY

CAUSALITY

Cause
process

Effect
impact

Causal attribution
CAUSALITY

Cause process

Effect impact

Causal contribution

DETERMINING CAUSALITY

Three requirements

1. Temporal precedence
   The potential cause happened before the effect

Determining Causality

Three requirements

1. Temporal precedence
   The potential “cause” happened before the “effect”

2. Covariation of the cause and effect
   When the potential cause is present, so is the effect

DETERMINING CAUSALITY
Three requirements

1. Temporal precedence
   The potential “cause” happened before the effect

2. Covariation of the cause and effect
   When the potential “cause” is present, so is the effect

3. No plausible alternative explanations
   Nothing else could have explained the effect

DETERMINING CAUSALITY
Three requirements

Crime rates
Ice cream sales

Ice cream sales are positively correlated with crime rates, suggesting a potential causal relationship.

More ice cream = more crime!
DETERMINING CAUSALITY
Three requirements

April  May  June  July  August

Crime rates
Ice cream sales
Temperature

Increase in temperature
More ice cream
More crime
DETERMINING CAUSALITY
Three requirements

1. Temporal precedence
   The potential “cause” happened before the effect

2. Covariation of the cause and effect
   When the potential “cause” is present, so is the effect

3. No plausible alternative explanations
   Nothing else could have explained the effect

CASE EXAMPLE
Wood Hollow Community College

CYBERSECURITY FOR ALL

- Internship opportunities
- Number of Black, Hispanic, and female students
- Credentials in cybersecurity
- Employment in cybersecurity
- National security

EVALUATION SCENARIOS
Cybersecurity for All

- Experimental Design
- Logical Analysis
- Asking Participants

EvaluATE Webinar Series
December 11, 2019

EXPERIMENTAL DESIGN
Cybersecurity for All

Cybersecurity students

EXPERIMENTAL DESIGN
Cybersecurity for All

42

43

Slides and recording:
www.evaluate.org/webinars/dec-19
EXPERIMENTAL DESIGN
Cybersecurity for All

- 50 Randomly selected students

EXPERIMENTAL DESIGN
Cybersecurity for All

- Students
**EXPERIMENTAL DESIGN**

**Cybersecurity for All**

Randomly assign

- Receive internships
- No internships

EXPERIMENTAL DESIGN
Cybersecurity for All

- Receive internships
- No internships
EXPERIMENTAL DESIGN
Cybersecurity for All

- Temporal precedence
- Covariation of the cause and effect
- No plausible alternative explanations

EXPERIMENTAL DESIGN
Cybersecurity for All

- Temporal precedence
- Covariation of the cause and effect
- No plausible alternative explanations
EXPERIMENTAL DESIGN
Cybersecurity for All

- Temporal precedence
- Covariation of the cause and effect
- No plausible alternative explanations

Receive internships
No internships

Temporal precedence
Covariation of the cause and effect
No plausible alternative explanations
**EXPERIMENTAL DESIGN**

Cybersecurity for All

- **Receive internships**
- **No internships**

**LOGICAL ANALYSIS**

Cybersecurity for All

**PROJECT LOGIC MODEL**

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>SHORT TERM</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and offer Intro to Aviation course</td>
<td>Graduates transfer to aviation engineering programs at four-year institutions</td>
<td>More students persist in program</td>
</tr>
<tr>
<td>Develop and offer Aviation Summer Camp for Grades 6-12</td>
<td>Graduates gain employment as aviation technicians</td>
<td></td>
</tr>
<tr>
<td>Develop and offer Applied Mathematics for Aviation course</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---


EvaluATE Webinar Series
December 11, 2019

Slides and recording:
www.evalu-ate.org/webinars/dec-19
LOGICAL ANALYSIS
Cybersecurity for All

Does the data match the program theory?

PROJECT LOGIC MODEL

ACTIVITIES  SHORT TERM  IMPACT

- Develop and offer Intro to Aviation course
- Develop and offer Aviation Summer Camp for Grades 6-12
- Develop and offer Applied Mathematics for Aviation course

More students persist in program
Impact Evaluation:
Who, What, and How

LOGICAL ANALYSIS
Cybersecurity for All

PROJECT LOGIC MODEL

ACTIVITIES

SHORT TERM

IMPACT

Graduates transfer to aviation engineering programs at four-year universities.
Graduates gain employment as aviation technicians.

IMPACT

More students persist in the program.

PROJECT LOGIC MODEL

Develop and offer Intro to Aviation course.
Develop and offer Aviation Summer Camp for Grades 6-12.
Develop and offer Applied Mathematics for Aviation course.

58

LOGICAL ANALYSIS
Cybersecurity for All

PROJECT LOGIC MODEL

ACTIVITIES

SHORT TERM

IMPACT

Graduates transfer to aviation engineering programs at four-year universities.
Graduates gain employment as aviation technicians.

IMPACT

More students persist in the program.

PROJECT LOGIC MODEL

Develop and offer Intro to Aviation course.
Develop and offer Aviation Summer Camp for Grades 6-12.
Develop and offer Applied Mathematics for Aviation course.

59
Does the timing make sense?

Year 2  Year 3  Year 4  Year 5  Year 6

Employment in Cybersecurity
LOGICAL ANALYSIS
Cybersecurity for All

Are there other plausible explanations?

Regional Cybersecurity Employment

Year -1  Year 0  Year 1  Year 2  Year 3  Year 4  Year 5  Year 6

LOGICAL ANALYSIS
Cybersecurity for All

Year 1
Year 2
Year 3
Year 4
Year 5
Year 6

Employment in Cybersecurity

Regional Cybersecurity Employment

Temporal precedence
Covariation of the cause and effect
No plausible alternative explanations

Slides and recording: www.evalu-ate.org/webinars/dec-19
LOGICAL ANALYSIS
Cybersecurity for All

ASKING PARTICIPANTS
Cybersecurity for All
ASKING PARTICIPANTS
Cybersecurity for All

Post Graduation Survey
Wood Hollow Community College
Cybersecurity for All

To what extent did your internship with Cybersecurity for All influence your ability to find employment in the cybersecurity sector?

- Not at all
- Small extent
- Moderate extent
- Great extent

70

ASKING PARTICIPANTS
Cybersecurity for All

How was your choice in pursuing cybersecurity as a career path been influenced by your internship with Cybersecurity for All?

71
ASKING PARTICIPANTS
Cybersecurity for All

Tell me about the most significant change you saw in your career path after your internship with Cybersecurity for All.

72

ASKING PARTICIPANTS
Cybersecurity for All

Were there other significant events that impacted your career path in addition to Cybersecurity for All?

73
ASKING PARTICIPANTS
Cybersecurity for All

Tell me about your choice in pursuing cybersecurity as a career path.

ASKING PARTICIPANTS
Cybersecurity for All

- Temporal precedence
- Covariation of the cause and effect
- No plausible alternative explanations
ASKING PARTICIPANTS
Cybersecurity for All

IMPACT EVALUATION

- Measures the long-term effects
- Attends to causality and the project’s role in bringing about these effects
- Assesses intended and unintended effects
DETERMINING CAUSALITY

Three questions to ask

1. Did the cause happen before the effect?
   Temporal precedence

2. Does the effect increase when the cause increases, and decreases when the cause decreases?
   Covariation of the cause and effect

3. Are there any other plausible explanations that could explain the change in the effect?
   No plausible alternative explanations

QUESTIONS?
MATERIALS

Impact Evaluation: Why, What, and How

Slides

Additional Resources

Recording

Slides and recording:
www.evalu-ate.org/webinars/dec-19