

Lessons Learned :

The do's and don'ts of using GIS tools to investigate socio-environmental science in the secondary classroom

SCOTT RUTZMOSE

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PALM SPRING, CA

ALEC BODZIN

THOMAS HAMMOND

DAVID ANASTASIO

BREENA HOLLAND

KATE POPEJOY

DORK SAHAGIAN

JAMES CARRIGAN

WILLIAM FARINA

ROBSON JUNIOR

Presentation Outline



About Our Research



About Building 21



Technology



Activities



Implementation



Lessons Learned





LEHIGH
UNIVERSITY

Bethlehem, Pennsylvania



About Myself

Scott Rutzmoser MS GISP

Sr. Geospatial Specialist

Center for Innovation in Teaching and Learning

Lehigh University

scr211@lehigh.edu

[Introductory Video](#)

<http://www.ei.lehigh.edu/eli/sesi/>

Research Team

Dr. Alec Bodzin – College of Education

Dr. Thomas Hammond – College of Education

Dr. David Anastasio – Earth and Environmental Science

Dr. Breena Holland – Political Science

Dr. Kate Popejoy – Grant Consultant

Dr. Dork Sahagian – Earth and Environmental Science

James Carrigan – Graduate Student

William Farina – Graduate Student

Robson Martins De Araujo Junior – Graduate Student





SESI Investigation

Socio-environmental science investigations (SESI) are a **series of secondary level geospatial investigations** that focus on social issues related to **environmental science**. The investigations focus on local problems and utilize **fieldwork** to gather data in a local setting. Students use the **Esri Collector** app to gather geo-referenced data outside their school. The student-collected data is then shared into a Cloud-based map service over the Internet. The collaborative data set is **analyzed in ARCGIS.com**, a Web-based GIS with interactive mapping visualization tools that students use to manage, query, and analyze geospatial data. Students **use geospatial thinking and analysis skills** for investigating geospatial relationships in the data in addition to critical thinking skills to synthesize, compare, and interpret information to **solve problems in their local environment**.



National Science Foundation



ITEST Grant Innovative Technology Experiences for Students and Teachers

Year 1 – Pilot Exercises, design and test

Year 2 – Implementation, Pre & Post Testing 6 Classrooms

Year 3 – Implementation and Dissemination, Pre & Post Testing 6 Classrooms

Year 4 – Publication and Dissemination





Building 21 Allentown is a non-selective competency-based high school in the Allentown School District. It is a new secondary model that seeks to facilitate an authentic learning experience that will address the unique social and academic needs of all learners.

City of Allentown Public School

Students Selected via Lottery

<https://allentown.building21.org/>

<http://building21.org/>



Personalized Learning Pathways: Students' own strengths, interests, and passion shape their pathway across foundation and design years toward college and career readiness.



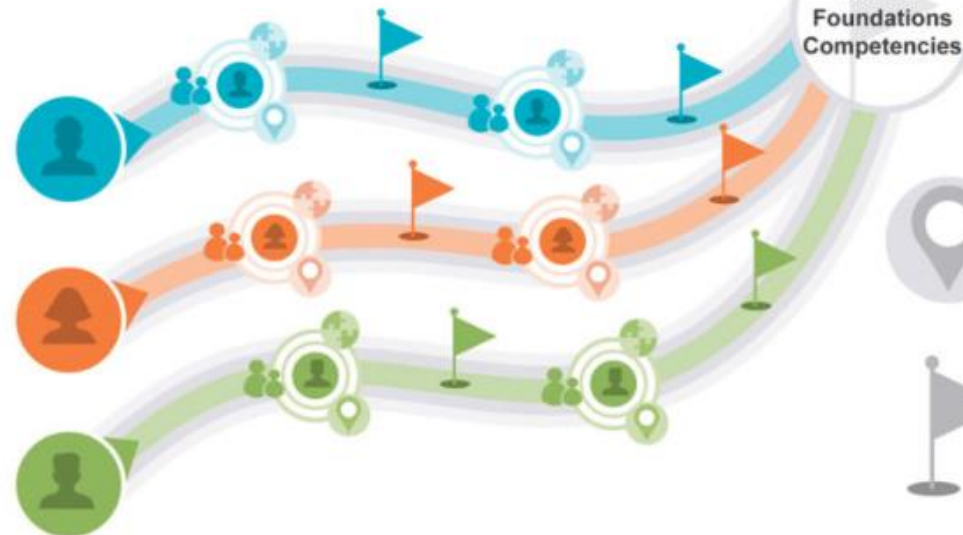
Strong Relationships

Every student is known and understood – this provides the motivation, safety, and confidence that students need to discover and pursue their passions.



Problem-based Learning

Students learn through inquiry and problem-solving, then apply the lessons to make an impact on school and community.



Master
Foundations
Competencies

College
or Career
Ready



Real-World Learning Experiences

Learning takes place in and among the larger community, through career- connected studios, mentoring, internships, and more.



Competency-based Assessment

Continual assessment ensures that students progress toward mastery of competencies and receive the right level of support.



Current Implementation (Year 3)

140 ninth-grade students

- 65% Identify as Hispanic or Latino
- 21% Identified by Districts as English Language Learners
- 19% Have Individualized Education Plans

Population is traditionally under represented in the STEM field.

Initial assessment approximately 30% are reluctant learners.



ESRI ArcGIS Online

Free for Education

Create Accounts

Manage Roles

Manage Groups

Create Data and Maps

Share Content

Plenty of Documentation

www.esri.com/en-us/industries/education/licensing





ESRI ArcGIS Collector App

Field Data Collection Activities

Check-out maps and data

Collector for iOS

ArcGIS Online Suite

- Same Accounts
- Groups
- Data and Maps



<https://doc.arcgis.com/en/collector/>





Five Field and Classroom Activities

Ecosystem Scavenger Hunt

- Items in Nature

Built Environment Scavenger Hunt

- Observations Man-made Resources

Trees and Ecological Services

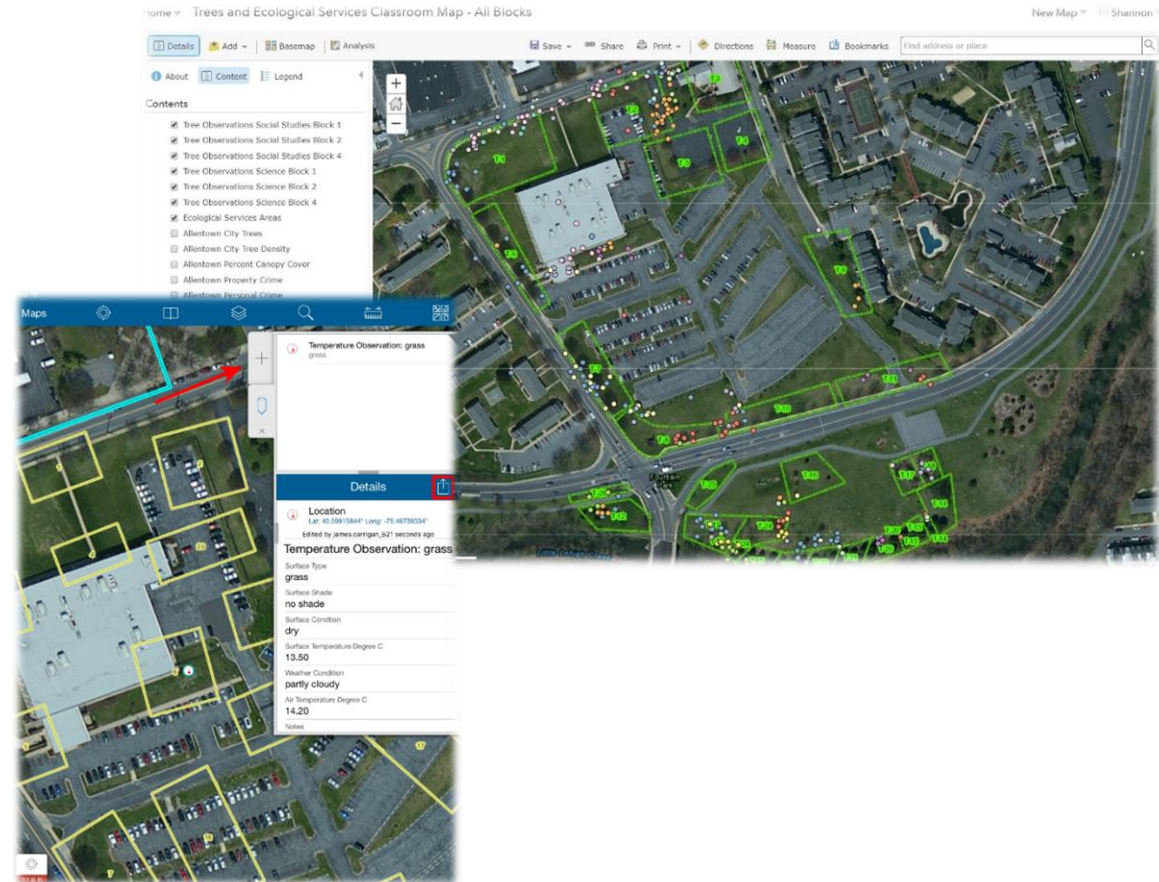
- Benefits of Trees and Nature

Urban Heat Island

- Effects of Ground Surface

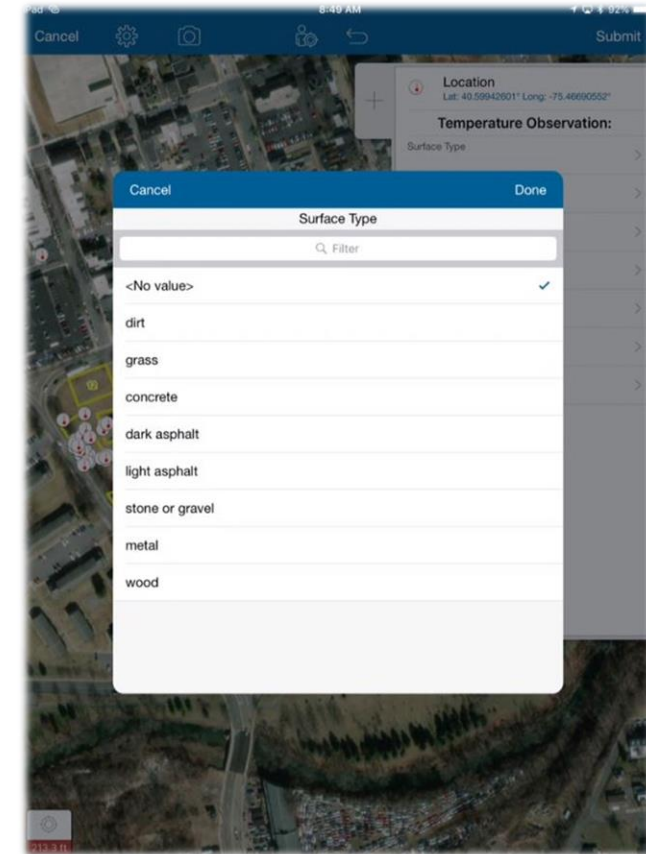
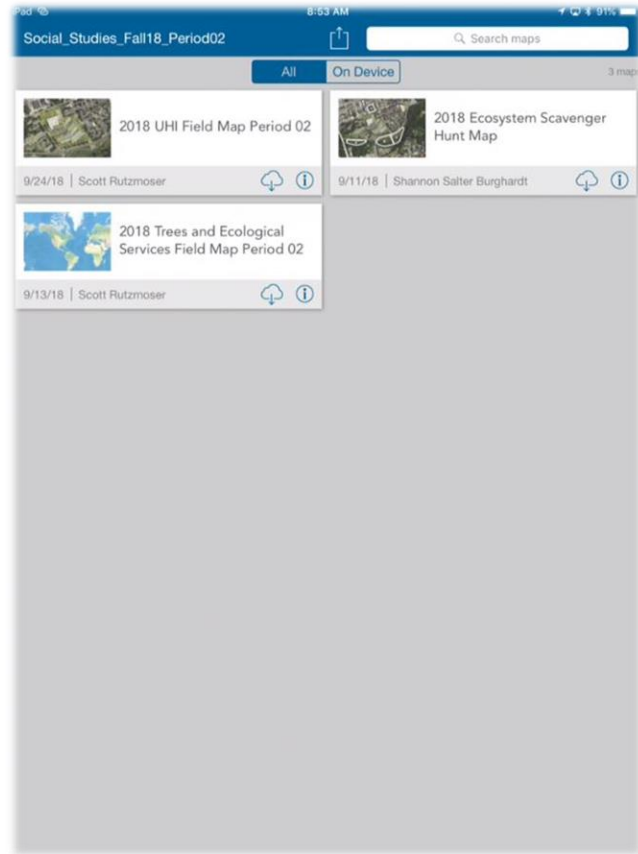
Zoning

- Buildings and Services



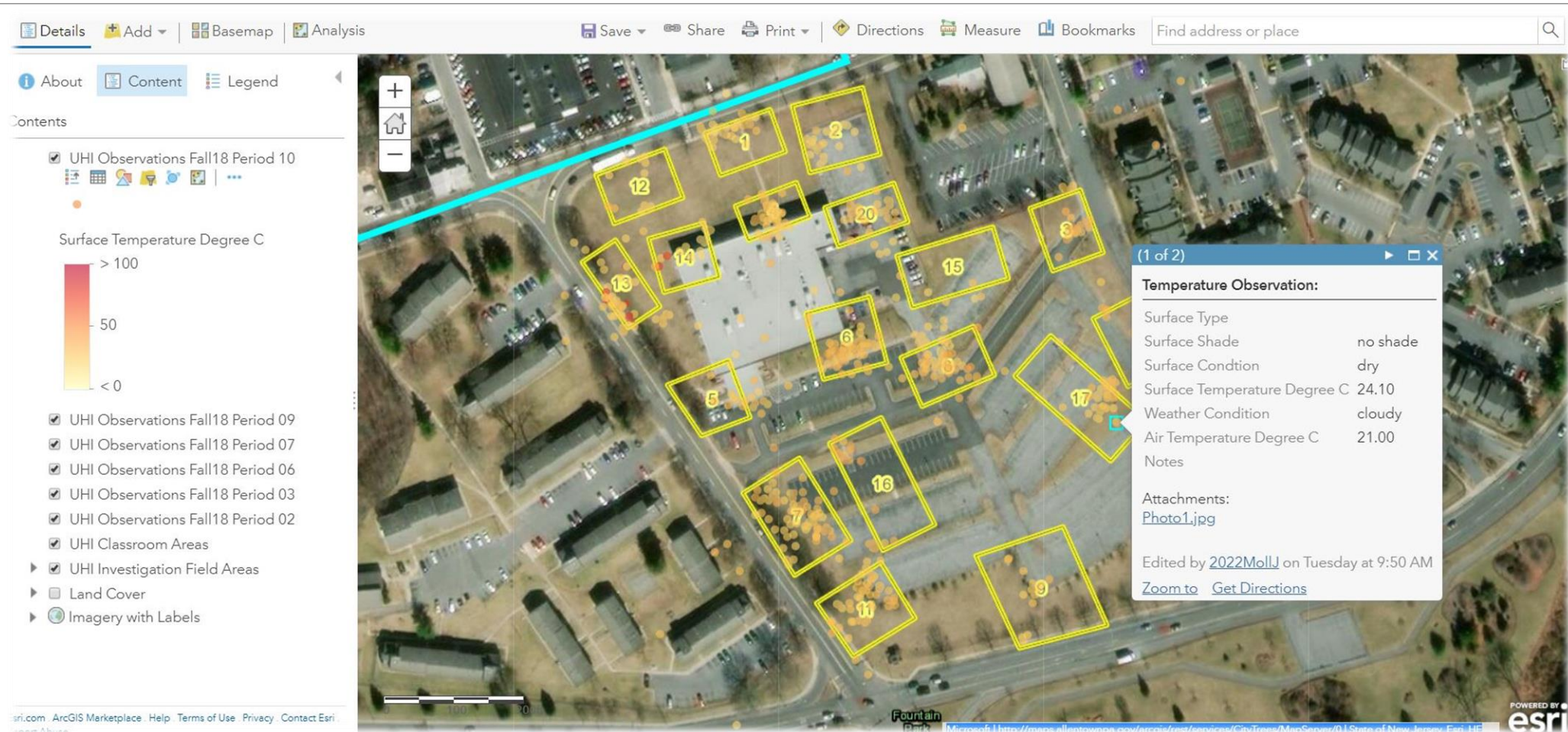


Field Data Collection



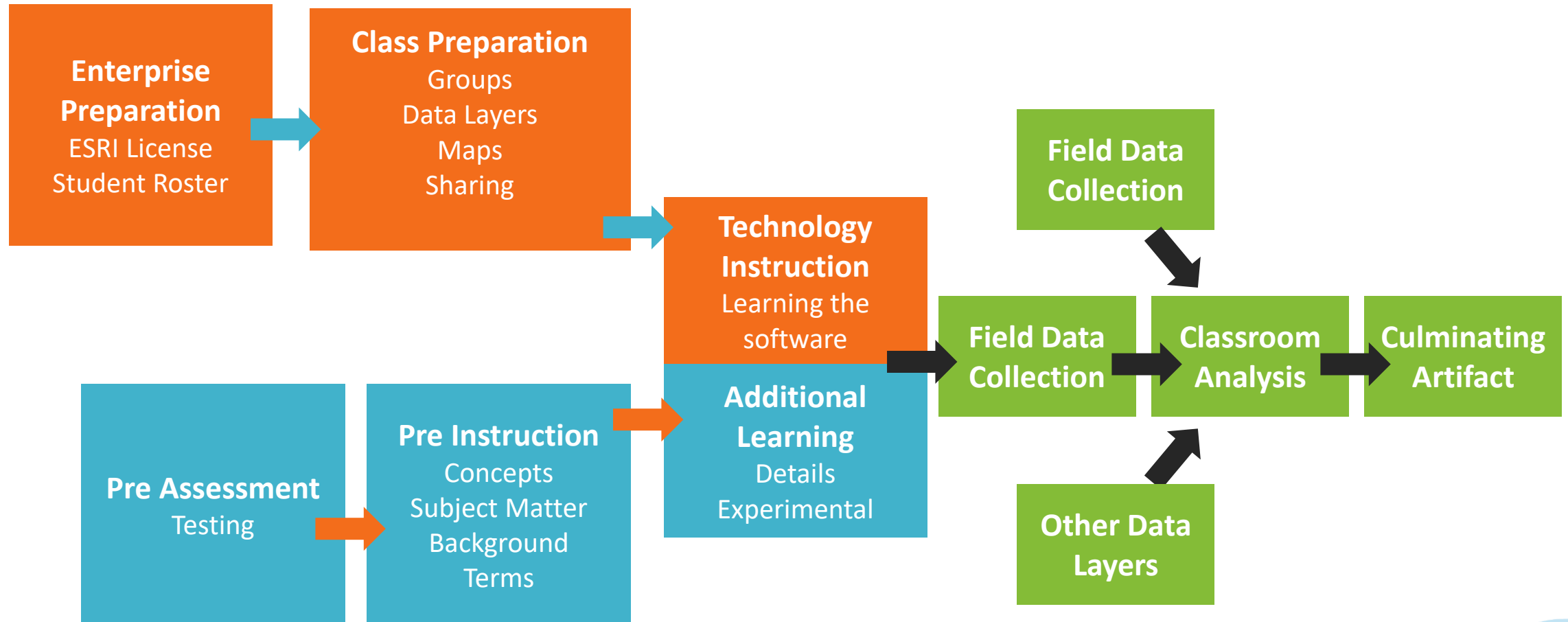


Classroom Analysis





Implementation





Required Pre-Preparation

Curriculum Based Activities

- Teacher Documentation
- Student Documentation
- Worksheets

6 Classroom Sections (20-30 students each)

6 Feature Services

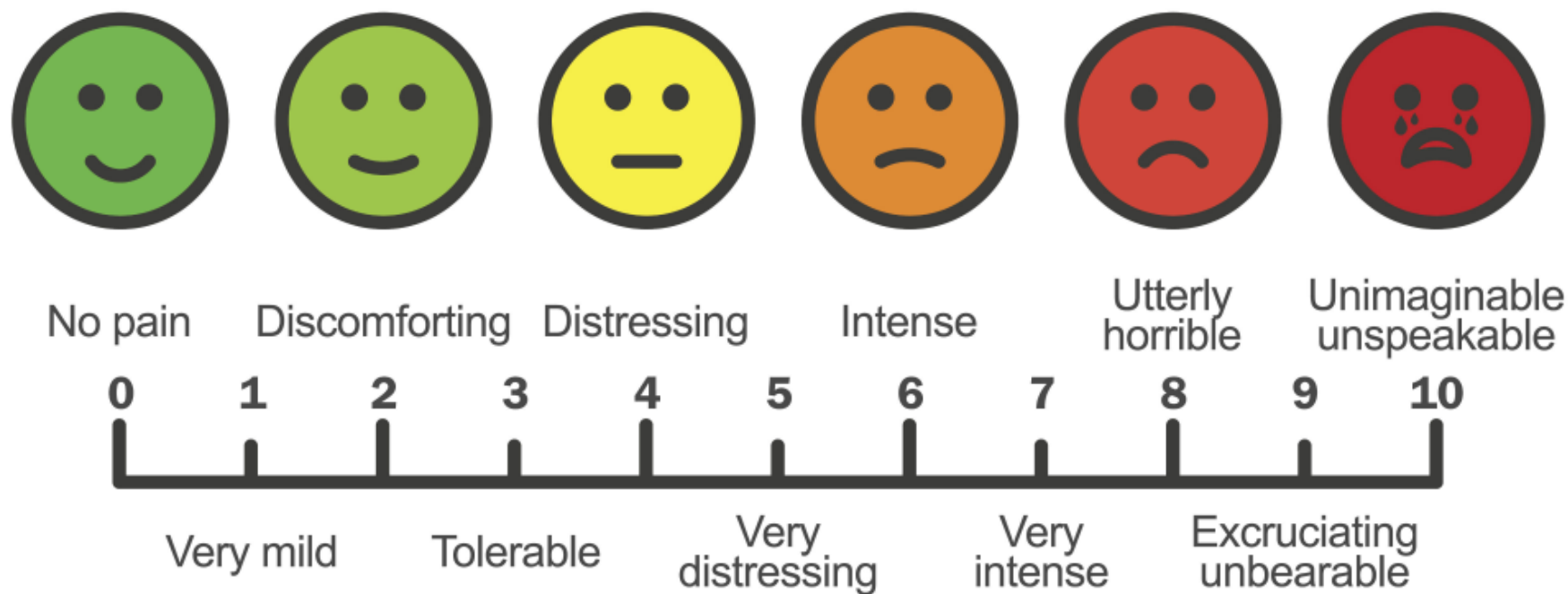
7 Maps

- 6 Field Data Collection
- 1 Classroom (used by all six classes)
- Other Supporting Layers





Lessons Learned





Lessons Learned

- ☹️ Engage and Leverage Stakeholders
- ☹️ Expecting Too Much
- ☹️ Students Lost Focus
- ☹️ Too Much Too Fast
- ☹️ Taking it Outside
- ☹️ Embrace Changing Technology
- 😊 Providing a Hook
- 😊 Use Our Stuff





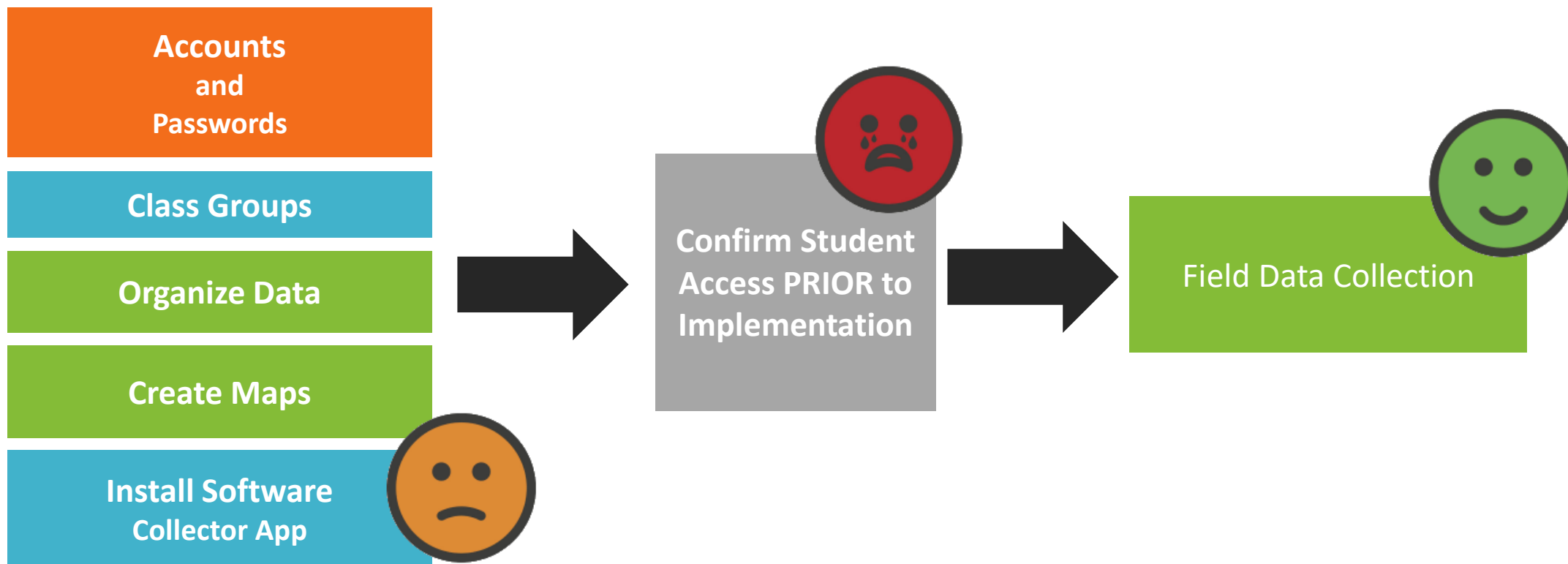
Engage and Leverage Stakeholders





Expecting Too Much

Do as much as you can in advance and remove as many moving parts as possible.





Students Lost Focus

Avoid non-essential technology and apps when possible.

ArcGIS Collector



ArcGIS Online

V-Tree



Leaf Snap



Tree iBook App



Does the tree have needles or leaves?



LEAVES



NEEDLES

What are **Needles**?



BACK TO DIRECTIONS

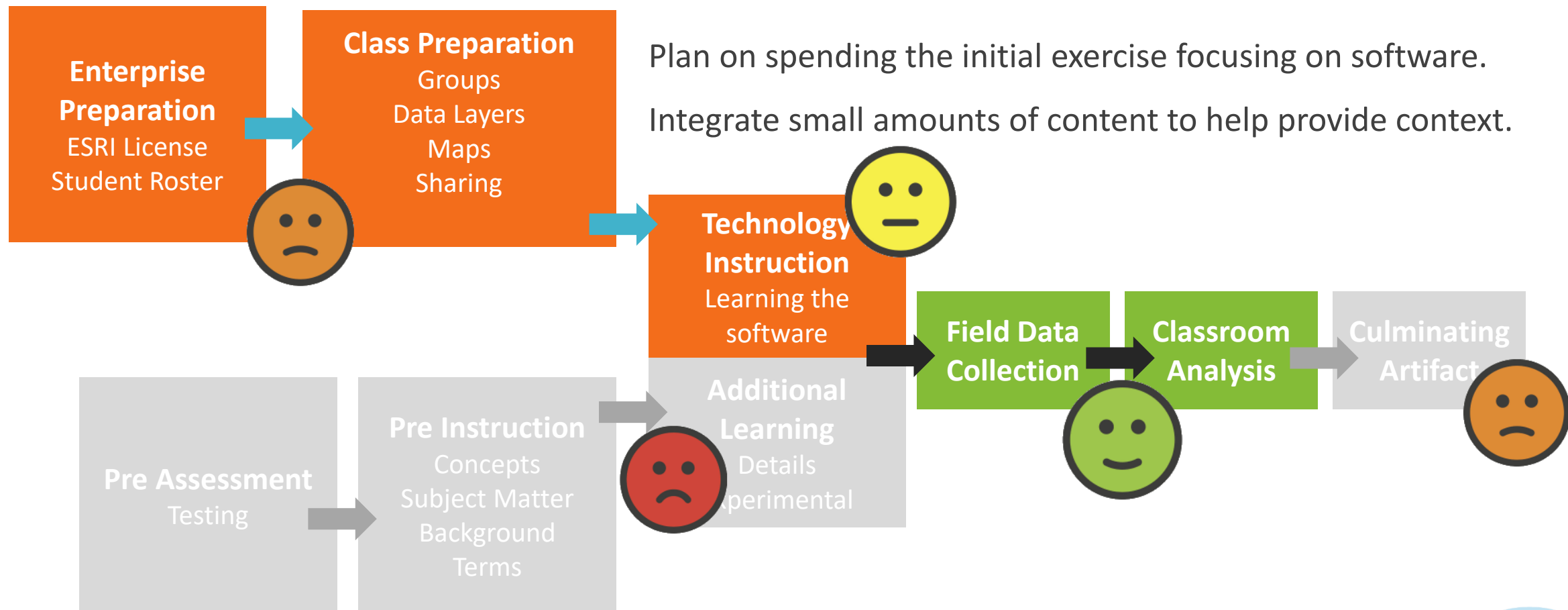


MORE INFO



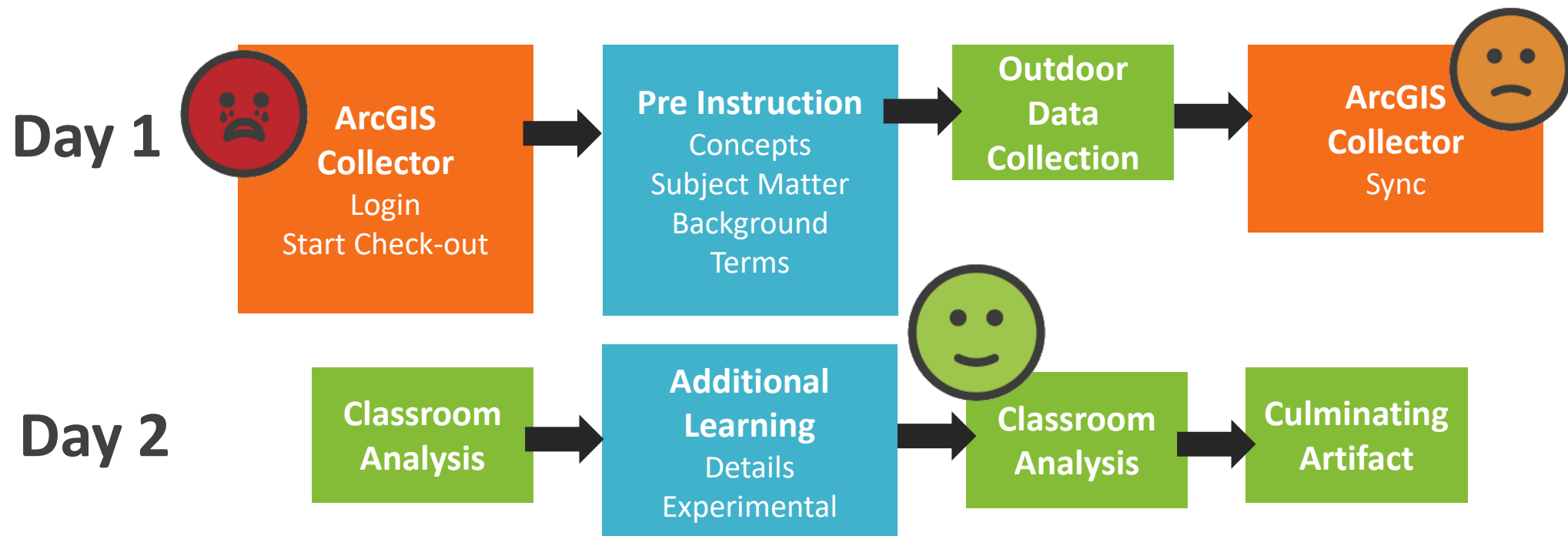


Too Much Too Fast





Taking it Outside



Check-out process can be sloooow! Get started right away.

Spend 15 minutes before Day 1 logging in to ArcGIS.com and confirm accounts.





Embrace Changing Technology

😊 ArcGIS Collector is Improving

😊 Interface Changes

😐 New Permissions Roles

😞 Bugs in Tiled Layers

Stay Calm and Map On!



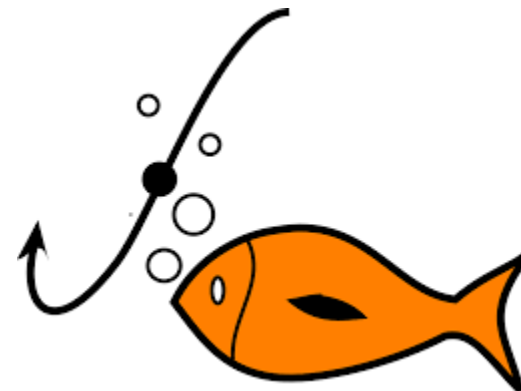


Providing a Hook

Different for Every Class and Activity

- Engagement
- Fascination
- Flow

Lead to Motivation



Examples

Taking Photos



Viewing Creator/Editor Information

Zoning Activity – Students engaged when they mapped beauty salons.

Trees and Ecological Services - We used a local park to identify and map trees with students.





Use Our Stuff

<http://b21.maps.arcgis.com>

- Feature Layer Templates
- Example Applications

<http://www.ei.lehigh.edu/eli/sesi/>

- Teacher Documentation
- Student Documentation
- Student Worksheets



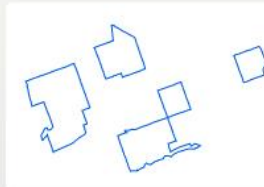
building**21**
ALLENTOWN

b21.maps.arcgis.com geospatial tools for learning

Featured Layers and Maps



Built Environment Scavenger
Hunt Template



Ecological Services Areas



Ecosystems Scavenger Hunt
Template



Land Cover



Thank You



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Lehigh University, Pennsylvania

scr211@lehigh.edu