Geospatial Connections Promoting Advancement to Careers & Higher Ed (GEOCACHE)

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Pathways

Research questions & methodology

ISTE's Classroom Observation Tool

Blevins & Hare, Esri EdUC, 2014

Career & educational pathways

- High school through two- & four-year institutions
- Industry stakeholders

Sustained professional development

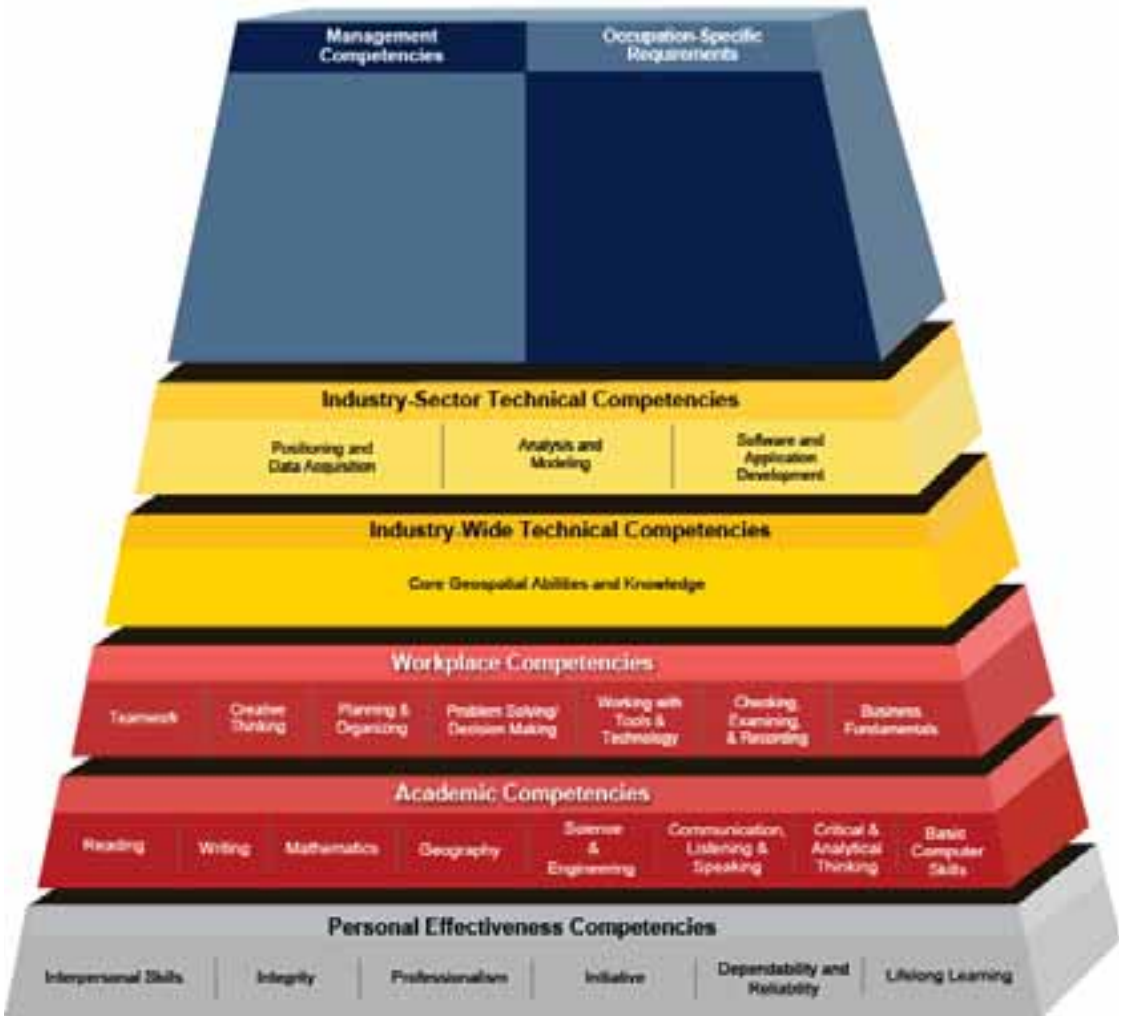
- Effective instructional strategies
- Basic & Advanced

Skill development

- 21st century & spatial thinking
- Spatial- & data-based strategies that support critical thinking & problem solving abilities

Career awareness

- Prepare students for success in geospatial industry



Geospatial Technology Competency Model

GeoTech Center

Blevins & Hare, Esri EdUC, 2014

Course Pathways and Articulation

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Blevins & Hare, Esri EdUC, 2014

“We must teach students to be tenacious, use their creativity, and learn to deal with situations in which there are different outcomes every time. In other words, they must know how to solve problems.”

Rick Stephens, retired Vice President for Human Resources, Boeing

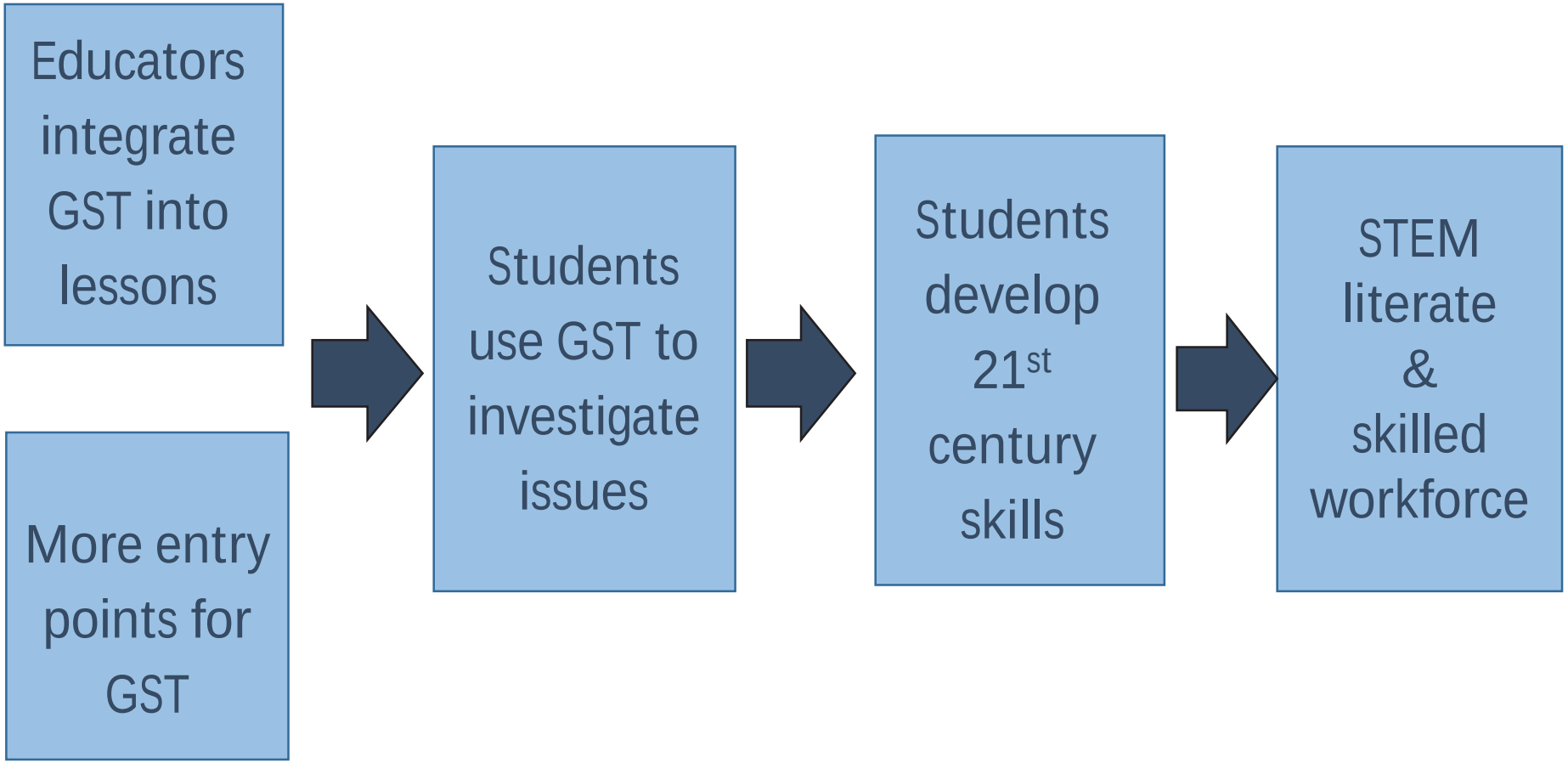
- spatial thinking
- public speaking
- critical thinking
- creativity
- problem solving
- information management

21st Century Skills

Teachers concur skills are important *and* being taught

2012 Industry Needs Assessment

(Solem, Cheung, Schlemper, 2008)



Conceptual Model

Blevins & Hare, Esri EdUC, 2014

Research Question

- To what extent do teachers **provide opportunities to use GST** to communicate patterns in data to describe phenomena to promote **21st century skills**?

Methodology

- Questionnaires (self-report)
- PD observations
- **Classroom observations**
- Analysis of student work

Macro-enabled Excel file

Captures integration of ed tech (GST) and 21st century skills

- ISTE Standards for Students (ISTE-S)

Continually tracks the duration of classroom events

- classroom characteristic
- type of technology use

Duration reported as percent of total observation time.

ISTE Classroom Observation Tool (ICOT)

A	B	C	D
START OBSERVATION	1:56:34 PM	END OBSERVATION	2:14:48 PM
Teacher Roles			
Facilit	○	Model	○
Interact	○	Moderate	○
Lecture	○	Manage	○
Student Groupings		1	
Indiv	◉	WholeCls	○
SmGroups	○	OtherGp	○
Learning Activities			
RecvPres	☐	Write	☐
GivePres	☐	Read	☐
CreatePres	☐	HandsOn	☐
RunSimul	☐	StdntDiscuss	☐
Practice	☐	TchrDiscuss	☐
Research	☐	Logistics	☐
Analyze	☐	OtherAct1	☐
Test	☐	OtherAct2	☐
Student Engagement		Off-task Criterion (min.): 3.00	
Student1	☐	Student5	☐
Student2	☐	Student6	☐

Setting

- Teacher roles
- Student groupings
- Learning activities
- Student engagement

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Subject	10	Attribute Duration (default=0)			
NumStdnts	7	Checkbox Status 1=TRUE 0=FALSE	Current Instance Start	Current Instance End	Cumul. Duration
Start	13:56:34				
End	14:14:48				
Facilit	0.49	0	14:08:43	14:14:48	0:08:52
Interact	0.08	0	13:58:34	14:00:00	0:01:26
Lecture	0.00	0	0:00:00	0:00:00	0:00:00
Model	0.00	0	0:00:00	0:00:00	0:00:00
Moderate	0.00	0	0:00:00	0:00:00	0:00:00
Manage	0.39	0	14:06:52	14:08:43	0:07:05
Indiv	0.95	1	13:57:27	14:14:48	0:17:21
SmGroups	0.00	0	0:00:00	0:00:00	0:00:00
WholeCls	0.00	0	0:00:00	0:00:00	0:00:00
OtherGp	0.00	0	0:00:00	0:00:00	0:00:00
RecvPres	0.35	0	13:57:34	14:04:01	0:06:27
GivePres	0.00	0	0:00:00	0:00:00	0:00:00
CreatePres	0.58	0	14:03:58	14:14:32	0:10:34
RunSimul	0.00	0	0:00:00	0:00:00	0:00:00
Practice	0.01	0	14:14:33	14:14:48	0:00:15
Research	0.22	0	14:10:46	14:14:48	0:04:02
Analyze	0.00	0	0:00:00	0:00:00	0:00:00
Test	0.00	0	0:00:00	0:00:00	0:00:00
Write	0.00	0	0:00:00	0:00:00	0:00:00
Read	0.00	0	0:00:00	0:00:00	0:00:00
HandsOn	0.57	0	14:04:23	14:14:48	0:10:25
StdntDiscuss	0.30	0	14:10:22	14:14:21	0:05:25
TchrDiscuss	0.00	0	0:00:00	0:00:00	0:00:00

Classroom Events

- Total time calculated as percentage of observation

A	B	C	D
START OBSERVATION	1:56:34 PM	END OBSERVATION	2:14:48 PM
Teacher Roles			
Facilit	○	Model	○
Interact	○	Moderate	○
Lecture	○	Manage	○
Student Groupings		1	
Indiv	◉	WholeCls	○
SmGroups	○	OtherGp	○
Learning Activities			
RecvPres	☐	Write	☐
GivePres	☐	Read	☐
CreatePres	☐	HandsOn	☐
RunSimul	☐	StdntDiscuss	☐
Practice	☐	TchrDiscuss	☐
Research	☐	Logistics	☐
Analyze	☐	DataCollection	☐
Test	☐	DataPrep	☐
Student Engagement		Off-task Criterion (min.): 3.00	
Student1	☐	Student5	☐
Student2	☐	Student6	☐

Modified Setting

- Data collection
- Data preparation

A	B	C	D	E	F
Technology Use		Return to SETTING to STORE DATA or CLOSE			PREVIEW D
# Digital Devices		0	Students/Device		#DIV/0!
Hardware used by:	Teacher	Students	Software used by	Teacher	Student
Calculator	☐	☐	DatAnal	☐	☐
Computer	☐	☑	Email/Chat	☐	☐
Tablet	☐	☐	Drill/Test	☐	☐
SmartPhone	☐	☑	TextEdit	☐	☐
CamVideo	☐	☐	Graphics	☐	☑
DocCam	☐	☐	LearnMgt	☐	☑
SensorGPS	☐	☐	OutlineMap	☐	☐
InteractBoard	☐	☐	MultiMedEdit	☐	☐
PresentSyst	☐	☐	PresentSW	☐	☐
ResponSyst	☐	☐	Simulation	☐	☐
VideoCon	☐	☐	WebBrowse	☐	☑
OtherHW1	☐	☐	GIS	☐	☑
OtherHW2	☐	☐	OtherSW1	☐	☐
OtherHW3	☐	☐	OtherSW2	☐	☐
Need for Technology in Comparison to Alternatives					
Less effective	○	Alternative approaches would be superior, or technology was			
Similar	○	Technology, even if convenient, was no more effective than			
Better	○	Technology provided advantages for the quality or efficiency of			
Essential	◉	The learning experience would not be possible without the			
Unable to rate	○	Technology was not used, or its effectiveness cannot be rated.			
Technology Use Time	**Teacher**	**Students**			
Technology Timers	*Off*	*Running*			
TechTime	0:00:00	0:00:00			
TechPct	0.0%	0.0%			
ObsDuration	0:18:14				

Technology Use

- Hardware/ software
- Student/ teacher use
- Advantage technology provides vs. alternatives
- Time

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Technology - modified

- Add GST
- Combine with hardware and software

Technology Use

Return to SETTING to STORE DATA or CLOSE | PREVIEW

# Digital Devices	0		Students/Device	#DIV/0!	
Hardware used by:	Teacher	Students	Software used by	Teacher	Student
Calculator	☐	☐	DatAnal	☐	☐
Computer	☐	☑	Email/Chat	☐	☐
Tablet	☐	☐	Drill/Test	☐	☐
SmartPhone	☐	☑	TextEdit	☐	☐
CamVideo	☐	☐	Graphics	☐	☑
DocCam	☐	☐	LearnMgt	☐	☑
SensorGPS	☐	☐	OutlineMap	☐	☐
InteractBoard	☐	☐	MultiMedEdit	☐	☐
PresentSyst	☐	☐	PresentSW	☐	☐
ResponSyst	☐	☐	Simulation	☐	☐
VideoCon	☐	☐	WebBrowse	☐	☑
OtherHW1	☐	☐	GST	☐	☑
OtherHW2	☐	☐	OtherSW1	☐	☐
OtherHW3	☐	☐	OtherSW2	☐	☐

Need for Technology in Comparison to Alternatives		
Less effective	○	Alternative approaches would be superior, or technology was
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Essential	◉	The learning experience would not be possible without the
Unable to rate	○	Technology was not used, or its effectiveness cannot be rated.

Technology Use Time	Teacher	Students
Technology Timers	*Off*	*Running*
TechTime	0:00:00	0:00:00
TechPct	0.0%	0.0%
ObsDuration	0:10:14	

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ISTE Standards for Students (ISTE-S)

Creativity, Innovation	1a. apply existing knowledge to generate new ideas, products, or processes	☐
	1b. create original works as a means of personal or group expression	☐
	1c. use models and simulations to explore complex systems and issues	☐
	1d. identify trends and forecast possibilities	☐
Communication, Collaboration	2a. interact, collaborate, publish w/peers, experts, others employing ...digital environments...	☐
	2b. communicate information/ideas to ... audiences using a variety of media and formats	☐
	2c. develop cultural understanding/global awareness...engaging with learners of other cultures	☐
	2d. contribute to project teams to produce original works or solve problems	☐
Research, Inf. Fluency	3a. plan strategies to guide inquiry	☐
	3b. locate, organize, analyze, evaluate, synthesize, ethically use information...	☐
	3c. evaluate / select information sources / digital tools based on appropriateness to tasks	☐
	3d. process data and report results	☐
Crit Thinking, Problem Solving	4a. identify and define authentic problems and significant questions for investigation	☐
	4b. plan and manage activities to develop a solution or complete a project	☐
	4c. collect and analyze data to identify solutions and/or make informed decisions	☐
	4d. use multiple processes and diverse perspectives to explore alternative solutions	☐
Digital Citizenship	5a. advocate and practice safe, legal, and responsible use of information and technology	☐
	5b. exhibit positive attitudes toward technology that supports collaboration, learning, productivity	☐
	5c. demonstrate personal responsibility for lifelong learning	☐
	5d. exhibit leadership for digital citizenship	☐
Tech. Ops. & Concepts	6a. understand and use technology systems	☐
	6b. select and use applications effectively and productively	☐
	6c. troubleshoot systems and applications	☐
	6d. transfer current knowledge to learning of new technologies	☐

Creativity, Innovation	1a. apply existing knowledge to generate new ideas, products, or processes	☐
	1b. create original works as a means of personal or group expression	☐
	1c. use models and simulations to explore complex systems and issues	☐
	1d. identify trends and forecast possibilities	☐
Communication, Collaboration	2a. interact, collaborate, publish w/peers, experts, others employing ..digital environments...	☐
	2b. communicate information/ideas to ... audiences using a variety of media and formats	☐
	2c. develop cultural understanding/global awareness...engaging with learners of other cultures	☐
	2d. contribute to project teams to produce original works or solve problems	☐
Research, Info. fluency	3a. plan strategies to guide inquiry	☐
	3b. locate, organize, analyze, evaluate, synthesize, ethically use information...	☐
	3c. evaluate / select information sources / digital tools based on appropriateness to tasks	☐
	3d. process data and report results	☐
Crt. Thinking, Problem Solving	4a. identify and define authentic problems and significant questions for investigation	☐
	4b. plan and manage activities to develop a solution or complete a project	☐
	4c. collect and analyze data to identify solutions and/or make informed decisions	☐
	4d. use multiple processes and diverse perspectives to explore alternative solutions	☐

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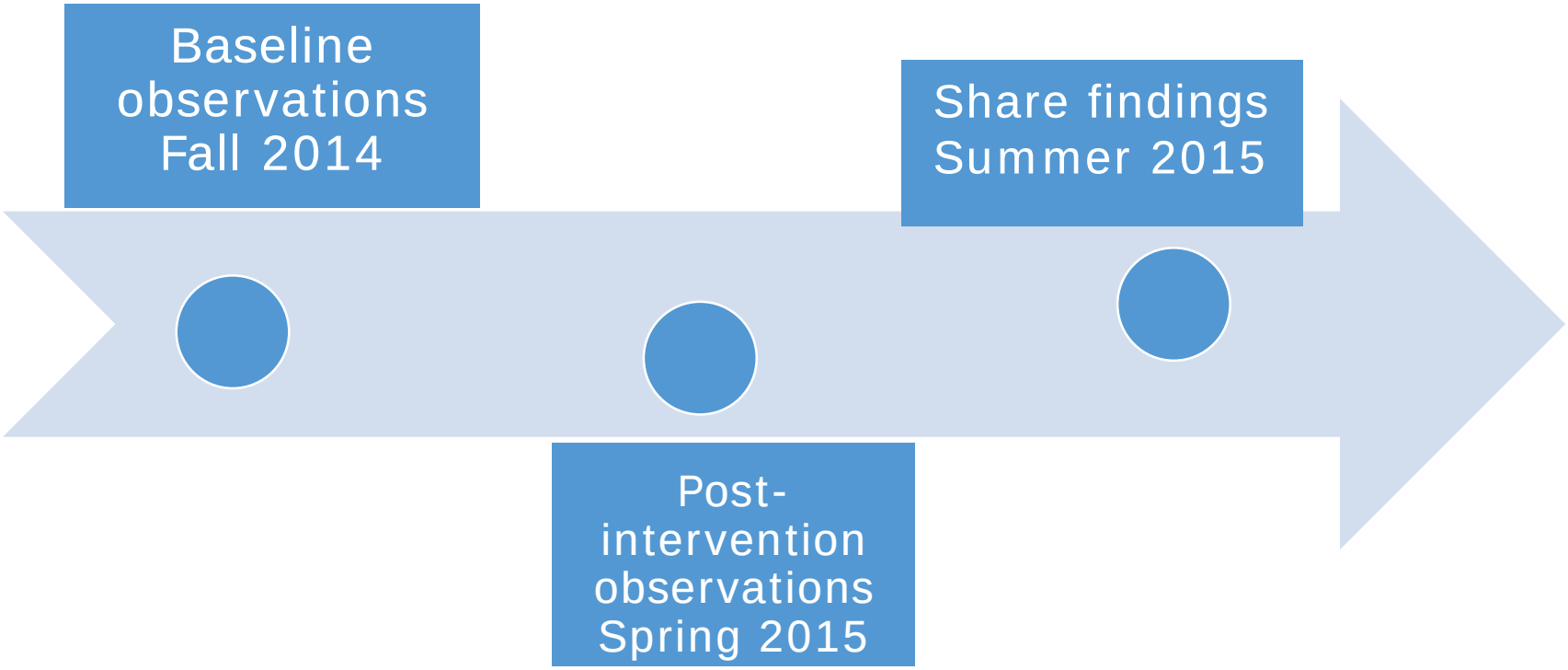
Our Focus

Blevins & Hare, Esri EdUC, 2014


Baseline observations Fall 2014
Post-intervention observations Spring 2015
Share findings Summer 2015

Next Steps

ISTE Classroom Observation Tool

http://www.mathlanding.org/system/files/ICOT%20Instructions%20v3.1_0.pdf

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