

# Assessing Classroom Technology Use for 21st Century Skills: A Research-Based Rubric



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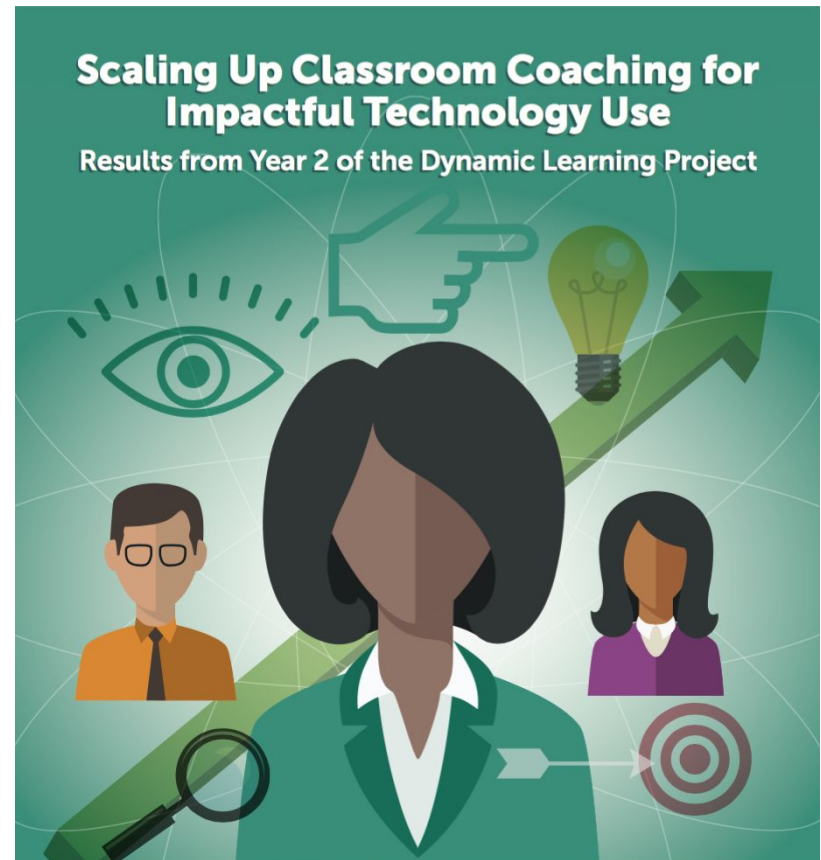
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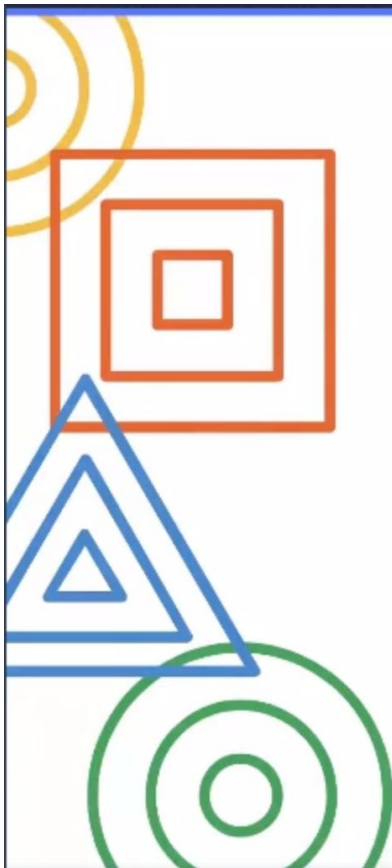
# Talk Outline

- Program Overview
- Research study
- Tools
- Next Steps



Mahsa Bakhshaei, Angela Hardy, Jason Ravitz, and John Seylar

# Program Overview



## The Dynamic Learning Project (DLP) - *Now under Google Certified Coach Program*

- 3 year pilot (2017-2020)
- Mission: improve educational equity by empowering teachers to leverage technology in meaningful ways
- Robust instructional technology coaching program, including research into effectiveness of coaching



Google for Education



# Scaling Up Classroom Coaching for Impactful Technology Use

Results from Year 2 of the Dynamic Learning Project



Mahsa Bakhshaei, Angela Hardy, Jason Ravitz, and John Seylar

## Dynamic Learning Project (DLP)

### Intensive coaching program

- Ran for 3 years

### Three tools

- Short-Cycle Feedback
- Long-Cycle Feedback
- Impactful Technology Use Rubric

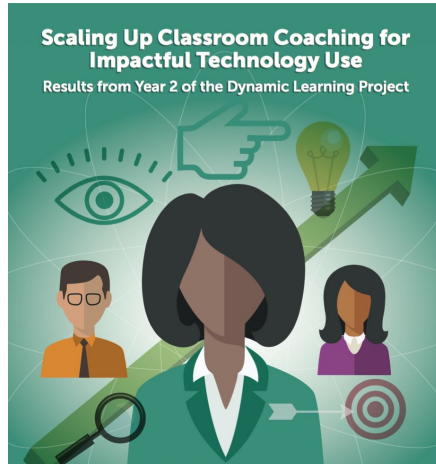
### Impactful Technology Use (building 6 skills)

- Student agency
- Selection of relevant tech tools
- Critical thinking
- Collaboration
- Communication
- Creativity

### Explicit link between skills and technology use

- National Education Association, 2012
- Framework for 21st century skills, 2012

# Impactful Technology Use (ITU) Framework



Digital Promise

Google

EdTechTeam

Students use technology to develop  
**COMMUNICATION** skills



Students use technology to develop  
**COLLABORATION** skills



Students **SELECT** RELEVANT TECHNOLOGY TOOLS or resources to learn something new or complete a task



**Impactful technology use to develop students' 21st century skills**

Students use technology to develop  
**CREATIVITY** and **INNOVATION** skills



Students use technology to develop **CRITICAL THINKING** skills



Students use technology to develop **AGENCY**



Used for 3 years

- To guide coaching
- To study impact

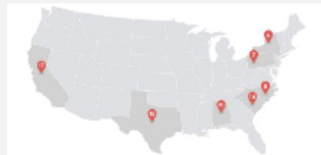
Bakhshaei, Hardy, Ravitz & Seylar (2019)

Adapted from Hixson, Ravitz & Whisman (2012)

# Program Overview

Implemented in 160+ underserved schools across the country since 2017

10 states: Alabama, Arkansas, California, New York, North Carolina, Pennsylvania, South Carolina, Washington, Wisconsin, and Texas



## DLP facts: Pilot Years

165 Schools

35,000+ Students

2,720+ Teachers

88% Schools receive Title I funding

66% Students receive free or reduced-price lunch

56% Students of color

## 8-Week Coaching Cycle



## Professional Development for Coaches

<b>Summer &amp; Winter Institutes</b> 	<b>1:1 Mentoring from Experts</b> 	<b>Custom Coaching Tools</b> 	<b>Communities of Practice</b> 
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# Research Questions

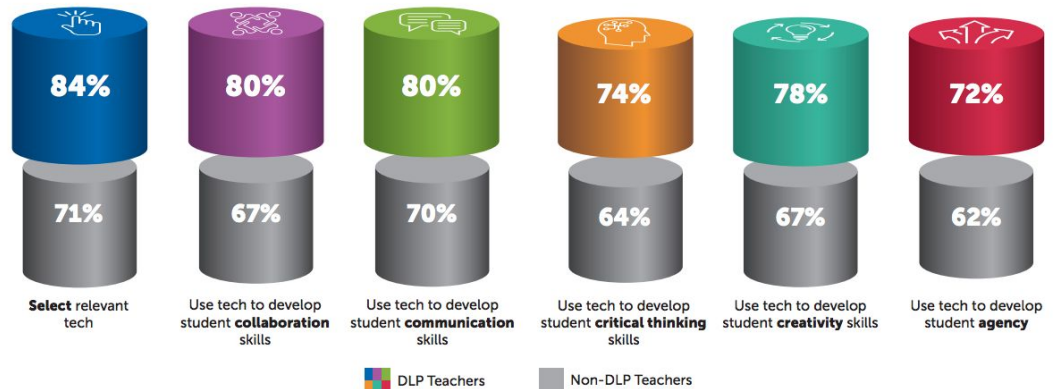
1. **Teacher self-ratings** of their ability to engage students...?
2. **How frequently do students use** technology in impactful ways...?
  - a. Through which **specific classroom practices**?
3. **Do teachers believe** these have a positive impact....?
4. How do teacher **self-ratings** (1) and **frequency of practices** (2) correspond to **perceived impact** (3)?

# Teacher ITU self-ratings of ability to engage students

RQ1: What are teacher self-ratings of their ability to engage students in impactful technology use?

- a) A majority of teachers agreed they were able to use technology in impactful ways with students.
- b) This was especially true for teachers who received coaching.

**More DLP teachers agreed that they are able to use technology in impactful ways that develop students' 21st century skills.**



From Year 2 report

\* Coached teachers (N= 1,546)

\* Non-coached teachers (N= 1,162)



# Frequency of Impactful Technology Use (ITU)

RQ2: How frequently do **students use technology in impactful ways**...through which specific classroom practices?

For these example practices

- A least 35% of all teachers reported monthly student ITU

For those with coaching

- Nearly half (46%) or more of teachers reported monthly use

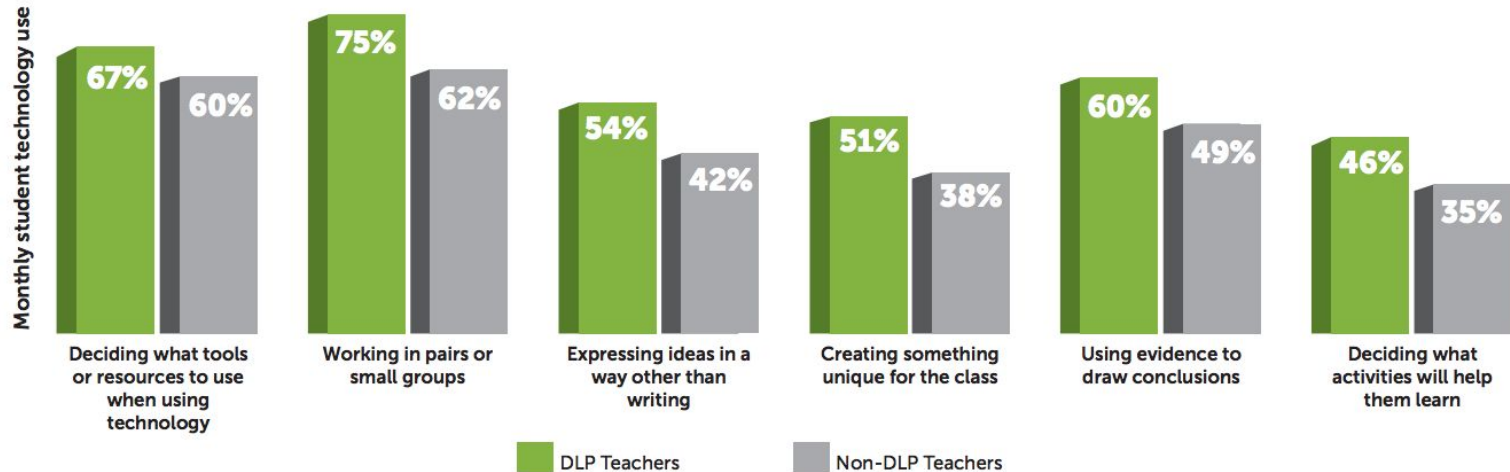
**More frequent uses of technology**

- working in pairs or small groups
- deciding what tools or resources to use

**Less frequent uses of technology**

- expressing ideas in a way other than writing
- creating something unique for the class
- deciding what activities will help them learn

**More DLP teachers reported at least monthly impactful technology use by their students in each skill area.**



# Perceived Impact of Impactful Technology Use (ITU)

RQ3. To what extent do teachers believe these students' technology uses have a positive impact on student engagement and learning?

- A majority reported a “positive impact on student engagement and learning” as a result of ITU

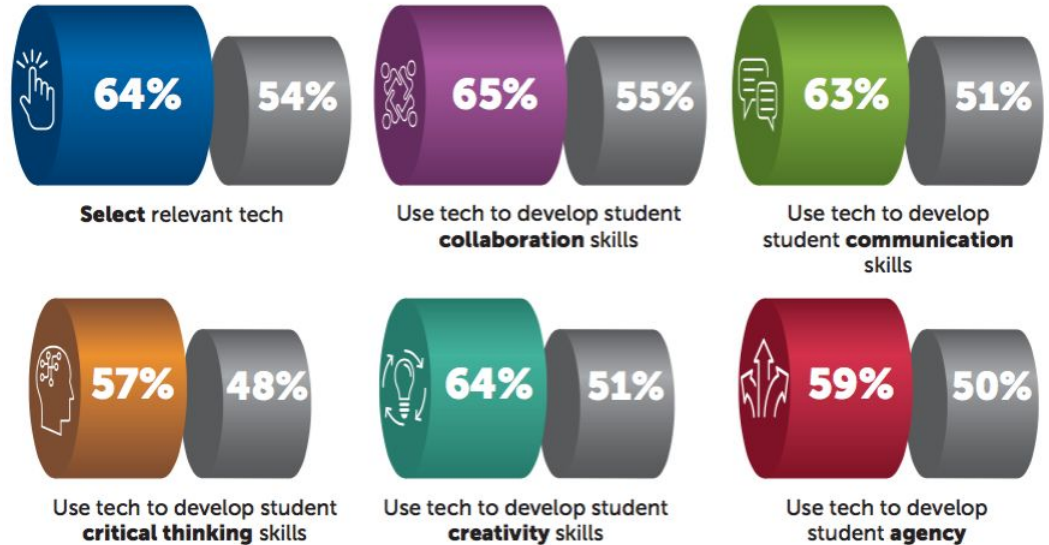
On average

- 62% of coached teachers
- 52% of non-coached teachers.

- The greatest perceived impact was for developing these skills

- Select relevant technology
- Collaboration
- Communication
- Creativity

Compared to non-DLP teachers, DLP teachers see more impact on student engagement and learning as a result of their impactful technology use.



# Relating perceived impact to frequency of practices and self-ratings

RQ4. How do teacher self-ratings of their own **capabilities** in teaching each skill and their reports of student **technology use** correspond to their **perception of impact** on student engagement and learning?

*“Reports of the frequency of actual activities occurring in the classroom can be a better predictor of the impact of ITU on student engagement and learning, compared to teacher self-report of their abilities”*

Perceived **IMPACT** teachers report from ITU correlates to **BOTH**

- **Frequency of student** ITU to practice these skills
  - Correlation = **.55** or **higher for 3 skills**
- **Teacher self-rating** of ability to engage students in ITU
  - Correlation = **.40** or **lower**

Correlations (practices > perceptions)

Perceived impact on engagement and learning	Frequency of ITU Practices	Teacher Self-Ratings of ITU ability
Agency	<b>.57</b>	.36
Critical Thinking	<b>.56</b>	<b>.40</b>
Creativity	<b>.55</b>	.36
Communication	.45	.32
Collaboration	.46	.35
Selection of Tech Tools	.33	.29

When we look at who reports the most impact

- it is those who used the practices, not those who self-rated higher
- self-ratings show positive relationships, but they are much weaker measures



# Research Conclusions

- **Self-ratings:** Most teachers (~ 60 - 80%) said they were able to implement technology effectively, especially coached teachers.
- **Frequency of practices:** Between ~  $\frac{1}{3}$  and  $\frac{3}{4}$  of teachers implemented practices monthly, especially coached teachers
  - Much wider variation on practices than self-ratings
- **Perceived impact:** Between ~  $\frac{1}{3}$  to  $\frac{2}{3}$  of teachers perceived a positive impact on student engagement and learning as a result of their technology use
- **Relationship to impact:** The teachers who perceived the most impact were those who **used the practices** with greater frequency, and to a lesser extent those who had higher self-ratings

**Recommendation:** Rely on self-ratings sparingly vs. actual use & practices

# Development Process for ITU Rubric



Our Networks Our Projects Our Research Your Learning

Our Blog

## Sharing Tools for Measuring Impactful Technology Use



November 19, 2019 | By Mahsa Bakhtshahi

- **Start with early (Year 1) uses**
  - Rubric
  - Long-term surveys
  - Coaching snapshots
- **Review data quality from pilot year**
  - To identify & use the best items only
- **Adapt items for coaching rubric**
  - Frequency (w/definition & practices)
  - Proficiency (w/examples)
- **Test using cognitive interviews**
  - With ~6 lead teachers and coaches

# Reliability of ITU Rubric Measures



- **Measures with strong reliability**

Standardized Alpha > .90

- Self-ratings of ability to engage students
- Perceived impact of ITU on students

- **Measures with good reliability**

Standardized Alpha > .80 (or two-item correlations > .74)

- Frequency of student ITU practices
  - 2-4 items each

# First Rubric Version

Impactful Technology Use		Descriptions of Development				
Indicator	Short Description	1-Ready to start	2-Emerging	3-Developing	4-Mastering	5-Innovating
<b>Students select relevant technology for learning</b>	The extent to which students can select relevant technology tools and resources for learning.	Students are not using technology.	Students use teacher-selected technology tools or resources for completing an assignment.	Students use teacher selected technology to explore concepts, model relationships, and extend assignments.	Students appropriately select <u>from variety</u> of digital tools to further discourse, facilitate collaboration, and share ideas.	Students differentiate, personalize, or accelerate learning based upon individual and/or collaborative learning goals utilizing student selected technology.
<b>Students develop collaboration skills</b>	The extent to which students can use technology to work together to solve problems, complete tasks, and accomplish common goals.	Students are not using technology in collaborative structures.	Students use technology to share information in pairs or small groups to support one another to complete individual assignments.	Students use technology to divide tasks in order to complete group assignments.	Students use technology to explain concepts and provide feedback to their peers in the completion of group assignments.	Students use technology to expand the classroom so that they work as a team within and beyond class time to create group products that incorporate contributions and feedback from all team members.

## Positive features

- illustrative practices
- different levels
- advanced ideas

## Issues

- Treated as required/not illustrative
- Text-heavy/hard to digest
- No frequency/differentiation (e.g., peer explanations, feedback and assignments do NOT always = mastery or impact)

# New Version

## Impactful Technology Use Rubric



Purpose: This rubric is designed to help teachers and coaches formatively assess "impactful technology use" (ITU) by students on two dimensions: **frequency and proficiency**. It defines six indicators for ITU and provides illustrative examples of skills for each. These examples are not intended to be exhaustive, but to clarify the opportunities that teachers might create in their classrooms for students to demonstrate ITU.



The frequency rating pertains to how often students have had a chance to demonstrate these skills using technology.



The proficiency rating pertains to how competent or skilled students are in demonstrating these skills using technology.

Instructions: For each ITU indicator, select the frequency and proficiency rating that best describes student technology use in your classes overall. To better understand the dimension of proficiency, also refer to the descriptors provided in levels 1 and 5.

### From surveys

- Definition
- Examples
- Frequencies



Students use technology to develop CREATIVITY and INNOVATION skills. Students use technology to generate and refine solutions to complex problems or tasks using ideation, synthesis, and analysis processes.

#### Example skills:

- Come up with different ideas or solutions and test them out
- Elaborate, refine, analyze and evaluate their ideas or solutions in order to improve them
- Create an original and compelling project incorporating their ideas or solutions



In my classes, students use technology to create and innovate.



My students are proficient in using technology to create and innovate (as appropriate for their grade level).

1. Almost Never

2. A few times per semester

3. Monthly (1-3 times per month)

4. Weekly 1-3 times per week

5. Almost Daily

1. Not at all

2. To a small extent

3. To some extent

4. To a large extent

5. To a very large extent

- Students use technology for copying of ideas, products, solutions or strategies from others rather than demonstrating originality or trying out new ideas.

### New for DLP

- Proficiency ratings with examples

+ Students use technology to demonstrate originality and inventiveness in their work and learn about the limits of their new ideas and how they can be improved.



# Short-Term “Coaching” Snapshots

(pre-post coaching cycles)



## Dynamic Learning Project

### Measure teacher and student short-term progress in impactful technology use

**Purpose:** Based on the Impactful Technology Use (ITU) Rubric, the following questions are designed to measure short-term student and teacher growth in their technology use for developing students’ 21<sup>st</sup> century skills.


**Instructions:** We recommend using these questions when surveying teachers at the beginning *and* at the end of the time frame that a coach works with a teacher in order to measure the growth over time.

#### Student Impactful Technology Use

For each Impactful Technology Use indicator, select the frequency and proficiency rating that best describes student technology use in your classes overall. The [Rubric](#) is available to provide you with more information about ITU, including examples showcasing how teachers might create opportunities for students to demonstrate ITU in their classrooms.

### To guide coaching

- Frequency
- Perceived student proficiency

 <b>Students SELECT RELEVANT TECHNOLOGY TOOLS or resources to learn something new or complete a task at hand</b>				
In your recent teaching, how OFTEN have you asked your students to select relevant technology tools or resources? For example, to: <ul style="list-style-type: none"><li>● Decide which technology tools to use (e.g., computer, cell phone, or notebook)</li><li>● Decide which technology resources to use (e.g. app or website)</li></ul>				
1. Almost Never	2. A few times per semester	3. Monthly (1-3 times per month)	4. Weekly (1-3 times per week)	5. Almost Daily
How PROFICIENT are your students in selecting relevant technology tools or resources (as appropriate for their grade level)?				
1. Not at all	2. To a small extent	3. To some extent	4. To a large extent	5. To a very large extent

# Long-Term “Growth” Measures

(pre-post,  
for the year)



## Dynamic Learning Project

### Measure teacher and student long-term progress in impactful technology use

**Purpose:** Based on the Impactful Technology Use (ITU) Rubric, the following questions are designed to measure long-term student and teacher growth in their technology use for developing students’ 21<sup>st</sup> century skills.


**Instructions:** We recommend using these questions for teachers at the beginning of the year and at the end of the year from both teachers who received coaching and not in order to measure the impact of coaching over time.

### To guide program improvements

- Frequency
- Perceived impact

#### Student Impactful Technology Use

For each Impactful Technology Use indicator, select the frequency and proficiency rating that best describes student technology use in your classes overall. The [Rubric](#) is available to provide you with more information about ITU, including examples showcasing how teachers might create opportunities for students to demonstrate ITU in their classrooms.

 Students SELECT RELEVANT TECHNOLOGY TOOLS or resources to learn something new or complete a task at hand					
In your recent teaching, how OFTEN have you asked your students to select relevant technology tools or resources? For example, to:					
<ul style="list-style-type: none"><li>• Decide which technology tools to use (e.g., computer, cell phone, or notebook)</li><li>• Decide which technology resources to use (e.g. app or website)</li></ul>					
1. Almost Never	2. A few times per semester	3. Monthly (1-3 times per month)	4. Weekly (1-3 times per week)	5. Almost Daily	
How IMPACTFUL was student selection of technology for increasing student engagement and learning?					
1. N/A – not used or first year	2. A negative impact	3. No positive impact yet	4 A small positive impact	5. A moderate positive impact	6. A large positive impact

# Sharing Three (3) Tools for Measuring Impactful Technology Use (ITU)



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Our Blog

## Sharing Tools for Measuring Impactful Technology Use



November 19, 2019 | By Mahsa Bakhtshaei

Benefits: tied to skills, trackable over time

## Rubric (for coached teachers)

- Short- and long-term progress
  - Frequency of practices
  - Perceived student proficiency

## Short-cycle survey (for coached)

- Beginning & end of a coaching cycle
  - Frequency of practices
  - Perceived student proficiency

## Long-cycle survey (for all teachers)

- Beginning & end of the year
- For coached & not coached teachers
  - Frequency of practices
  - Perceived impact on students

# Next Steps @ Google

## Google for Education Certified Coach Program

- **Free, online curriculum and coaching model**
- Helps coaches to support teachers in using technology in impactful ways
- Based on the research of the Dynamic Learning Project; utilizes the ITU framework

Website:

<https://edu.google.com/teacher-center/programs/certified-coach>



Google for Education  
Certified Coach



# Next Steps @ Evaluation by Design

## Worldwide re-use

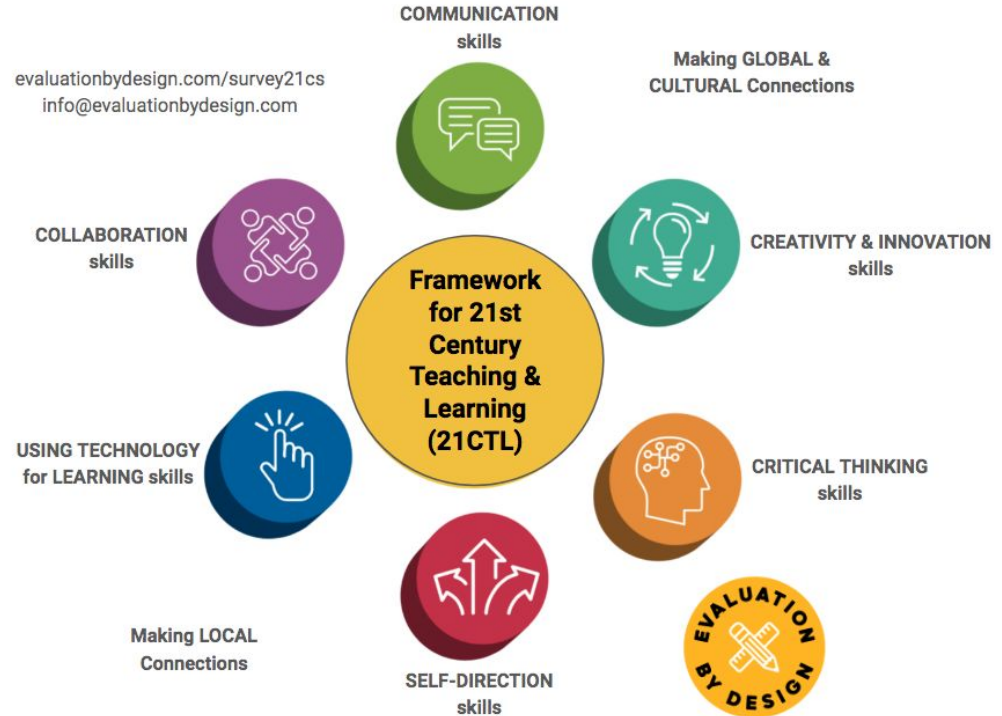
- Building on DLP & WVDE versions
- Key differences
  - Local Connections
  - Global/Cultural Connections
  - Technology for Learning (own skill)

## Student version

- **Workforce Development**
- Completed pilot in NM
- Teacher Dashboards

## Built into online curriculum (“by design”)

- Coaches
- Teachers
- Students



[evaluationbydesign.com/survey21cs](http://evaluationbydesign.com/survey21cs)



## Selected 21CTL Studies



### Extended Professional Development in Project-Based Learning

Impacts on 21st Century Skills Teaching and Student Achievement

West Virginia  
EDUCATION

Office of Research  
Division of Curriculum and Instruction

## US, Published

- West Virginia Department of Education
- Digital Promise / Google (Top 5 Award, SITE 2020)

## US, other

- Maine Ed Policy Research Inst : State Legislature
- Virginia State Univ: Chromebooks & 21st Century Skills
- James Madison Univ.: Professional organizations study
- BreakoutEDU: Elementary digital literacy & Gamification

## International, Published

- **EU:** Trinity College, Dublin (4-country baseline studies)
- **Canada:** Toronto District School Board (Entrepreneurship)
- **Philippines:** Alternative schools journal article

## International, other

- **Egypt:** Governmental schools needs assessment
- **Iraq:** Kurdistan's higher ed (Ishik University-Iraq)
- **Trinidad and Tobago:** Games in STEM (Univ. of West Indies)
- **Sri Lanka:** ESL & 21<sup>st</sup> Century learning (Univ. of Colombo)
- **Turkey:** EFL & 21st century skills (Abant İzzet Baysal Univ)
- **Malaysia:** Several studies (Universiti Sains Malaysia, etc.)
- **Philippines:** Dozens of studies

## Most recent

- Canada
- Pakistan
- China
- Turkey
- Philippines

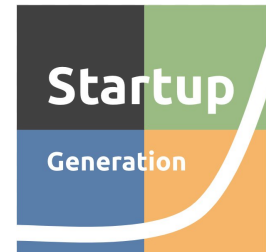
flags show [academia.edu](https://academia.edu) views



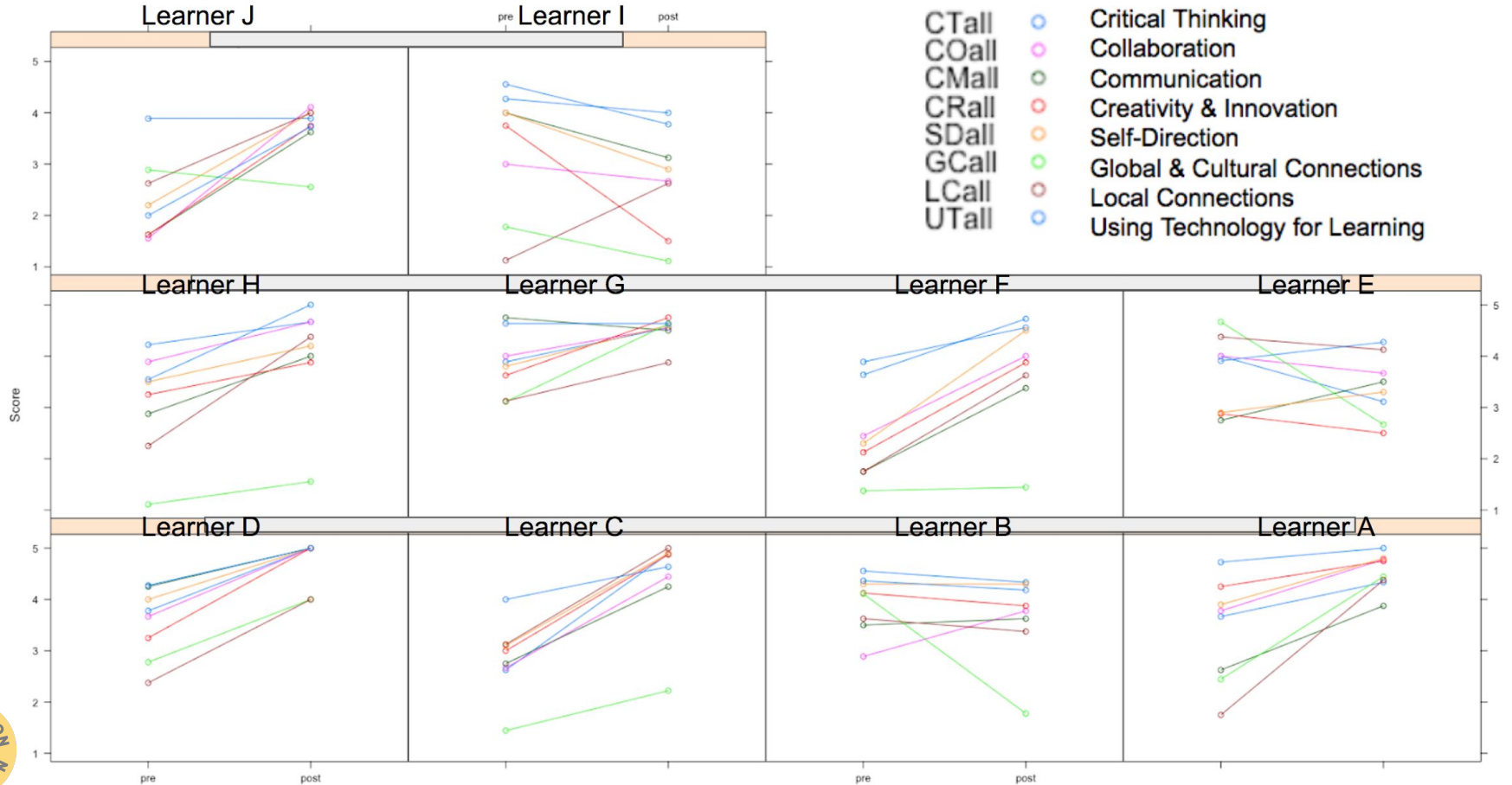
# Adding 21CTL to an existing program “by design”

## Eastern New Mexico Workforce Board & Startup Generation

- **Badging for Entrepreneurship**
  - **Learners**
    - reflect and see their growth
    - collect evidence for badges
  - **Instructors**
    - “know” their online learners better
    - see where changes are needed
    - collect evidence for badges
  - **Projects and funders**
    - Have better data and stories
    - Learn how to improve and grow their impact



# Increasing opportunities to learn





# Guiding Learners & Validating Insights

Let experienced students model behaviors to demonstrate skills and teach others.

Less experienced students...	Need help to...
Communication	<ul style="list-style-type: none"><li>● Make sure their ideas can be heard</li><li>● Practice in a low-stakes setting</li></ul>
Collaboration	<ul style="list-style-type: none"><li>● Know expectations for a successful group</li><li>● Define roles so everyone feels included</li><li>● Pair experienced with less experienced (or bummer lambs)</li></ul>
Critical Thinking	<ul style="list-style-type: none"><li>● Gently solicit opinions or ask for summaries of what others say</li><li>● Model questioning techniques and ask them directly to try</li></ul>
Creativity & Innovation	<ul style="list-style-type: none"><li>● Encourage trying out ideas that end up not working</li><li>● Play brainstorming games where there are no bad ideas</li></ul>



**Next step:** Online modules to gather evidence and ratings to validate (e.g., Ravitz & Hoadley, 2005)

# Next Steps @ Google

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Google for Education  
Certified Coach



# More info

Digital Promise



[digitalpromise.org/initiative/dynamic-learning-project/research/](https://digitalpromise.org/initiative/dynamic-learning-project/research/)

Evaluation by Design



[evaluationbydesign.com/survey21cs](https://evaluationbydesign.com/survey21cs)

Google

[edu.google.com/teacher-center/programs/certified-coach/](https://edu.google.com/teacher-center/programs/certified-coach/)

