Ravitz, J., Bakhshaei, M., Hardy, A., & Seylar, J. (2020). *Assessing Classroom Technology Use for 21st Century Skills: A Research-Based Rubric*. International Society for Technology in Education (ISTE), Nov 28- Dec 1, 2020, Anaheim, United States.

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

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Evaluation by Design

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Digital Promise

Purpose and objectives

The Dynamic Learning Project (DLP) is a coaching program — launched in 2017-2018 — that helps teachers use technology in impactful ways to improve teacher practice and student engagement and learning. In its first year, the program helped 50 low-income middle schools in five U.S. states engage one site-based technology coach. In the second year, the program expanded to 100 elementary, middle, and high schools in seven total states.

The program provided coaches and principals in the participating schools with a defined coaching model as well as sustained mentorship and professional development. Each year, coaches provided personalized support to teachers during four eight-week coaching cycles, allowing more than 1,100 teachers in year 1 and 1,945 teachers in year 2 to participate.

This research session shares the Impactful Technology Use (ITU) Rubric and associated survey questions that were developed by the researchers and practitioners of this coaching program to provide participating teachers and coaches with scaffolding to help them use technology in more impactful ways. By discussing the process of the development and validation of the rubric, attendees understand how this tool can be used in their settings to support meaningful technology use.

Perspective

It is well documented that K-12 instruction that prepares students to navigate in a global society should foster 21st century skills, including the “4Cs”, communication, collaboration, creativity and critical thinking (NRC, 2013). It is also well documented that technology can enhance teaching and learning (US Department of Education, 2017).

Previous studies provided resources that help advance students' 21st century competencies in classroom practices (NEA, 2012; Hixson, Ravitz, & Whisman, 2012). However, there is still a need for high-quality tools that help educators purposefully use technology to develop 21st century skills through learning experiences. The existing tools for supporting meaningful technology use are neither fully aligned with 21st century skills (e.g., SAMR and Technology Integration Matrix) nor do they provide educators with a framework that guides reflection on growth in technology integration over time (Budhai & Taddei, 2015).

We addressed this gap by conceptualizing and designing our ITU Rubric that focuses on technology uses for developing students' 21st century skills. It provides educators with a tool for professional growth and helps them reflect on their progress in using technology to develop students' 21st century skills.

In this study, we investigate four research questions to establish the usefulness of the Rubric in helping educators improve impactful technology use in their practices:

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

2. How frequently do students use technology in impactful ways in their classrooms? Through which specific classroom practices?

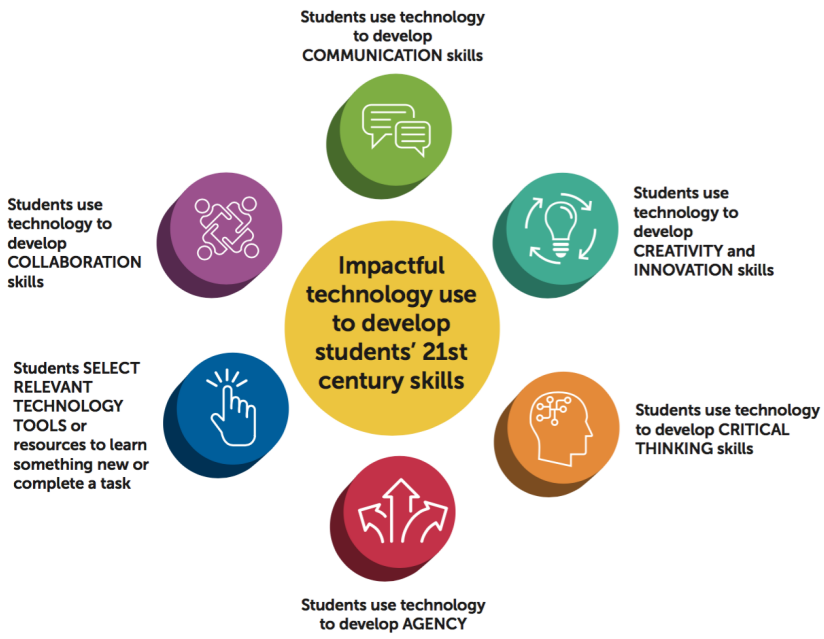
3. To what extent do teachers believe these students' technology uses have a positive impact on their engagement and learning?

4. 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?

Research methods

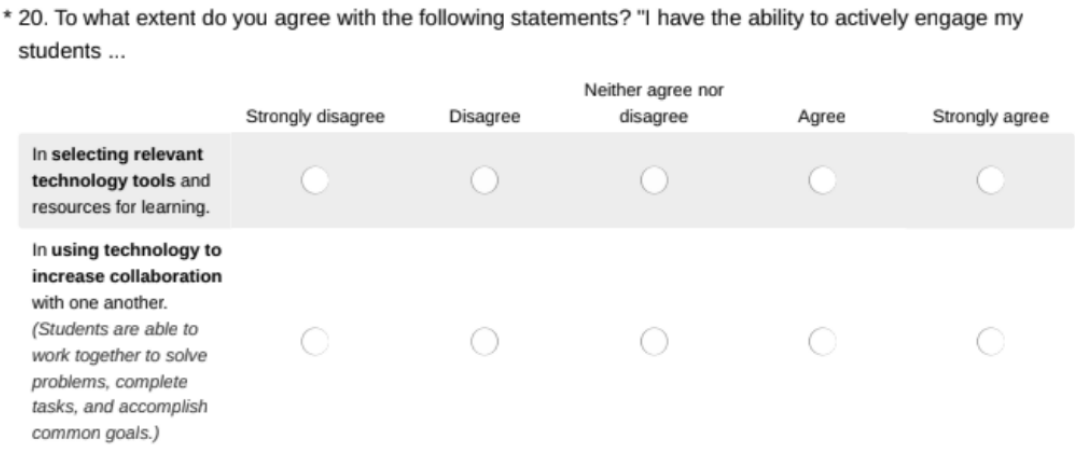
Following West Virginia's 21st Century Survey (Hixson, Ravitz, & Whisman, 2012), our ITU Framework was born in August 2017. It included five core areas of 21st century skills from the West Virginia survey that showed very strong reliability: Critical thinking, collaboration, communication, creativity, and agency. Definitions were drawn from a general body of research, but expanded to include an explicit link to technology use (NEA, 2012; Framework of the 21st century skills, 2012). We also conceptualized a sixth indicator focused on the selection of relevant technology tools. These six indicators together formed the ITU Framework (Figure 1).

Figure 1. ITU Framework



This framework was employed in our surveys, asking teachers the extent to which they agreed they had the ability to engage their students in developing each of the skills (Figure 2).

Figure 2. Sample survey question on teacher confidence in selecting and using technology in impactful ways



While this framework helped educators conceptualize ITU, it did not provide them with a coherent set of criteria to formatively reflect on their progress in ITU. Therefore, a team

of educational practitioners and researchers worked together to develop the ITU Rubric (Figure 3). This Rubric defined five descriptors of development for each of the six indicators (‘ready to use’, ‘emerging’, ‘developing’, ‘mastering’ and ‘innovating’) with one or two illustrative — but non-exhaustive — examples at each level.

Figure 3. The first version of ITU Rubric

Impactful Technology Use

This rubric provides illustrative examples of how each indicator of "impactful technology use" could present itself in the classroom. We hope that these descriptions will assist in leveling student behaviors not explicitly represented below. The descriptions in this rubric are not intended to be exhaustive.

If you are filling out Snapshots, please place your classroom on the rubric based upon student behaviors for each indicator of "impactful technology use."

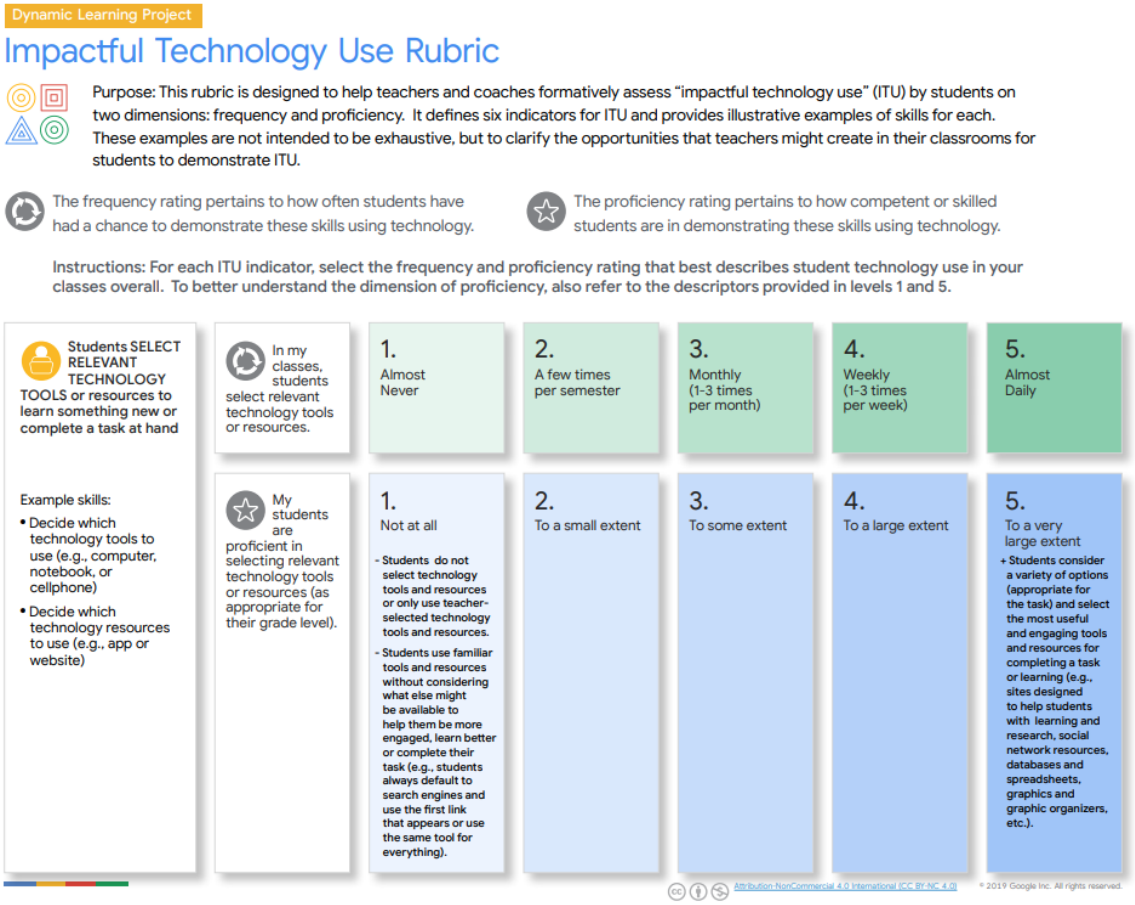
Impactful Technology Use		Descriptions of Development				
Indicator	**Short Description**	**1-Ready to start**	**2-Emerging**	**3-Developing**	**4-Mastering**	**5-Innovating**
Students select relevant technology for learning	The extent to which students can select relevant technology tools and resources 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 from variety 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.
Students develop collaboration skills	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.

User testing among teachers and coaches suggested this version could be improved to provide clearer dimensions. While the descriptors accompanied by illustrative practices helped them understand what ITU could look like at different levels of performance, these example practices could be misinterpreted as being required rather than just illustrative, and made the Rubric feel text-heavy and difficult to digest across different grades or subjects. In addition, we realized this version presented more advanced levels of development as the addition of more practices, without capturing the frequency or differences in these activities. For example, having students involved in explaining concepts to peers, providing feedback to peers, and completing group assignments are three ways of using technology for collaboration that may or may not represent a “mastering” level of student proficiency or positive impact on teaching and learning.

The above insights resulted in an updated version of the Rubric that includes dimensions of both frequency and proficiency (Figure 4). The frequency rating concerns how often students engage in ITU activities. The proficiency rating concerns teacher perception of student ITU proficiency. In this version, instead of providing example practices for each proficiency level, we provide illustrative examples for the indicator as a whole as well as a description of student use at the lowest and highest levels of proficiency.

Among coached teachers, we measure these two dimensions in teacher surveys at the beginning and end of each eight-week coaching cycle, then share data reports to help teachers and coaches reflect on their progress in using technology to develop student 21st century skills. These coaching experiences and ratings of student proficiency are kept between teachers and coaches and are not used in our research.

Figure 4. The last version of ITU Rubric



In our research, we use a pre- and post- survey that is administered annually to all teachers, regardless of whether they received coaching or not, to measure:

1. Teachers' self-rating ability to engage students in ITU (question shown in Figure 2)
2. Frequency of student ITU (Figure 5)
3. Impact of ITU on student engagement and learning (Figure 5).

We present teacher responses (N for coached teachers = 1,546; N for non-coached teachers = 1,162) from our year 2 post-survey to show the extent to which these three sets of questions are strong measures to assess teacher and student ITU. Including teachers not participating in our coaching program gives us a chance to see whether these rubric-based items are "sensitive to treatment" or able to pick up distinctions in teachers' experiences, practices and perceptions.

Figure 5. Sample survey question on impact of ITU on student engagement and learning

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:

- Decide which technology tools to use (e.g., computer, cell phone, or notebook)
- Decide which technology resources to use (e.g. app or website)

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?

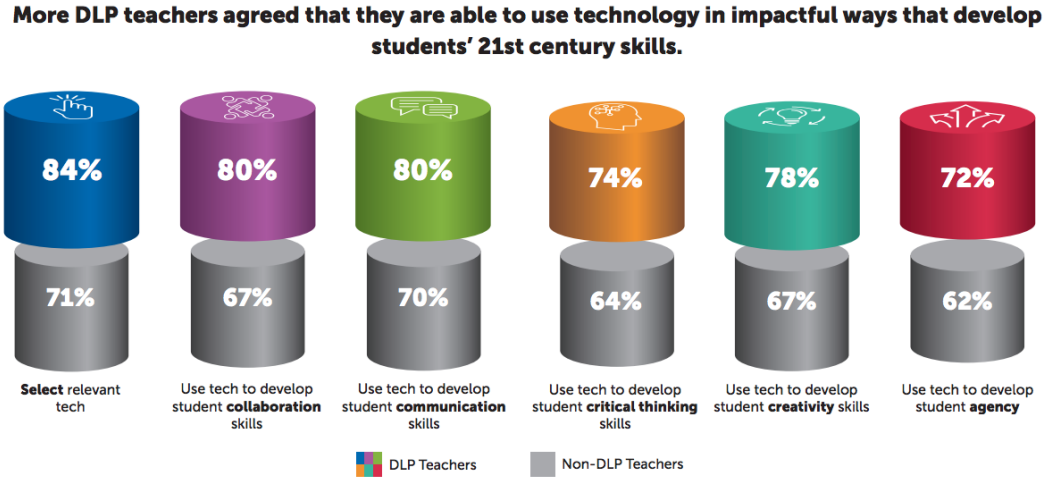
1. N/A – not used or first year	2. A negative impact	3. No positive impact yet	4 A small positive impact	5. A moderate positive impact	6. A large positive impact

Results

Teacher self-rating ability to engage students in ITU

As shown in the following chart, a majority of teachers agreed they were able to use technology in impactful ways with students. This was especially true for teachers who received coaching.

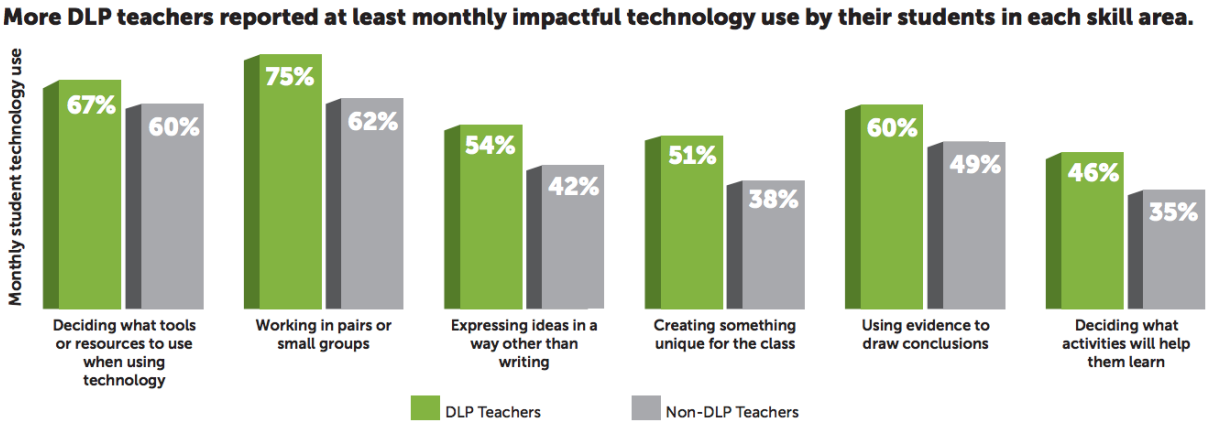
Chart 1. Teacher self-rating of ability to engage students in ITU



Frequency of student ITU

Teacher confidence in using technology in impactful ways was reflected in frequent impactful technology use by their students (Chart 2). At least 35% of teachers reported impactful technology use by their students in each skill area at least monthly. This rises to nearly half of the teachers who received coaching. The most frequent monthly impactful technology use involved students using technology to collaborate in pairs or small groups. This was followed by students deciding what tools or resources to use. Students less frequently used technology for exploring ideas in a way other than writing, creating something unique for the class or deciding what activities will help them learn.

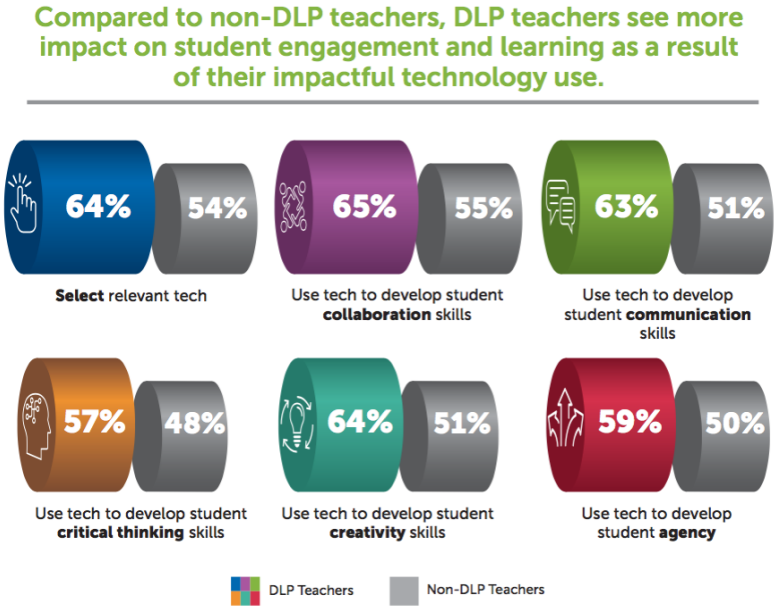
Chart 2. Frequency of monthly ITU, examples from each skill area



Perceived impact of ITU on student engagement and learning

As shown in the chart below, a majority of teachers reported a "positive impact on student engagement and learning" from student ITU, with an average of 62% of coached teachers reporting a positive impact for each use compared to 52% of non-coached teachers. The uses of technology that teachers reported had the greatest impact on student engagement and learning involved student development of collaboration skills, creativity skills, ability to select relevant technology, and communication skills.

Chart 3. Percent of teachers reporting positive impact on student engagement and learning



Predicting perceived impact of ITU on student engagement and learning

As Table 1 shows, the perceived impact of ITU on student engagement and learning is correlated to teacher self-rating of ability to engage students in ITU and to frequency of student ITU to practice these skills. However, the stronger correlation was to frequency of student ITU index scores. For example, for impact of ITU creativity, critical thinking and agency the correlation to frequency of ITU practices was .55 or higher, while the correlation to self ratings was .40 or lower.

Table 1. Correlation between impact of ITU on students' engagement and learning and teacher self-rating of ability in ITU and frequency of student ITU

	Correlations	
Teachers' perceived impact of ITU on student engagement and learning	Frequency of ITU Practices	Teacher Self-Ratings of ITU ability
Agency	.57	.36
Critical Thinking	.56	.40
Creativity	.55	.36
Communication	.45	.32
Collaboration	.46	.35
Selection of Tech Tools	.33	.29

This suggests that teacher 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. Furthermore, in our analyses comparing teachers who received coaching outside our technology-focused program to those in the program, we saw relatively small differences in self-rating of ability to engage students in ITU, and larger differences in the frequency of student ITU and the perceived impact of ITU. Therefore, while teacher self-ratings of capabilities may have a place in the evaluation of the implementation of meaningful use of technology, it seems more helpful to consider the actual frequency of technology use activities.

Reliability of rubric measures

Analyses of the teacher survey showed the measures of teacher self-rating ability to engage students in ITU, frequency of student ITU practices, and teacher perceived impact of ITU on student engagement and learning all three demonstrated strong reliability (Standardized Alpha > .90 for combined indices). The frequency of student ITU practices items produced reliable index scores consisting of 2-4 items for each skill (Standardized Alpha > .80 or item correlations > .74).

Educational or scientific importance

The purpose of this research session is to share the process of developing, user testing and validating a rubric that educators can use to self-assess their growth in classroom technology use. We employed the rubric items into a survey study to better understand the perceptions of teachers regarding their ability to engage students in ITU. We found that teachers' reports of frequency of actual activities occurring in the classroom as captured by our newer version of the rubric were better predictors of impact than teacher self-ratings, and they were also more closely tied to participation in the program. The resulting rubric and surveys from this study can help educators and researchers reflect on which are the most impactful technology uses in specific grades and subjects, where teachers think students need help, and how to increase impact through coaching and use of rubrics.

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