The Learning Accelerator

Student Creativity Survey Pilot
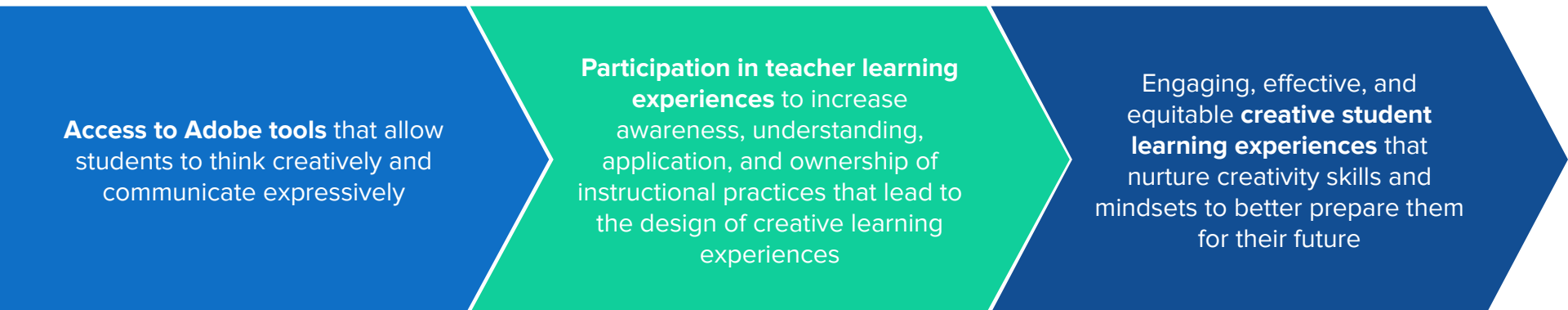*Descriptive Observations & Trends*

March 2023

BL BetterLesson®

Research Opportunity

Currently, a disconnect exists between the [demand for creativity in the workplace](#) and how students are provided with opportunities to develop creativity skills — this disconnect is even more stark in schools that serve global majority students who live in low-income communities leading to not only a digital divide but also an opportunity divide. While teachers have expressed the desire to learn how to foster creativity, they do not always know how to factor it into instructional design or have access to the tools and professional learning to make it a reality.

How might partnering with Adobe, BetterLesson, and TLA tackle this challenge?

Access to Adobe tools that allow students to think creatively and communicate expressively

Participation in teacher learning experiences to increase awareness, understanding, application, and ownership of instructional practices that lead to the design of creative learning experiences

Engaging, effective, and equitable **creative student learning experiences** that nurture creativity skills and mindsets to better prepare them for their future

Operational Definition of Creativity

Creativity is the competence to leverage self-interests, motivation, imagination, and prior knowledge in flexible ways[1] to generate, evaluate, or improve ideas; imagine new ways of solving problems;[2] forge new connections — across content and people;[3] create new understanding; or communicate thinking through writing, drawing, voice, music, or any other means of expression.[4]

Research Big Picture: Purpose

The Purpose of this study is to **measure the effect** of providing districts with **access to creative tools** — for both teachers and students — as well as **high-quality professional learning** to develop educator skills, capacities, and mindsets to design learning experiences that foster student creativity skills.

Research Big Picture: *Objectives*

1. Examine the effects of active participation in professional learning on **educators' beliefs, mindsets, and understanding about fostering student creativity**;

2. **Understand students' perceptions** about their participation in learning opportunities designed to foster creativity;

3. Examine the effects of engaging in creative learning opportunities on the **development of students' creativity, critical thinking, and creative communication skills**;

4. **Identify instructional strategies and practices** that lead to the design and implementation of student creativity, critical thinking, and creative communication skills; and

5. **Understand the system conditions** required to support educators in the design and implementation of learning experiences that foster student creativity.

Project Phase 2 - Design & Pilot a Survey to Understand Students' Perceptions and Behaviors

Student Creativity Survey Overview

To measure *creativity*, we broke the overarching theory into four separate dimensions based on the *4Ps of Creativity*[5]: person, press, process, and product. The *process* dimension was then divided into specific constructs: creative communication, creative problem-solving, and creative thinking.

Dimension	Definition
Person	The Creative Person dimension is defined as the mindsets of the creative person. The student survey then measures mindsets that facilitate their creativity.
Press	The Creative Press dimension refers to contextual, environmental, cultural, linguistic, as well as social factors and how the creative person interacts with and perceives the relevance of these factors that influence their imagination, a sense of purpose, and curiosities.
Process	The Creative Process dimension involves the generative actions that engage a student's motivation, perception, learning, thinking, and communicating. Process, therefore, represents students' creative process - their creative communication, creative problem-solving, and creative thinking - and, more specifically, how instructional experiences and learning facilitate that process.
Product	The Creative Product is the physical representation of creative ideas. In this context, we want to measure students' attitudes and experiences toward developing products that represent their novel ideas.

Creativity Dimensions & Measures

The different dimensions map onto two levels - **Perceptions** and **Behaviors**. Students then responded to questions aligned to different measurement scales.

Dimension	Level	Scale
Person **Press**	Perception	*1 = Strongly Disagree* *2 = Disagree* *3 = I'm not sure* *4 = Agree* *5 = Strongly Agree*
Process **Product**	Behavior	*1 = Never* *2 = Sometimes* *3 = I'm not sure* *4 = Often* *5 = All the Time*

Survey Dissemination

The Student Creativity Survey intended to measure students' perceptions and behaviors around creativity. During this initial pilot phase, we asked a group of classroom teachers of students in grades 6-10 to ask their students to complete the survey so that the TLA research team could assess the reliability (analysis of Cronbach's alpha) and validity (confirmatory factor analysis) of the instrument. To run these statistical tests, the team needed a MINIMUM of 250 responses.

Because we used a purposive sample of teachers from a small number of schools, the results should be considered preliminary and the findings descriptive.

Survey Respondent Demographics

# Sample Composition

Seven teachers of grades 6-12 from four schools (2 charter, 1 public, and 1 private) asked their students to complete the survey (n=324). Collectively, these schools served a diverse student population from across the country. The teachers provided demographic data about their students.

Percentage of Students Who Identify As...
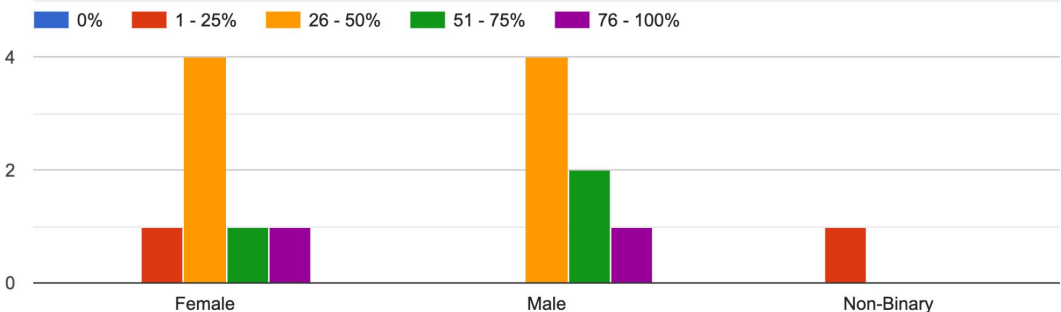
Percentage of Students Who Identify As...
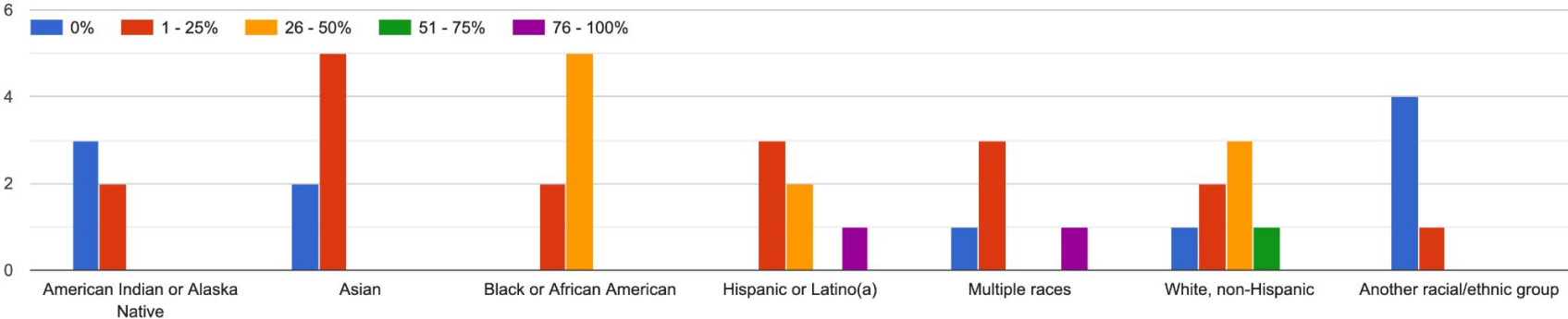
Data Analysis Process

We completed the process below to analyze the data from the survey:

1. Conducted a [Confirmatory Factor Analysis (CFA)](#) to determine how many factors might be represented in the data structure. This was the first step towards determining whether the survey might be statistically valid.
2. Examined the [internal consistency and reliability](#) for each of the seven scales by conducting an analysis of Cronbach's alpha.
3. Built [correlation matrices](#) (Pearson's Correlation) to examine the relationship between each of the survey items associated with each construct.
4. Completed a [descriptive analysis](#) of each survey item (mean, median, and standard deviation).
5. [Modeled the data](#) within each dimension and sub dimension to look for trends.

Limitations

With this first pilot, our goal was to test the survey with students so that we could understand whether it will be a reliable and valid measure to help the field understand their perceptions and behaviors around creativity. In addition, we wanted to understand the usability of the instrument in terms of length and clarity of the questions.

Given the small sample size, and limited number of participating classes, the findings presented on the following slides should be considered observations.

Analysis by Dimension

Person (Perception)

The mindsets of the person that facilitate their creativity.

Interestingly, the students indicated strong levels of agreement when asked whether they were not afraid to express their ideas and whether they could get better at being creative. At the same time, the highest levels of *disagreement* surrounded the question about fearing failure.
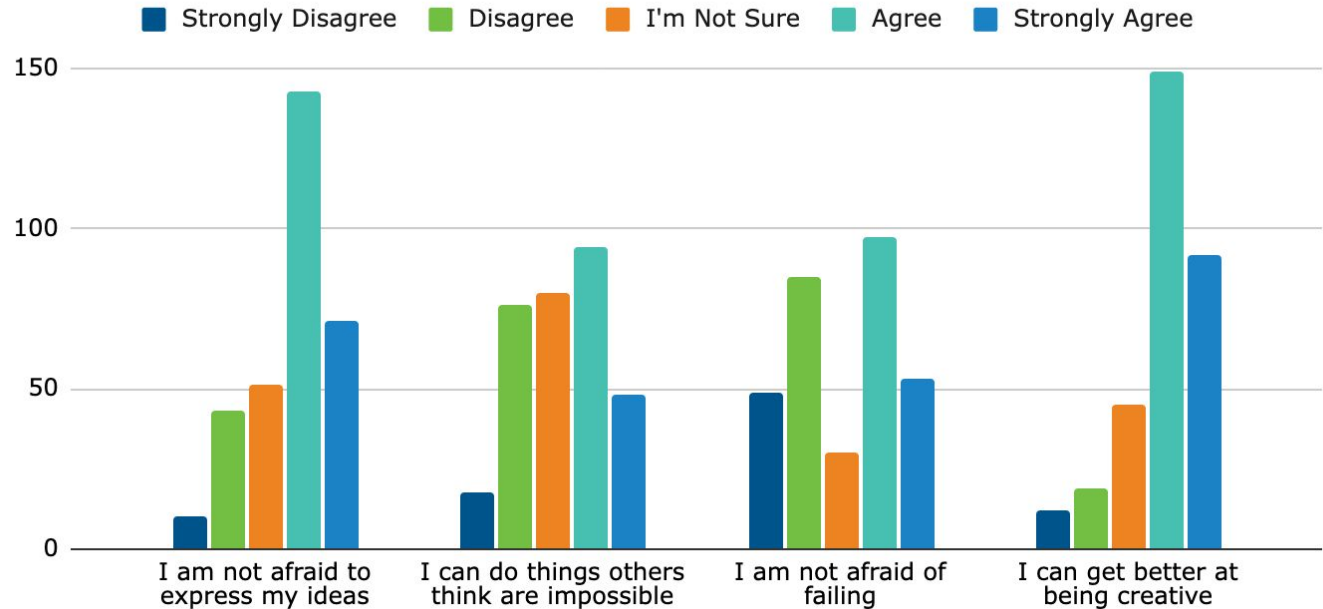
Press (Perception)

The contextual, environmental, cultural, linguistic, as well as social factors that influence a person's imagination, sense of purpose, and curiosities.

Students indicated strong levels of agreement with the items in this dimension of the survey, particularly the question about coming up with solutions to problems by relying on prior knowledge.
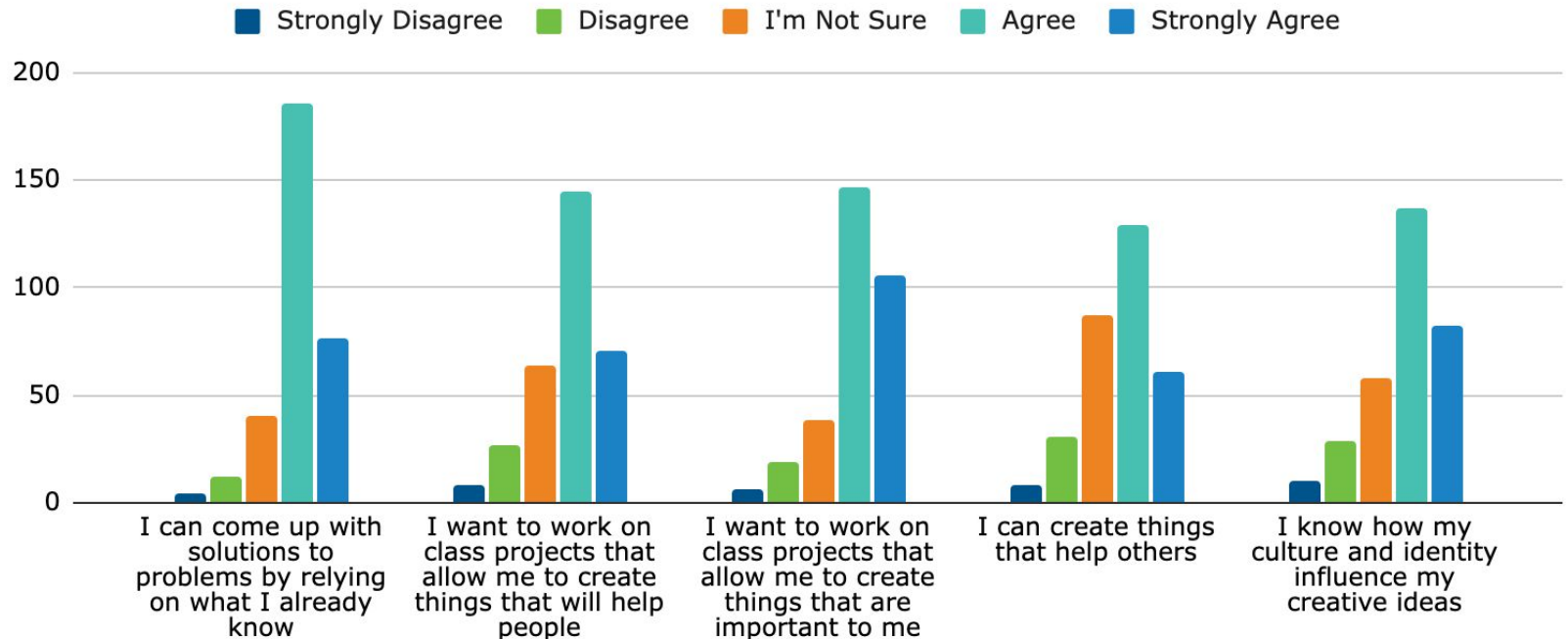
Process (Behavior)

The generative actions that engage a student's motivation, perception, learning, thinking, and communicating- their creative communication, problem-solving, and thinking.

The majority of survey items associated with this dimension addressed either *creative problem-solving* or *creative thinking*. We present our observations from those sub-dimensions on the next page.

The one item about *creative communication* revealed that the students were largely split between their teachers *sometimes* or *often* asking them to share their ideas.

Creative Communication: *My teacher asks me to share my ideas.*
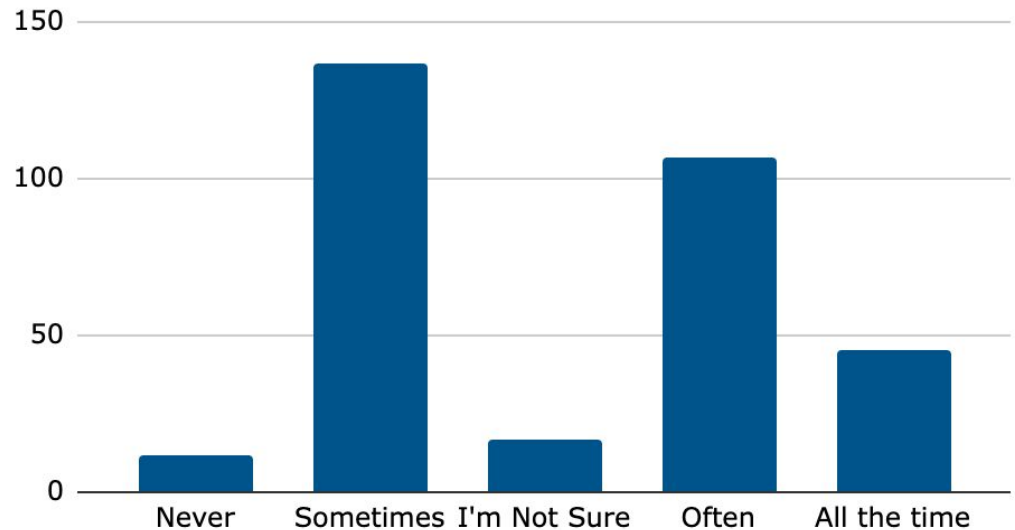
Process - Creative Thinking (Behavior)

Students are able to look at problems or situations from a fresh perspective. They engage productively in the generation, evaluation and improvement of ideas that can result in original and effective solutions, advances in knowledge, and impactful expressions of imagination.

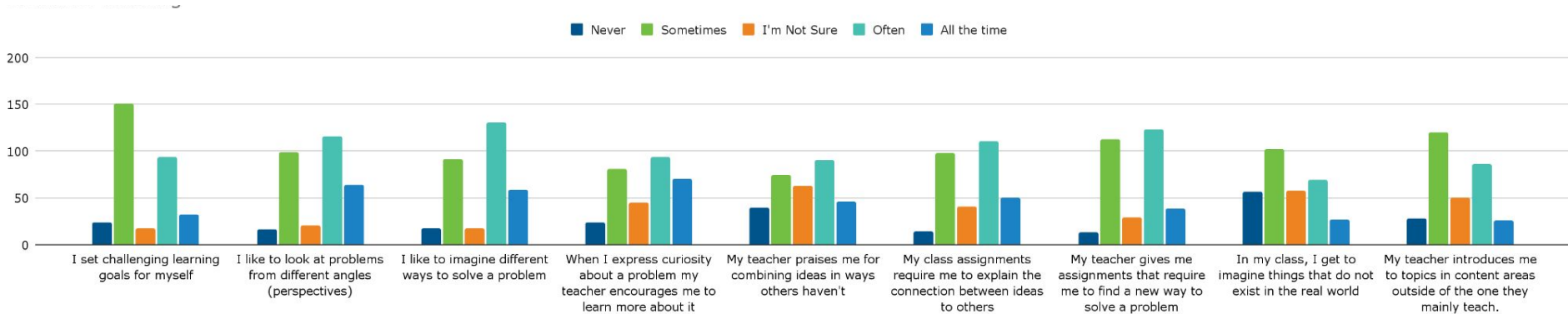Across survey items, students indicated that they *sometimes* or *often* engage in those behaviors. Of note, the *least* frequently reported behaviors were those that asked about students using their imaginations: (a) *My teacher praises me for combining ideas in ways others haven't*, and (b) *In my class, I get to imagine things that do not exist in the real world*.

Legend: ■ Never ■ Sometimes ■ I'm Not Sure ■ Often ■ All the time

Categories:
- I set challenging learning goals for myself
- I like to look at problems from different angles (perspectives)
- I like to imagine different ways to solve a problem
- When I express curiosity about a problem my teacher encourages me to learn more about it
- My teacher praises me for combining ideas in ways others haven't
- My class assignments require me to explain the connection between ideas to others
- My teacher gives me assignments that require me to find a new way to solve a problem
- In my class, I get to imagine things that do not exist in the real world
- My teacher introduces me to topics in content areas outside of the one they mainly teach.

Process - Creative Problem-Solving (Behavior)

Students are able to look at problems or situations from a fresh perspective. They engage productively in the generation, evaluation and improvement of ideas that can result in original and effective solutions, advances in knowledge, and impactful expressions of imagination.
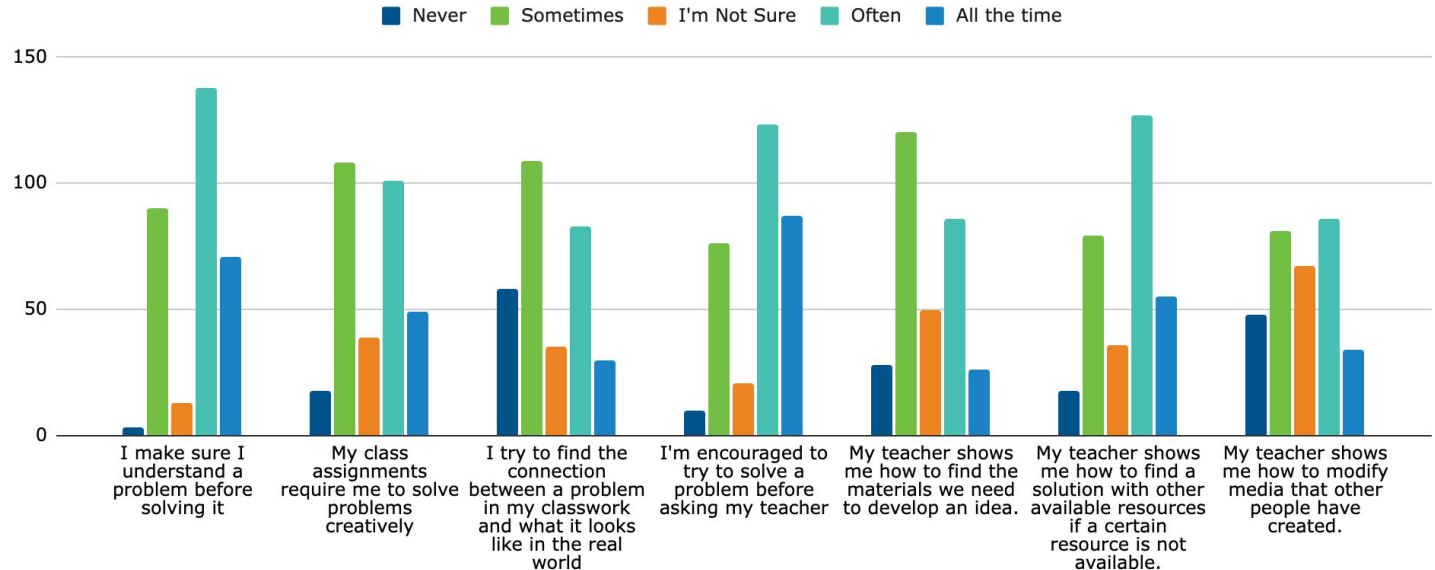
Across survey items in this sub-dimension, we made a few observations. The most frequently reported behaviors were associated with students working independently. In contrast, one of the least frequently reported behavior was related to finding connections to the real world.

Product (Behavior)

Students' attitudes and experiences toward developing products that represent their creative and novel ideas.

With creative products, we observed an interesting dichotomy. While a substantial percentage of students reported that their teachers allow them to show creativity in their work and to produce digital products, they also indicated that their teachers praise them for those efforts with less frequency.
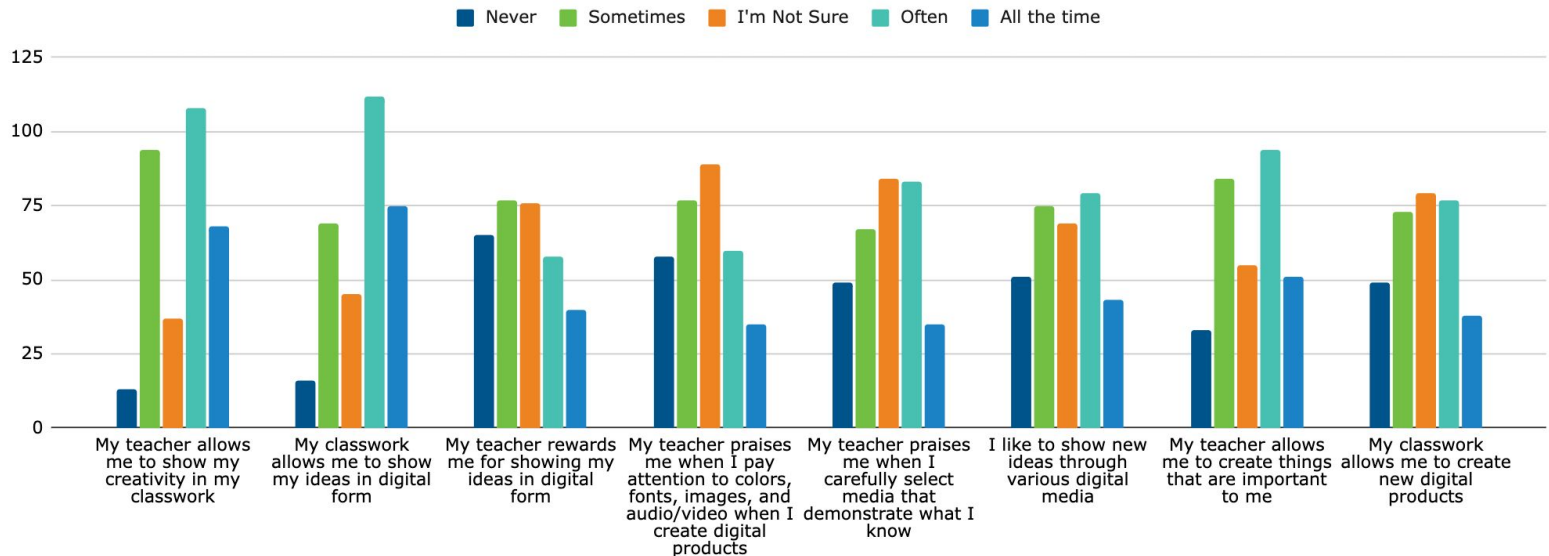
Highlights

- Students **expressed confidence in their own creativity** and indicated that they could improve their creativity knowledge and skills.
- When asked about their behaviors, **students tended to report that they *sometimes* or *often* engaged in that activity**.
- When asked about individual actions - such as solving problems independently - students reported those behaviors with higher frequencies.
- **A disconnect may exist between what teachers allow students to do and what they reward students for doing.** This should be further explored.
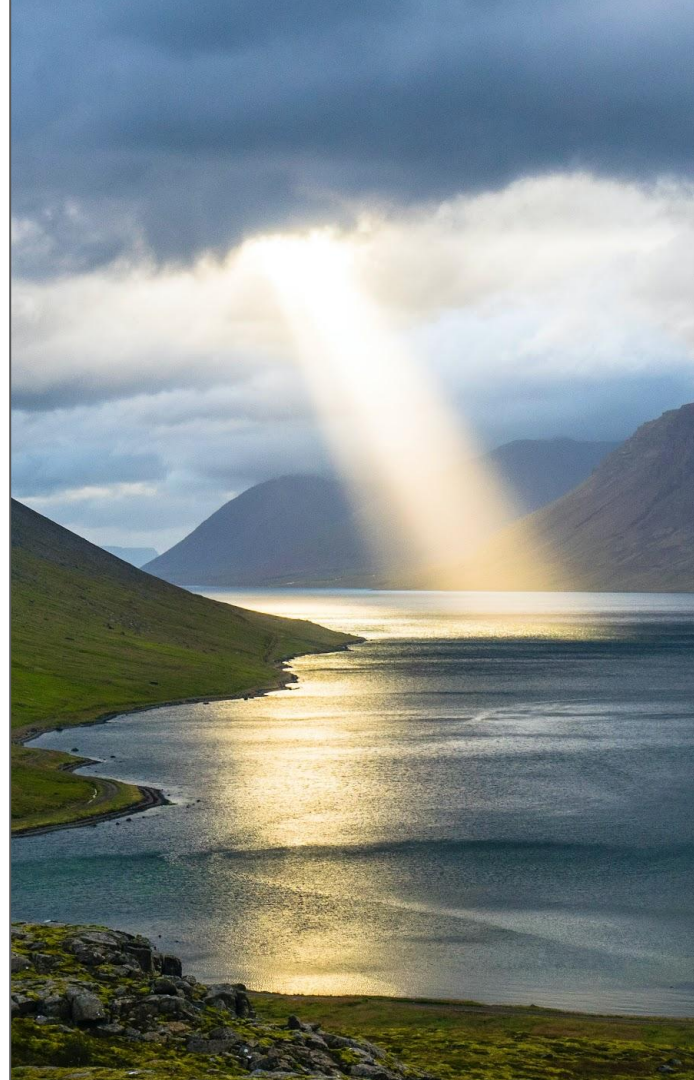
Teacher Feedback

We asked the teachers who disseminated the survey to provide feedback about the experience.

- Many students struggled with the length of the survey and lost interest.
- Two of the teachers requested to see the data from their classes and indicated that they would be interested in learning more. **At the same time, they also reported that they could not devote substantial time to another project.**
- In a high school math class, the teacher reported that the students found the survey confusing because, "we don't do these things in class." The recommendation was to include NA as an option on future surveys.
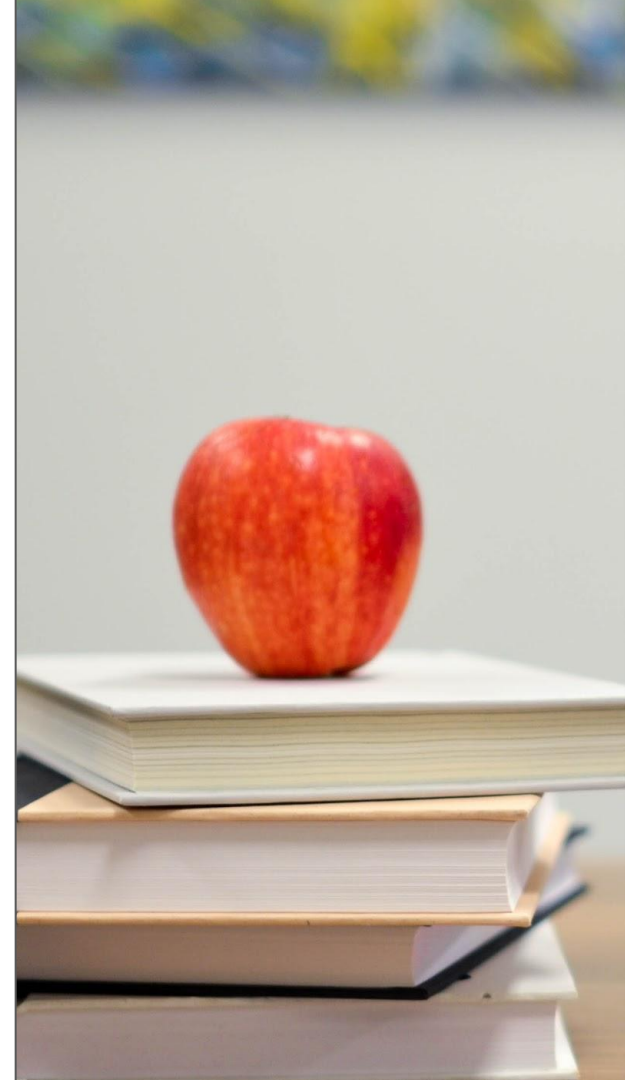
Next Steps

- Based on teacher feedback as well as our analysis, we have revised the Student Creativity Survey and will make it available for other schools and systems to use. This tool intends to help teachers and leaders understand their students' perceptions and frequency of reported behaviors.

- Once enough data has been collected with the revised Student Creativity Survey, we will conduct a second Confirmatory Factor Analysis (CFA) to assess its validity and repeat our reliability analysis.

- The next phase of the project is to design and test a protocol to inform teachers' instructional practices and help students build more concrete language to talk about creativity with technology.
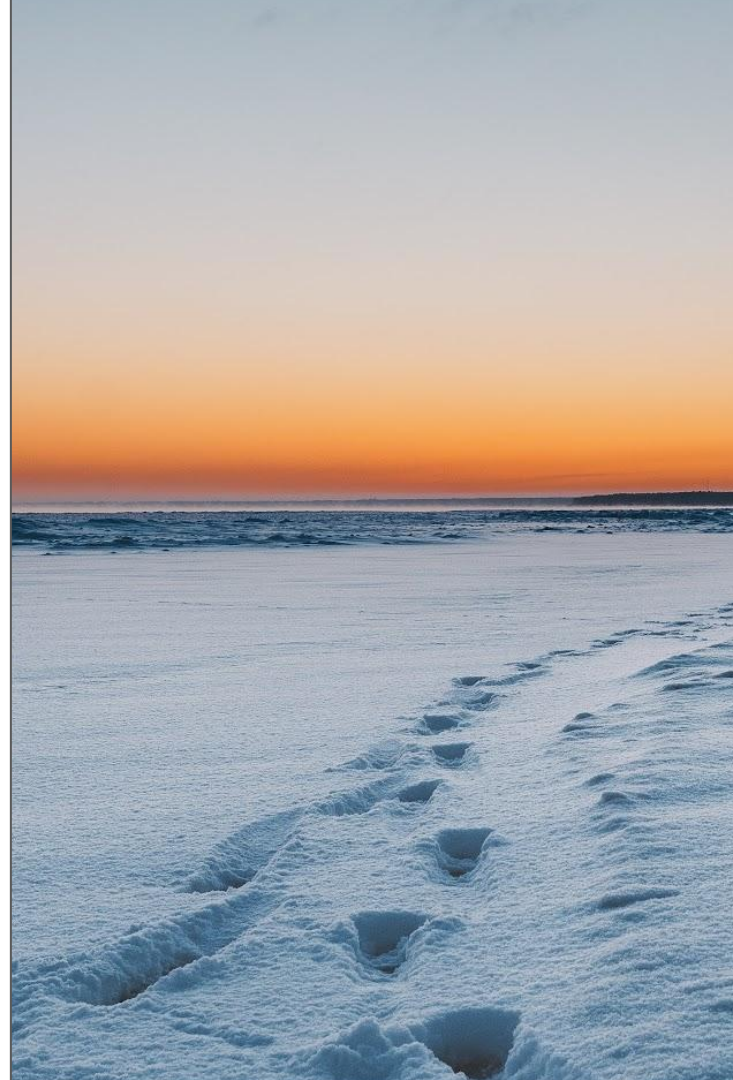
Appendix A - Survey Assessment

Confirmatory Factor Analysis (CFA)

We conducted a Confirmatory Factor Analysis using 271 middle and high school students, grades 7-12, across 17 classrooms in a limited number of districts. We tested a four-factor model representing the Person, Press, Process, and Product dimensions underlying the Student Creativity Survey. We evaluated the measurement model's fit using goodness of fit indices. Chi-square (df = 554) = 1095.070, p<.001, the value of RMSEA [.06, (LLCI = .055, ULCI = .065)], and the value of SRMR (.069) suggest reasonable model fit to the data. However, the values of CFI and TLI, though close to the cut-off, do not indicate a good model fit.

The CFA is significantly underpowered. Minimum sample size guidelines suggest a 10:1 or 20:1 ratio for observations and free parameters. Our model has 76 free parameters, meaning that we would need a minimum sample size of 760 to accurately assess the validity of this instrument. Further validity study of this measure is encouraged with a larger and more representative sample of students. In addition, we recommend using item-level statistics to inform instructional decisions. Any inferences based on dimension-level scores should be made with caution and in concert with other evidence (e.g., observational data).

Confirmatory Factor Analysis (CFA) - Outputs for Person & Press

While not all of our indices indicate a goodness of fit, the items highlighted in blue have the strongest relationship with the latent factor. These items are the quintessential representation of the concept we want to convey and will inform revisions to the survey instrument.

Person	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Pers1	1.000			0.586	0.57	
Pers2	1.249	0.170	7.34	0	0.732	0.635
Pers3	0.884	0.176	5.021	0	0.518	0.378
Pers4	0.982	0.140	7.000	0	0.576	0.587

Press	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Press6	1.000			0.433	0.545	
Press7	1.747	0.211	8.267	0.000	0.756	0.773
Press8	1.360	0.180	7.542	0.000	0.589	0.646
Press9	1.567	0.198	7.935	0.000	0.678	0.708
Press10	1.231	0.189	6.528	0.000	0.533	0.518

Confirmatory Factor Analysis (CFA) - Outputs for Process

The items highlighted in blue have the strongest relationship with the latent factor of Process and represent *creative thinking* and *creative problem-solving*.

Process	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Proc11	1.000			0.262	0.275	
Proc12	1.880	0.499	3.764	0.000	0.493	0.406
Proc13	1.544	0.432	3.576	0.000	0.405	0.355
Proc14	2.652	0.642	4.133	0.000	0.695	0.566
Proc15	2.488	0.621	4.004	0.000	0.652	0.497
Proc16	2.889	0.690	4.187	0.000	0.757	0.603
Proc17	2.505	0.613	4.089	0.000	0.656	0.540
Proc18	2.963	0.709	4.181	0.000	0.776	0.599
Proc19	3.016	0.716	4.213	0.000	0.790	0.623
Proc20	2.683	0.644	4.165	0.000	0.703	0.587
Proc21	2.402	0.592	4.059	0.000	0.629	0.524
Proc22	2.583	0.624	4.140	0.000	0.677	0.571
Proc23	1.248	0.397	3.141	0.002	0.327	0.271
Proc24	1.718	0.477	3.600	0.000	0.450	0.361
Proc25	2.126	0.537	3.961	0.000	0.557	0.477
Proc26	2.693	0.646	4.170	0.000	0.706	0.591
Proc27	2.908	0.685	4.242	0.000	0.762	0.647
Proc28	2.703	0.653	4.137	0.000	0.708	0.569

Confirmatory Factor Analysis (CFA) - Outputs for Product

The items highlighted in blue have the strongest relationship with the latent factor of Product. Within this dimension, the majority of the survey items loaded reasonably well.

Product	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Prod29	1.000				0.850	0.699
Prod30	0.854	0.093	9.152	0.000	0.726	0.597
Prod31	1.051	0.100	10.471	0.000	0.893	0.687
Prod32	1.019	0.095	10.670	0.000	0.866	0.701
Prod33	1.115	0.096	11.614	0.000	0.948	0.767
Prod34	1.017	0.100	10.142	0.000	0.865	0.664
Prod35	0.995	0.097	10.225	0.000	0.846	0.670
Prod36	0.981	0.097	10.143	0.000	0.834	0.664

Internal Consistency & Reliability

We examined the internal consistency and reliability for each of the four dimensions by conducting an analysis of Cronbach's alpha. We also examined reliability at the dimension level to build evidence for subscale or scale-level reporting and recommendations. As shown in the table, all four dimensions exhibited sufficient internal consistency reliability. The alpha coefficients ranged from .630 to .871 with the benchmark value >=.70.

At the dimension level, the survey items associated with *Person* had the lowest level of reliability. This indicates that these perception questions may not always reliably measure individual mindsets and should be further examined. Given this finding and the CFA results, we recommend descriptively analyzing the data at the item level until further validation and testing can occur.

dimension	N	Alpha Coefficient
Person	318	.630
Press	319	.732
Process	317	.859
Product	320	.871

Appendix B - Correlation Matrices

Person (Perception)

A Pearson correlation coefficient assessed the linear relationship between the four variables and the items associated with each dimension. There was a positive correlation with r-values in the acceptable range (0.3-0.9) and p<.001 for some of the items.

		Pers1	Pers2	Pers3	Pers4
I am not afraid to express my ideas (Pers1)	Pearson Correlation	—			
	Sig. (2-tailed)	—			
I can do things others think are impossible (Pers2)	Pearson Correlation	.376**	—		
	Sig. (2-tailed)	<.001	—		
I am not afraid of failing (Pers3)	Pearson Correlation	.263**	.255**	—	
	Sig. (2-tailed)	<.001	<.001	—	
I can get better at being creative (Pers4)	Pearson Correlation	.385**	.364**	.194**	—
	Sig. (2-tailed)	<.001	<.001	<.001	—

**. Correlation is significant at the 0.01 level (2-tailed).

Press (Perception)

A Pearson correlation coefficient assessed the linear relationship between the items in the Press dimension. Only some of the correlations with r-values fell within the acceptable range (0.3-0.9) and p<.001.

		Press5	Press6	Press7	Press8	Press9	Press10
I pay attention to other people's ideas. (Press5)	Pearson Correlation	—					
	Sig. (2-tailed)	—					
I can come up with solutions to problems by relying on what I already know. (Press6)	Pearson Correlation	.166**	—				
	Sig. (2-tailed)	0.003	—				
I want to work on class projects that allow me to create things that will help people. (Press7)	Pearson Correlation	.288**	.380**	—			
	Sig. (2-tailed)	<.001	<.001	—			
I want to work on class projects that allow me to create things that are important to me. (Press8)	Pearson Correlation	.115*	.339**	.562**	—		
	Sig. (2-tailed)	0.042	<.001	<.001	—		
I can create things that help others. (Press9)	Pearson Correlation	.135*	.426**	.560**	.474**	—	
	Sig. (2-tailed)	0.016	<.001	<.001	<.001	—	
I know how my culture and identity influence my creative ideas. (Press10)	Pearson Correlation	0.064	.358**	.357**	.350**	.363**	—
	Sig. (2-tailed)	0.257	<.001	<.001	<.001	<.001	—

**. Correlation is significant at the 0.01 level (2-tailed)

Process (Behavior)

The Process dimension contained the largest number of survey items (***click here to view the correlation matrix in a separate spreadsheet***). Our correlation analysis revealed that r-values fell within the acceptable range (0.3-0.9) and p<.001 sporadically across this dimension. We made the following observations:

- Those items that had the strongest relationship with the latent factor of *Process* according to the CFA also had some of the strongest correlations.

- Items associated with the *creative thinking* and *creative problem-solving* sub dimensions were often correlated to an acceptable degree indicating that a relationship exists.

- The strongest correlations were associated with items related to teacher actions. For example, Proc27 (*My teacher shows me how to find a solution with other available resources if a certain resource is not available.*) and Proc26 (*My teacher shows me how to find the materials we need to develop an idea.*)

Product (Behavior)

The items in the Product dimension were the most positively correlated with all of the values falling in an acceptable range

		Prod29	Prod30	Prod31	Prod32	Prod33	Prod34	Prod35	Prod36
My teacher allows me to show my creativity in my classwork. (Prod29)	Pearson Correlation	–							
	Sig. (2-tailed)	–							
My classwork allows me to show my ideas in digital form. (Prod30)	Pearson Correlation	.563**	–						
	Sig. (2-tailed)	<.001	–						
My teacher rewards me for showing my ideas in digital form. (Prod31)	Pearson Correlation	.476**	.421**	–					
	Sig. (2-tailed)	<.001	<.001	–					
My teacher praises me when I pay attention to colors, fonts, images, and audio/video when I create digital products. (Prod 32)	Pearson Correlation	.449**	.381**	.480**	–				
	Sig. (2-tailed)	<.001	<.001	<.001	–				
My teacher praises me when I carefully select media that demonstrate what I know. (Prod33)	Pearson Correlation	.476**	.379**	.568**	.647**	–			
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	–			
I like to show new ideas through various digital media. (Prod 34)	Pearson Correlation	.396**	.356**	.463**	.483**	.518**	–		
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	–		
My teacher allows me to create things that are important to me. (Prod35)	Pearson Correlation	.430**	.412**	.433**	.473**	.517**	.449**	–	
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	–	
My classwork allows me to create new digital products. (Prod36)	Pearson Correlation	.397**	.334**	.473**	.455**	.490**	.455**	.508**	–
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	–

Appendix C - Descriptive Analysis

Person (Perception)

	N	Minimum	Maximum	Mean	Standard Deviation
I am not afraid to express my ideas	318	1	5	3.7	1.058
I can do things others think are impossible	316	1	5	3.25	1.147
I am not afraid of failing	314	1	5	3.06	1.371
I can get better at being creative	317	1	5	3.91	1.004

Press (Perception)

	N	Minimum	Maximum	Mean	Standard Deviation
I pay attention to other people's ideas.	319	1	5	3.76	1.121
I can come up with solutions to problems by relying on what I already know.	318	1	5	4	0.794
I want to work on class projects that allow me to create things that will help people.	315	1	5	3.77	0.976
I want to work on class projects that allow me to create things that are important to me.	316	1	5	4.04	0.932
I can create things that help others.	316	1	5	3.65	0.983
I know how my culture and identity influence my creative ideas.	316	1	5	3.8	1.028

Process (Behavior)

	N	Minimum	Maximum	Mean	Standard Deviation
The way I learn about things in this class is different from my other classes	317	1	5	3.57	0.937
I set challenging learning goals for myself	318	1	5	2.87	1.209
I make sure I understand a problem before solving it	315	1	5	3.58	1.152
My class assignments require me to solve problems creatively	315	1	5	3.17	1.22
I try to find the connection between a problem in my classwork and what it looks like in the real world	315	1	5	2.74	1.29
I like to look at problems from different angles (perspectives)	316	1	5	3.36	1.253
I like to imagine different ways to solve a problem	315	1	5	3.39	1.233
When I express curiosity about a problem my teacher encourages me to learn more about it	314	1	5	3.33	1.284
My teacher praises me for combining ideas in ways others haven't	314	1	5	3.09	1.272
My class assignments require me to explain the connection between ideas to others	313	1	5	3.27	1.19
My teacher asks me to share my ideas	318	1	5	3.11	1.215
My teacher gives me assignments that require me to find a new way to solve a problem	317	1	5	3.2	1.169
I'm encouraged to try to solve a problem before asking my teacher	317	1	5	3.63	1.206
In my class I get to imagine things that do not exist in the real world	312	1	5	2.71	1.238
My teacher introduces me to topics in content areas outside of the one they mainly teach	310	1	5	2.88	1.162
My teacher shows me how to find the materials we need to develop an idea	315	1	5	3.5	1.198
My teacher shows me how to find a solution with other available resources if a certain resource is not available	315	1	5	3.39	1.198

Product (Behavior)

	N	Minimum	Maximum	Mean	Standard Deviation
My teacher allows me to show my creativity in my classwork	320	1	5	3.39	1.224
My classwork allows me to show my ideas in digital form	317	1	5	3.51	1.211
My teacher rewards me for showing my ideas in digital form	316	1	5	2.78	1.309
My teacher praises me when I pay attention to colors, fonts, images, and audio/video when I create digital products	319	1	5	2.8	1.25
My teacher praises me when I carefully select media that demonstrate what I know	318	1	5	2.96	1.238
I like to show new ideas through various digital media	317	1	5	2.96	1.295
My teacher allows me to create things that are important to me	317	1	5	3.15	1.267
My classwork allows me to create new digital products	316	1	5	2.94	1.256

Endnotes

1. Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262–272). New York, NY: Freeman.

2. Gallup. (2019). *Creativity in Learning.* https://www.gallup.com/education/267449/creativity-learning-transformative-technology-gallup-report-2019.aspx

3. OECD. (2021). PISA 2021 Creative Thinking Framework. https://www.oecd.org/pisa/publications/PISA-2021-creative-thinking-framework.pdf

4. Gregory, E., Hardiman, M., Yarmolinskaya, J., Rinne, L. & Limb, C. (2013). Building creative thinking in the classroom: From research to practice. *International Journal of Educational Research, 62*, 43–50.

5. Rhodes, M. (1961). An Analysis of Creativity. *The Phi Delta Kappan, 42*(7), 305–310. http://www.jstor.org/stable/20342603

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