Applied Learning Student Questionnaire: *Overall Analysis*

Executive Summary

The Applied Learning Student Questionnaire (ALSQ) is designed to measure pre and post gains related to student problem solving and communication skills. The ALSQ is a self-report questionnaire that includes 36 items to assess students' attitudes on five survey constructs: *Intrinsic Motivation, Self-Management/Self-Regulation, Intent to Persist, Problem-Solving,* and *Implementation Activities*.[1] In May 2017, 365 students across four Innovation Fund programs completed the Applied Learning Student Questionnaire (ALSQ). The programs include Carroll County Step into STEM and Full STEAM Ahead, Lowndes County BLAST, Tift County Coding Across Georgia, and Hall County/TCSG Career Pathways.

Key findings include:

- Overall, students showed statistically significant increases in *Intrinsic Motivation, Self-Management/Self-Regulation,* and *Intent to Persist*.
- Across all constructs, the largest effect size observed was for *Intrinsic Motivation*, which suggests that the programs were particularly effective at enhancing students' interest in learning and seeing value in the material being taught.
- Each of the four programs showed statistically significant increases in *Intrinsic Motivation, Self-Management/Self-Regulation,* and *Intent to Persist*.
- The "now" scores for three constructs—*Intent to Persist, Problem Solving,* and *Implementation Activities*—did not reach or exceed the optimal average of 4.00, which means programs may need additional work in supporting higher-order thinking, as well as improving student exposure to and interest in STEM.
- The average program rating across all programs exceeded the optimal 4.00 average, with an average of 4.26, suggesting that most programs were viewed positively by students.
- Student ratings indicate that the inquiry-based learning environment may be improved by allowing students to have more control over their own work.
- Student ratings also suggest that increasing student exposure to STEM professionals and real-world problems may enhance student interest in pursuing STEM education and careers in the future.

[1] *Intent to Persist* refers to aspirations, plans, and goals to pursue additional education and a career in STEM (Science, Technology, Engineering, and Math). *Implementation Activities* refer to hands-on activities designed to increase exposure to STEM topics and real-world application.

Overall Results
May 2017

Participants and Methods

In May 2017, 365 students across four Innovation Fund programs completed the Applied Learning Student Questionnaire (ALSQ). The response rate displayed in Table 1 suggest that 87% of the total number of participating students responded to the survey. The response rates per program ranged from 61% (Hall County/TCSG Career Pathways) to 100% (Carroll County). Although there is no agreed-upon standard for a minimum response rate, Martella, Nelson, Morgan, and Marchand-Martella (2013)[2] suggest that a response rate of 50% is *adequate* for analysis and reporting, 60% is *good*, and 75% or higher is considered *very good*. Overall, the response rate achieved across the Innovation Fund programs is considered *very good* for reporting and analysis.

Table 1. Survey Response Rates

Program	# of Survey Respondents	Total # of Participating Students[1]	Survey Response Rate
Carroll County Step into STEM & Full STEAM Ahead	66	66	100%
Lowndes County BLAST	153	178	86%
Tift Coding Across Georgia	127	144	88%
Hall County/TCSG Career Pathways	19	31	61%
Total	**365**	**419**	**87%**

Note: [1]The number of participating students represent approximations and may not reflect recent changes to the participant population (e.g., dropouts).

The ALSQ is designed to measure pre and post gains related to student problem solving and communication skills, self-management, and engagement.[3] The ALSQ is a self-report questionnaire that includes 36 items to assess students' attitudes on the following survey constructs:

1. **Intrinsic Motivation**: motivation stemming from goals of mastery, learning and challenge. Example, "It is important for me to learn what is being taught in this program."
2. **Self-Management/Self-Regulation**: effortful and persistent behaviors that are used to guide, monitor, and direct the success of one's learning and performance. Example, "I turn all my assignments in on time."
3. **Intent to Persist**: aspirations, plans, and goals to pursue additional education and a career in STEM. Example, "I intend to get a college degree in STEM (Science, Technology, Engineering, and Math)."
4. **Problem-Solving**: inquiry-based learning environment that provides higher-order cognitive tasks and real-world application. Example, "I work out explanations on my own."
5. **Implementation Activities**: hands-on activities designed to increase exposure to STEM topics and real-world application. Example, "We learn what scientists/technicians/engineers/mathematicians or other STEM professionals do."

[2] Martella, R., Nelson, J., Morgan, R., & Marchand-Martella, N. (2013). *Understanding and Interpreting Education Research*. New York, NY: The Guilford Press.
[3] See Appendix A for information related to the construct reliabilities of the ALSQ.

Results and Discussion

- **ALSQ Survey Constructs**

  Table 2 summarizes students' responses to the ALSQ survey constructs across all programs. In aggregate, students showed statistically significant increases in *Intrinsic Motivation, Self-Management/Self-Regulation,* and *Intent to Persist*. In addition to assessing statistical significance from "before" to "now," effect sizes—a measure of the magnitude of an intervention on students' attitudes—were computed. Specifically, effect sizes were computed using Cohen's *d* and are intended to measure the practical importance of a significant finding.[4] Cohen (1988) classified effect sizes as small, *d*=0.2; medium, *d*=0.5; and large, *d*=0.8.[5] Table 2 suggests medium effect sizes were found for *Self-Management/Self-Regulation* and *Intent to Persist*. The largest effect size observed was for *Intrinsic Motivation* (*d*=0.99). This suggests that the programs were particularly effective at enhancing student interest in learning and deriving value from the material taught. For example, after participating in the programs, 73% of students said they prefer classwork that is challenging, compared to 36% before the programs. See Tables 5-9 for more information.

  To maximize impact, we would expect students' average scores to exceed 4.00 on a 5-point Likert scale (1, *Strongly Disagree* to 5, *Strongly Agree*). The "now" scores for three constructs—*Intent to Persist*, *Problem Solving,* and *Implementation Activities*—did *not* reach or exceed the optimal average of 4.00. Figure 1 suggests that additional work may be needed in these areas.

Table 2. Summary of Results by Construct[6]

Overall - Constructs					
Constructs		**n**	**Mean**[1]	**Paired Samples t-test**[2]	**Effect Size (interpretation)**[3]
Intrinsic Motivation	Before	365	3.45	p<0.001**	0.99 (Large)
	Now	365	4.10		
Self-Management / Self-Regulation	Before	363	3.74	p<0.001**	0.68 (Medium)
	Now	363	4.11		
Intent to Persist	Before	363	3.33	p<0.001**	0.64 (Medium)
	Now	363	3.73		
Problem Solving	Now	361	3.98	n/a	n/a
Implementation Activities	Now	361	3.93	n/a	n/a

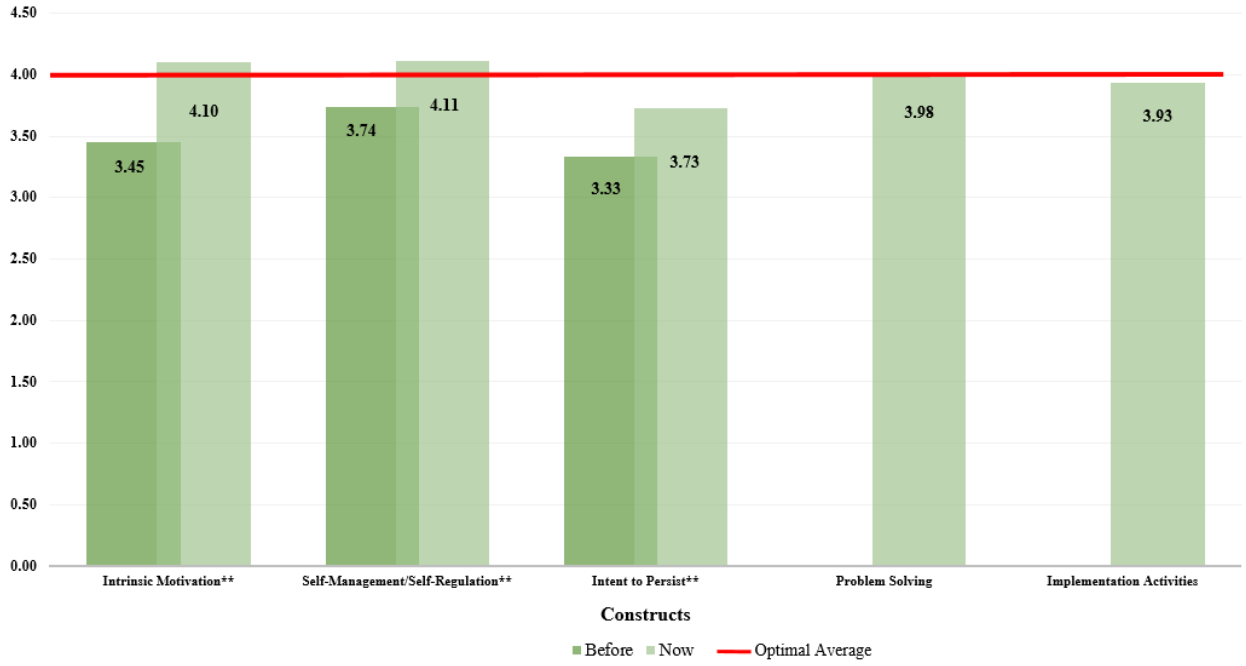
Note. [1]Reference lines are set at 3.5 and 4. [2]Please note that only students with matched Pre and Post data were assessed for significance. Desired statistically significant changes are highlighted in green. Negatively worded statements were reverse coded for mean computations. **p<0.001, *p<0.01, †p<0.05. See Tables 5-9 for more detailed information. [3]Effect size (Cohen's d): Small (<.2); Medium (.2 to .8); Large (>.8). Small effect sizes are highlighted in light red; medium effect sizes are highlighted in dark orange; large effect sizes are highlighted in dark green.

[4] To compute effect sizes, the formulas derived from Daniel & Kostic (2015) were utilized. Source: Daniel, T. & Kostic, B. (2015). *RStats effect size calculator*. Available online: http://www.missouristate.edu/rstats/Tables-and-Calculators.htm.

[5] Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed). Hillsdale, NJ: Lawrence Earlbaum Associates.

[6] As indicated by the n size, all students did not answer all questions in the constructs and demographics sections.

Figure 1. Constructs



Note. A paired samples t-test was used to compute the p-value. **p<0.001, *p<0.01, †p<0.05.

- **ALSQ Survey Constructs by Program**
  After disaggregating the data by program, all of the programs showed statistically significant increases in *Intrinsic Motivation*, *Self-Management/Self-Regulation*, and *Intent to Persist*. Examining effect sizes, all programs exhibited either medium or large effect sizes across all constructs. These data suggest that the individual programs were *effective* at enhancing students' motivations to succeed, their ability to direct their own learning, and their intent to persist in STEM education and careers. While the effect sizes were large (*d*>.8) across all constructs for the TCSG/Hall County Career Pathways program, caution should be employed when interpreting the results given the small sample size (n=19).[7]

[7] According to deWinter (2013), the t-test can be applied to a small sample size, as long as the effect size is expected to be large. Source: deWinter, J.C.F. (2013). Using the Student's t-test with extremely small sample sizes. *Practice Assessment, Research and Evaluation, 18(10).* Available online: http://pareonline.net/getvn.asp?v=18&n=10.

Table 3. Summary of Results by Constructs per Program

Overall - Constructs per Program													
Constructs		Carroll County (Step into STEM & Full STEAM Ahead) (n=66)			Lowndes County BLAST (n=153)			Tift County Coding Across Georgia (n=127)			TCSG/Hall County Career Pathways (n=19)		
		Mean	*t-test*	Effect Size	Mean	*t-test*	Effect Size	Mean	*t-test*	Effect Size	Mean	*t-test*	Effect Size
Intrinsic Motivation	Before	3.13	p<0.001**	1.03 (L)	3.71	p<0.001**	1.28 (L)	3.36	p<0.001**	0.66 (M)	2.98	p<0.001**	2.17 (L)
	Now	3.94			4.50			3.69			4.25		
Self-Management / Self-Regulation	Before	3.26	p<0.001**	0.71 (M)	4.11	p<0.001**	0.96 (L)	3.73	p<0.001**	0.39 (M)	2.42	p<0.001**	1.82 (L)
	Now	3.74			4.52			3.85			3.82		
Intent to Persist	Before	3.11	p<0.001**	0.63 (M)	3.64	p<0.001**	0.84 (L)	3.29	p<0.001**	0.36 (M)	1.78	p<0.001**	0.91 (L)
	Now	3.58			4.18			3.46			2.33		
Problem Solving	Now	3.54	n/a	n/a	4.37	n/a	n/a	3.72	n/a	n/a	4.01	n/a	n/a
Implementation	Now	3.48			4.26			3.77			3.82		

Note. Please note that only students with matched Pre and Post data were assessed for significance. Desired statistically significant changes are highlighted in green. Negatively worded statements were reverse coded for mean computations. **p<0.001, *p<0.01, †p<0.05. See Tables 5-9 for more detailed information. Effect size (Cohen's d): Small (<.2); Medium (.2 to .8); Large (>.8). Small effect sizes are highlighted in light red; medium effect sizes are highlighted in dark orange; large effect sizes are highlighted in dark green.

For programs to maximize their effectiveness, "now" scores should reach or exceed the optimal average of 4.00 on a 5-point Likert scale (1, *Strongly Disagree* to 5, *Strongly Agree*). Figures 2-6 display "now" scores for each program and construct. For example, Figure 2 indicates that two programs met or exceeded the optimal average for *Intrinsic Motivation*, but two programs also fell short of the optimal average. In general, programs not reaching or exceeding the red horizontal line may need additional attention. For instance, three out of four programs did not reach the optimal average for *Self-Management/Self-Regulation* (Figure 3), *Intent to Persist* (Figure 4), and *Implementation Activities* (Figure 6). Additionally, half of programs did not reach the optimal average for *Intrinsic Motivation* and *Problem Solving* (Figures 2 and 5, respectively). Again, caution should be employed when interpreting the results for the Hall County/TCSG Career Pathways program given the small sample size (n=19).

Figure 2. Intrinsic Motivation ("Now" Scores)

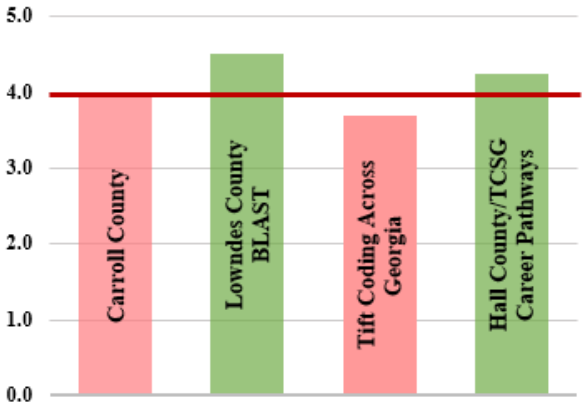


Figure 3. Self-Management/Self-Regulation ("Now" Scores)

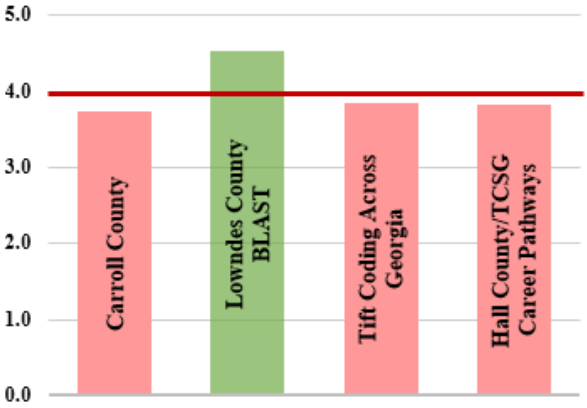


Figure 4. Intent to Persist ("Now" Scores)

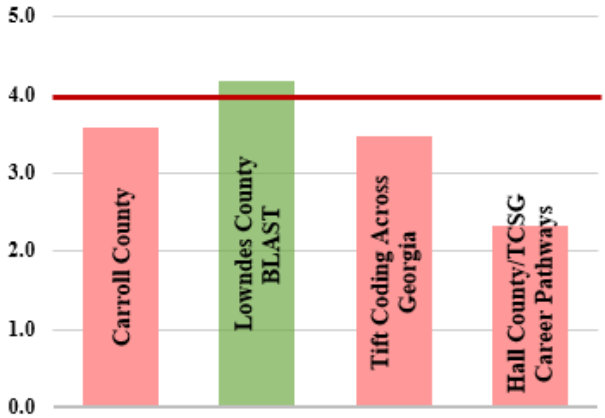


Figure 5. Problem Solving ("Now" Scores)

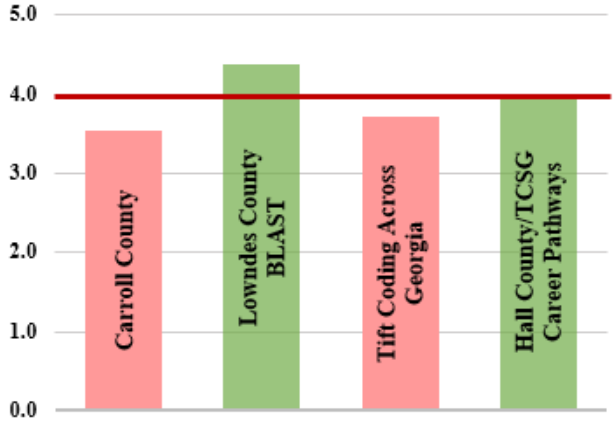


Figure 6. Implementation Activities ("Now" Scores)

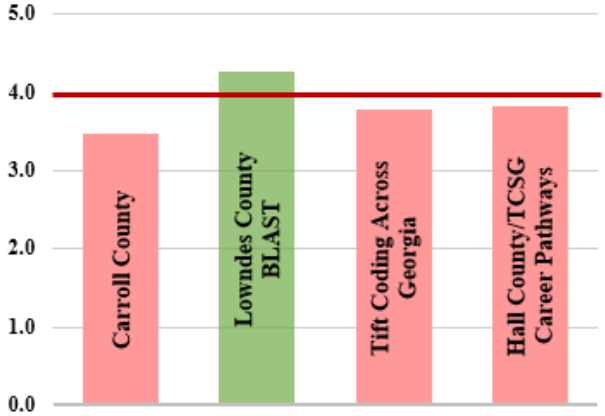
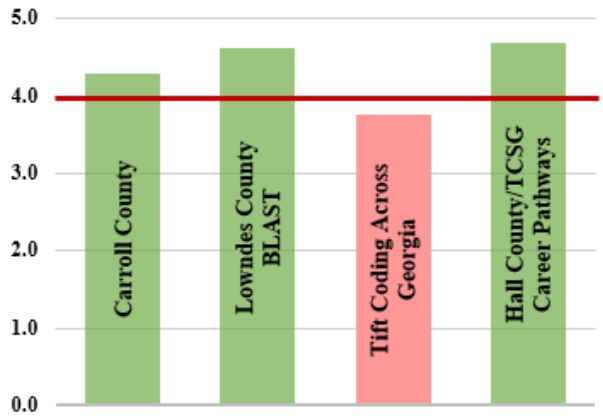


Figure 7. Overall Program Ratings



- **Program Rating**
  Collapsing across all programs, students' ratings of their programs exceeded the optimal average of 4.00. On a 5-point Likert scale where 1 signifies *Very Poor* and 5 signifies *Excellent*, the average score was 4.26. See Table 4. Looking at Figure 7, all programs, with the exception of Tift County Coding Across Georgia, were rated above the optimal average. These high ratings suggest that most programs were viewed positively by students.

- **Areas for Further Improvement**
  The "now" means for *Intrinsic Motivation* and *Self-Management/Self-Regulation* exceeded the optimal average of 4.00 on a 5-point Likert scale. The majority of items in each construct also showed statistically significant increases and had "now" scores above the optimal average. Of the sub-items under *Intrinsic Motivation* and *Self-Management/Self-Regulation*, only two items had "now" scores below the optimal average:
    - Preferring challenging class work to learn new things, and
    - Setting aside time to do homework and study.

  The "now" means for *Intent to Persist*, *Problem Solving*, and *Implementation Activities* fell below the optimal average. The majority of the sub-items under *Intent to Persist* and *Implementation Activities* had "now" scores below the optimal average. Within the *Intent to Persist* construct, the sub-items with the lowest average ratings referred to imagining and desiring a career in STEM. Within the

Implementation Activities construct, the sub-item with the lowest average rating was interactions with STEM professionals through the program.

Additionally, five of the ten item responses within the *Problem Solving* construct received average ratings below the optimal average. Specifically, the following areas received average ratings below the optimal average:

- Letting students choose their own topics or projects to investigate,
- Letting students work out explanations on their own,
- Providing students opportunities to explain their ideas,
- Letting students plan and do their own projects and/or experiments, and
- Encouraging students to investigate to see if their ideas are right.

The students' ratings suggest that the inquiry-based learning environment may be improved by allowing students to have more agency over their own work and increasing student exposure to STEM professionals and real-world problems. Incorporating the above strategies may enhance students' intentions to persist in STEM education and careers.

Table 4. Program Rating

Program Rating:	n	Mean	Assessment		(1) Very Poor	(2) Poor	(3) Average	(4) Good	(5) Excellent
All Students	360	4.26	Good		4%	1%	13%	30%	52%

Note. [1]Reference lines are set at 3.5 and 4.0. Assessment: Good = Above 4.0; Attention = Below 4.0; Action = Below 3.5. Highest percentages are highlighted in gray.

Table 5. Intrinsic Motivation

	Intrinsic Motivation		n	Mean[1]	Paired Samples t-test[2]	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1)	I prefer class work that is challenging so I can learn new things.	Before	365	3.07	p<0.001**	12%	16%	36%	25%	11%
		Now	365	3.96		3%	3%	21%	39%	34%
2)	It is important to me to learn what is taught in this program.	Before	365	3.63	p<0.001**	5%	8%	30%	34%	23%
		Now	365	4.26		3%	1%	14%	31%	51%
3)	I like what I am learning in this program.	Before	365	3.43	p<0.001**	4%	12%	35%	36%	13%
		Now	365	4.08		4%	4%	17%	32%	44%
4)	I think I will be able to use what I learn in this program in other classes.	Before	365	3.35	p<0.001**	6%	13%	36%	31%	14%
		Now	365	4.03		4%	5%	16%	37%	39%
5)	Even when I do poorly on a test, I try to learn from my mistakes.	Before	366	3.65	p<0.001**	8%	7%	22%	39%	24%
		Now	365	4.22		4%	0%	13%	34%	48%
6)	I think that what I am learning in this program is useful for me to know.	Before	365	3.42	p<0.001**	5%	10%	36%	38%	12%
		Now	365	4.13		3%	3%	14%	37%	43%
7)	I think that what we are learning in this program is interesting.	Before	365	3.39	p<0.001**	5%	12%	36%	30%	16%
		Now	365	4.10		4%	4%	16%	31%	45%
8)	Understanding STEM (Science, Technology, Engineering, and Math) is important to me.	Before	365	3.51	p<0.001**	5%	8%	36%	31%	20%
		Now	365	4.09		4%	3%	16%	34%	43%
9)	I enjoy STEM (Science, Technology, Engineering, and Math) in general.	Before	365	3.56	p<0.001**	8%	9%	29%	28%	26%
		Now	365	4.07		5%	4%	19%	24%	48%

Note. [1]Reference lines are set at 3.5 and 4. [2]Please note that only students with matched Pre and Post data were assessed for significance. Desired statistically significant changes are highlighted in green and undesired statistically significant changes are highlighted in red. **p<0.001, *p<0.01, †p<0.05. Highest percentages are highlighted in gray.

Table 6. Self-Management / Self-Regulation

Self-Management/Self-Regulation		n	Mean[1]	Paired Samples t-test[2]	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
10) I turn all my assignments in on time.	Before	363	3.53	p<0.001**	10%	9%	27%	28%	27%
	Now	363	4.09		3%	4%	19%	31%	44%
11) I miss class often. (negatively worded)	Before	363	1.78	p=0.743	57%	21%	11%	6%	4%
	Now	363	1.76		59%	18%	13%	6%	4%
12) I am often late for class. (negatively worded)	Before	363	1.72	p=0.424	61%	19%	12%	5%	4%
	Now	363	1.68		66%	14%	10%	4%	5%
13) I set aside time to do my homework and study.	Before	363	3.17	p<0.001**	9%	17%	34%	28%	12%
	Now	363	3.71		5%	8%	24%	36%	27%
14) When I say I'm going to do something, I do it.	Before	363	3.54	p<0.001**	7%	6%	35%	31%	21%
	Now	363	4.05		2%	2%	20%	38%	37%
15) I am a hard worker.	Before	363	3.87	p<0.001**	6%	4%	22%	34%	34%
	Now	363	4.28		2%	2%	14%	29%	53%
16) I finish whatever I begin.	Before	363	3.57	p<0.001**	8%	6%	30%	33%	23%
	Now	363	4.09		3%	2%	19%	35%	41%

Note. [1]Reference lines are set at 3.5 and 4. [2]Please note that only students with matched Pre and Post data were assessed for significance. Desired statistically significant changes are highlighted in green. **p<0.001, *p<0.01, †p<0.05. Highest percentages are highlighted in gray. Statements 11 and 12 are negatively worded; signficance is measured in the reverse direction as the other statements.

Table 7. Intent to Persist

Intent to Persist		n	Mean[1]	Paired Samples t-test[2]	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
17) I am considering a career in STEM (Science, Technology, Engineering, and Math).	Before	363	3.00	p<0.001**	16%	16%	34%	20%	13%
	Now	363	3.53		11%	9%	24%	28%	28%
18) I intend to get a college degree in STEM (Science, Technology, Engineering, and Math).	Before	363	3.10	p<0.001**	13%	16%	35%	20%	16%
	Now	363	3.54		11%	10%	26%	21%	32%
19) I can see myself working in STEM (Science, Technology, Engineering, and Math).	Before	363	2.99	p<0.001**	16%	17%	34%	20%	13%
	Now	363	3.44		13%	9%	28%	24%	27%
20) Someday, I would like to have a career in STEM (Science, Technology, Engineering, and Math).	Before	363	3.04	p<0.001**	15%	16%	36%	17%	16%
	Now	363	3.43		11%	11%	28%	23%	27%
21) I intend to graduate from high school.	Before	363	4.52	p<0.001**	3%	3%	9%	10%	75%
	Now	363	4.68		3%	1%	5%	8%	83%

Note. [1]Reference lines are set at 3.5 and 4. [2]Please note that only students with matched Pre and Post data were assessed for significance. Desired statistically significant changes are highlighted in green. **p<0.001, *p<0.01, †p<0.05. Highest percentages are highlighted in gray.

Table 8. Problem Solving, Now Only

	Problem Solving	n	Mean[1]		Assessment	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
22)	In this program, my teacher(s) tells me how to improve my work.	361		4.18	Good	4%	2%	11%	38%	45%
23)	In this program, my teacher(s) lets us choose our own topics or projects to investigate.	361		3.56	Attention	7%	5%	35%	30%	22%
24)	In this program, I work out explanations on my own.	361		3.74	Attention	4%	3%	29%	42%	22%
25)	In this program, I have opportunities to explain my ideas.	361		3.91	Attention	4%	4%	23%	37%	32%
26)	In this program, we plan and do our own projects and/or experiments.	361		3.78	Attention	4%	8%	25%	33%	30%
27)	In this program, we work on real-world problems.	361		4.06	Good	3%	3%	21%	29%	43%
28)	In this program, we have class discussions.	361		4.16	Good	3%	4%	16%	28%	49%
29)	In this program, we investigate to see if our ideas are right.	361		3.99	Attention	3%	4%	18%	40%	35%
30)	In this program, we need to be able to think and ask questions.	361		4.24	Good	3%	2%	14%	32%	50%
31)	In this program, we are expected to understand and explain ideas.	361		4.18	Good	4%	2%	13%	37%	45%

Note. [1]Reference lines are set at 3.5 and 4.0. Assessment: Good = Above 4.0; Attention = Below 4.0; Action = Below 3.5. Highest percentages are highlighted in gray.

Table 9. Implementation Activities, Now Only

	Implementation Activities	n	Mean[1]		Assessment	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
32)	In this program, my teacher(s) takes notice of students' ideas.	361		3.97	Attention	3%	2%	21%	42%	32%
33)	In this program, my teacher(s) shows us how new information relates to what we have already learned.	361		4.09	Good	3%	2%	18%	35%	41%
34)	In this program, we learn what scientists/ technicians / engineers / mathematicians or other STEM professionals do.	361		3.82	Attention	4%	4%	27%	38%	27%
35)	In this program, we do our work in groups.	361		4.04	Good	2%	2%	21%	39%	36%
36)	In this program, we interact with scientists / technicians / engineers / mathematicians or other STEM professionals.	361		3.74	Attention	3%	7%	29%	34%	27%

Note. [1]Reference lines are set at 3.5 and 4.0. Assessment: Good = Above 4.0; Attention = Below 4.0; Action = Below 3.5. Highest percentages are highlighted in gray.

Table 8. Educational Plans

What is the highest level of education you plan to achieve?	Before		Now		*Change*[1]	
	n	%	n	%		
High School	74	21%	53	15%	-21	-6%
2-year college	36	10%	29	8%	-7	-2%
4-year college	87	24%	67	19%	-20	-6%
Graduate School	87	24%	82	23%	-5	-1%
Professional School	72	20%	123	35%	51	15%
Total	**356**	**100%**	**354**	**100%**		
Average[2]	**2.93**		**3.20**		**p<0.001** (significant)[3]**	

[1] Change from Before to Now. Increases are highlighted in green; decreases are highlighted in red. [2]To compute averages, the following codes were applied: High School (1), 2-year college (2), 4-year college (3), Graduate School (4), Professional School (4). [3]Paired samples t-test, p-value: **p<0.001, *p<0.01, †p<0.05.

Table 9. Demographics

Gender	n	%
Female	147	41%
Male	210	59%
Total	**357**	**100%**

Ethnicity	n	%
Asian	-	-
Black	86	24%
Hispanic	40	11%
Native American	-	-
White	176	49%
Multiracial	34	9%
Other	10	3%
Total	**360**	**100%**

Grade	n	%
6th	37	10%
7th	131	36%
8th	108	30%
9th	27	7%
10th	49	14%
11th	-	-
12th	-	-
Other	-	-
Total	**361**	**100%**

Note: Tables are redacted to exclude n-sizes that are less than ten.

Table 10. Participation

How long have you participated in this program?		n	%
	0 Semesters	-	-
	1 semester	106	29%
	2 semesters	116	32%
	3 semesters	-	-
	4 or more semesters	89	25%
	Summer only	-	-
	Don't Know	35	10%
	Total	**361**	**100%**

Did you participate in this program during the summer?		n	%
Summer Participation	Yes	47	13%
	No	312	87%
	Total	**359**	**100%**

Note: Tables are redacted to exclude n-sizes that are less than ten.

Appendix A. Construct Reliabilities

Table A1. Construct Reliabilities (Omnibus, May 2017)

Constructs		Cronbach's alpha	*Reliability Interpretation*
Intrinsic Motivation (9 items)	Before	0.886	*Very good*
	Now	0.930	*Excellent*
Self-Management/Self-Regulation (7 items)	Before	0.821	*Very good*
	Now	0.806	*Very good*
Intent to Persist (5 items)	Before	0.882	*Very good*
	Now	0.905	*Excellent*
Problem Solving (10 items)	Now	0.921	*Excellent*
Implementation Activities (5 items)	Now	0.843	*Very good*

Cronbach's Alpha Reliability Key: Cronbach's alpha is a measure of the internal consistency of items in a construct. This statistic ranges from 0 to 1; the higher the value the better. An alpha of 0.80 or higher is considered to have achieved very good measurement reliability; an alpha of 0.65 is considered acceptable (Field, 2009).

Reliability	Interpretation
0.90 and above	Excellent reliability; at the level of the best measures
0.80 – 0.90	Very good
0.70 – 0.80	Good; in the range of most. There are probably a few items which could be improved.
0.60 – 0.70	Somewhat low. This measure needs to be supplemented by other measure (e.g., more surveys) to determine outcomes. There are probably some items which could be improved.
0.50 – 0.60	Suggests need for revision of measure, unless it is quite short (ten or fewer items). The test definitely needs to be supplemented by other measure (e.g., more tests).
0.50 or below	Questionable reliability. This measure should not contribute heavily to the outcomes and needs revision.

From: J. C. Nunnally, Psychometric Theory. New York: McGraw-Hill, 1967, pp. 172-235.

Reference:

Field, A. (2009). *Discovering Statistics Using SPSS, 3rd Edition.* Thousand Oaks, CA: Sage Publications.