The Rice University School Mathematics Project (RUSMP)

Evaluation Report for 2023 Summer Campus Program for Teachers (Virtual)

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2023 Summer Campus Program (Virtual)

In the summer of 2023, the Rice University School Mathematics Project (RUSMP) offered its 37th annual Summer Campus Program (SCP) for mathematics teachers in Houston, its neighboring areas, and around Texas. With emphasis on problem-solving, motivation, use of manipulatives, real-world applications, and technology in mathematics classrooms, the SCP provided an active learning approach to professional development in pedagogy and mathematics content. This year's SCP aimed to develop teachers with a deep understanding of and skills to implement high-quality mathematics curriculum, instruction, appropriate technology integration, and assessment (including data-informed decision-making), and a repertoire of research-based methods for motivating and supporting all students to persist and achieve in mathematics with a special focus on motivating underrepresented minorities in Science, Technology, Engineering, the Arts, and Mathematics (STEAM). The SCP focused on concept-based learning activities for numbers concepts, algebraic reasoning, and geometry and calculus by "Integrating Algebra, Geometry, and Number through STEAM." Participating teachers attended one of five classes: Pre-Elementary (Pre-K to 1st; 15 attendees), Elementary (2nd–5th grade teachers; 17 attendees), Middle School (6th grade–Algebra I teachers; 20 attendees), and High School (Geometry–Calculus teachers; 19 attendees). RUSMP provided each participant with classroom materials, including books, manipulatives, and other resources to support instruction before the virtual program started on June 12, 2023. At least two Master Teachers led each class. Most Master Teachers were former RUSMP participants themselves. All 71 teachers who attended the SCP were invited to complete pre- and post-surveys. Sixty-nine teachers completed the demographic and professional background questionnaire prior to the SCP. These teachers came from 38 different schools (including public schools in three independent school districts, two charter school systems, and one private school) to participate in the program. All participants were classroom teachers for the 2022-2023 year.

The program was held from 9:00 a.m. to 3:00 p.m. Monday through Friday via Zoom from June 12 through June 16 and Tuesday through Friday June 20 through June 23. Each morning, teachers joined the Zoom meetings and engaged in different activities where they undertook the role of students and actively explored important mathematics content and discussed pedagogical strategies to enact various educational activities. These activities included

hands-on individual work (with resources provided by RUSMP) or mini-projects with peers (using the Zoom breakout rooms). Most of the afternoons were designed for teachers to discuss and engage in various work and tasks with their peers.

All participants received a certificate of attendance and 54 Continuing Professional Education (CPE) contact hours. In addition, Houston ISD awarded 6 hours of Gifted and Talented Professional Development credit.

Program Goals

The program provides teachers with rigorous, evidence-based, and personalized "professional development" as defined by the education law, Every Student Succeeds Act (ESSA). The program assists teachers as they work towards the goal of being "adequately prepared" and helps "adequately prepared" teachers become "effective." Instructional activities foster the development of a conceptual framework that is necessary for a deep understanding of the K-12 mathematics concepts developed.

Program Objectives

- Teachers' technological pedagogical content knowledge will increase in mathematics.
- Teachers' methodology in the appropriate use of technology and manipulatives in the math classroom will improve for the targeted mathematics TEKS.
- Teachers will learn how to implement engaging, student-centered inquiry-based instructional methods for mathematics instruction.
- Teachers will learn how to use a variety of assessment methods including appropriate ongoing formative strategies to guide instruction.
- Teachers' self-efficacy, confidence, and sense of preparedness in teaching mathematics will improve.

Evaluation

Overall, 69 participants completed the pre-survey and 61 completed the post-survey. The number of participants who completed both surveys was 60. The surveys included information about the background of participants in addition to the Likert-scale items to assess RUSMP's impact on SCP participants in specific areas (e.g., teaching self-efficacy, diversity dispositions, and confidence in their preparedness and teaching skills for mathematics instruction). Participants' survey responses were used to conduct paired samples *t*-tests and measure changes as a result of participating in the SCP in the following specific areas: teachers' motivational

beliefs about mathematics and mathematics teaching; teachers' knowledge and beliefs about pedagogical content knowledge as well as constructivist teaching practices and assessments; confidence in their preparedness and teaching skills for mathematics instruction; and their diversity dispositions (Tables 2-10). The significant improvements in respective areas are marked by *, **, or *** in these tables (more *s mean greater significance). The tables indicate changes for both by class (elementary, middle, and high) and the whole group. Participants' evaluations of the SCP classroom climate and ratings about their overall satisfaction with the program were also analyzed (Figures 1-7). A summary of the significant results is provided in the Conclusion section at the end of the report. Appendix A contains a list of survey items used to assess teachers' beliefs, attitudes, and perceptions.

Table 1
Program Class Demographics

	SCP Teachers (All) $N = 71$	SCP Teachers (PreK–1) $N = 15$	SCP Teachers (Grades 2–5) $N = 17$	SCP Teachers (Middle School) $N = 20$	SCP Teachers (High School) $N = 19$
Gender					
Female	78%	100%	81%	74%	63%
Male	22%	0%	19%	26%	37%
Ethnicity					
White, Non-Hispanic	36%	20%	13%	42%	63%
Black, Non-Hispanic	19%	27%	25%	16%	11%
Hispanic	32%	40%	50%	32%	11%
Asian/Pacific Islander	6%	7%	0%	5%	11%
Other	7%	7%	13%	5%	5%
Years Teaching					
0-1	9%	13%	6%	11%	5%
2-3	22%	20%	31%	21%	16%
4-5	7%	0%	6%	16%	5%
6-10	29%	33%	25%	26%	32%
11-20	23%	20%	19%	21%	32%
21-30	9%	7%	13%	5%	11%
31+	1%	7%	0%	0%	0%
Certification					
Standard	38%	53%	44%	21%	37%
Provisional	39%	40%	31%	37%	21%
None	32%	7%	25%	42%	42%
Volunteered	75%	73%	63%	79%	84%

As presented in Table 1 above, there were significantly more female teachers than male teachers overall, even though the number of high school male teachers was slightly more than the number of female high school teachers. In terms of ethnicity, the SCP had a very diverse composition. About one third of the SCP participants were novice teachers who had 5 years or less teaching experience. Most of the teachers did not have a standard teacher certification. Moreover, almost one third of the teachers did not have a teaching certification at all. Lack of teaching certification was more common for middle and high school teachers when compared to elementary school teachers. Lastly, most of the teachers volunteered to attend the SCP rather than being requested to attend by their school administrations.

Program Outcomes

Self-efficacy for Teaching

Table 2

Paired-Samples t-test Results on Measures of Teacher Self-efficacy Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
Variable	**M**	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade									
Instruction	3.98	0.80	4.34	0.38	0.36	2.03^	-0.04	0.76	0.61
Student Engagement	4.14	0.62	4.30	0.49	0.16	1.64	-0.06	0.38	0.50
2nd–5th Grade									
Instruction	4.08	0.70	4.40	0.43	0.33	1.73	-0.08	0.74	0.48
Student Engagement	4.19	0.62	4.52	0.43	0.33	1.75	-0.08	0.73	0.49
Middle School									
Instruction	3.92	0.52	4.04	0.65	0.12	0.98	-0.14	0.37	0.22
Student Engagement	3.97	0.64	4.01	0.74	0.04	0.31	-0.23	0.31	0.07
High School									
Instruction	3.83	0.78	4.22	0.71	0.38	2.12^	0.00	0.77	0.51
Student Engagement	3.74	0.74	4.10	0.65	0.37	3.13**	0.12	0.62	0.76
Overall									
Instruction	3.94	0.68	4.23	0.59	0.28	3.46**	0.12	0.45	0.45
Student Engagement	3.98	0.67	4.20	0.63	0.28	3.12**	0.08	0.36	0.40

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Self-efficacy for Mathematics Teaching

Table 3

Paired-Samples t-test Results on Measures of Teachers' Self-efficacy for Mathematics Teaching Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade	3.76	0.53	4.08	0.56	0.33	2.74*	0.06	0.60	0.83
2nd–5th Grade	3.93	0.63	4.31	4.45	0.38	3.47**	0.14	6.63	0.96
Middle School	3.92	0.48	3.80	0.49	–0.12	-1.25**	-0.33	0.08	0.81
High School	3.87	0.53	4.14	0.60	0.27	3.35**	0.10	0.44	0.81
Overall	3.88	0.53	4.06	0.55	0.18	3.23**	0.07	0.29	0.41

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Mathematics Self-Concept

Table 4

Paired-Samples t-test Results on Mathematics Self-Concept Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade	3.56	1.06	3.60	0.98	0.05	0.35	-0.25	0.34	0.10
2nd–5th Grade	3.82	0.83	3.97	0.70	0.15	0.90	-0.31	0.53	0.25
Middle School	4.01	0.60	4.01	0.54	0.00	0.00	-0.23	0.230	0.00
High School	4.05	0.51	3.88	0.65	-0.17	-1.11	-0.48	0.15	-0.27
Overall	3.90	0.74	3.89	0.70	-0.01	-0.08	-0.15	0.13	-0.01

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Epistemic Beliefs for Mathematics

Table 5

Paired-Samples t-test Results on Measures of Teachers' Epistemic Beliefs for Math (non-Availing) Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
Variable	**M**	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade									
Certainty of Knowledge	2.72	0.37	2.70	0.49	-0.01	-0.09	-0.28	0.26	-0.03
2nd–5th Grade									
Certainty of Knowledge	2.69	0.68	2.32	0.51	-0.38	-1.86^	-0.82	0.07	-0.51
Middle School									
Certainty of Knowledge	2.73	0.62	2.70	0.61	-0.03	-0.21	-0.29	0.24	-0.05
High School									
Certainty of Knowledge	2.88	0.63	2.71	0.76	-0.18	-1.46	-0.43	0.08	-0.35
Overall									
Certainty of Knowledge	2.76	0.59	2.62	0.63	-0.14	-1.96^	-0.29	0.00	-0.25

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Technological Pedagogical Content Knowledge

Table 6

Paired-Samples t-test Results on Technological Pedagogical Content Knowledge Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade	3.67	0.40	4.09	0.55	0.42	2.53*	0.05	0.79	0.76
2nd–5th Grade	3.82	1.04	4.29	0.63	0.48	1.72	-0.13	1.08	0.48
Middle School	3.99	0.67	4.06	0.57	0.07	0.50	-0.23	0.38	0.12
High School	3.91	0.61	4.13	0.06	0.22	2.31*	0.02	0.43	0.56
Overall	3.87	0.71	4.14	0.58	0.27	3.08**	0.09	0.44	0.40

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Constructivist Teaching Practices

Table 7

Paired-Samples t-test Results on Measures of Teachers' Self-Perceptions of Constructivist Teaching Practices Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
Variable	**M**	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade									
Student Tasks	3.94	0.44	4.24	0.47	0.30	2.32*	0.01	0.59	0.70
Student-Student Interaction	4.06	0.36	4.42	0.45	0.36	2.63*	0.01	0.59	0.79
Teacher's Role	3.81	0.46	4.45	0.47	0.64	3.32*	0.21	1.06	1.00
Discovery	3.27	0.65	4.18	0.60	0.91	3.19*	0.27	1.54	0.96
2nd–5th Grade									
Student Tasks	3.77	0.70	4.28	0.54	0.51	1.82^	-0.10	1.13	0.51
Student-Student Interaction	3.97	0.63	4.77	0.39	0.79	4.65***	0.42	1.17	1.29
Teacher's Role	3.85	0.43	4.77	0.39	0.92	9.67***	0.71	1.13	2.68
Discovery	3.46	0.97	3.92	0.76	0.46	2.14^	-0.01	0.93	0.60
Middle School									
Student Tasks	3.79	0.46	3.88	0.54	0.09	0.60	-0.22	0.39	0.14
Student-Student Interaction	4.02	0.77	3.95	0.76	-0.07	-0.36	-0.48	0.34	-0.08
Teacher's Role	3.82	0.69	3.89	0.76	0,08	0.55	-0.22	0.38	0.13
Discovery	3.42	0.77	3.79	0.63	0.37	1.93^	-0.03	0.77	0.44
High School									
Student Tasks	3.84	0.70	4.16	0.69	0.31	1.96^	-0.03	0.65	0.48
Student-Student Interaction	3.90	0.63	4.24	0.64	0.33	2.92*	0.09	0.58	0.71
Teacher's Role	3.68	0.64	4.29	0.71	0.62	5.25***	0.37	0.87	1.27
Discovery	3.29	0.77	4.00	0.61	0.71	4.24***	0.35	1.06	1.03
Overall									
Student Tasks	3.83	0.58	4.11	0.58	0.28	3.08**	0.10	0.47	0.40
Student-Student Interaction	3.98	0.63	4.29	0.67	0.31	3.43**	0.13	0.49	0.44
Teacher's Role	3.78	0.58	4.30	0.70	0.52	6.48***	0.36	0.68	0.84
Discovery	3.37	0.78	3.95	0.65	0.58	5.59***	0.37	0.79	0.72

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Assessment

Table 8

Paired-Samples t-test Results on Teachers' Beliefs about Assessment Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade									
Summative	2.68	0.67	2.48	0.66	-0.20	-0.92	-0.70	0.29	-0.28
Formative	4.27	0.53	4.29	0.60	0.02	0.12	-0.32	0.36	0.04
Testing	1.85	0.50	1.91	0.63	0.06	0.48	-0.22	0.34	0.15
Large-Scale	2.20	0.72	2.29	0.97	0.09	0.34	-0.50	0.68	0.10
2nd–5th Grade									
Summative	2.90	0.59	2.62	0.63	-0.29	-1.37	-0.75	0.17	-0.38
Formative	4.06	0.78	4.45	0.50	0.38	2.12^	-0.01	0.78	0.55
Testing	2.03	0.50	1.69	0.40	-0.33	-2.94*	-0.58	-0.09	-0.82
Large-scale	2.75	0.79	2.91	0.58	0.15	0.55	-0.46	0.77	0.15
Middle School									
Summative	3.09	0.58	3.05	0.90	-0.04	-0.27	-0.35	0.27	-0.06
Formative	4.16	0.56	4.11	0.51	-0.05	1.06	-0.26	0.15	-0.12
Testing	1.98	0.59	2.09	0.51	0.11	0.55	-0.10	0.31	0.24
Large-scale	3.02	0.72	2.79	0.97	-0.23	-1.71	-0.52	0.05	-0.39
High School									
Summative	2.62	0.76	2.47	0.89	-0.15	-0.93	-0.48	0.19	-0.22
Formative	4.07	0.53	4.48	0.42	0.41	3.56**	0.17	0.66	0.86
Testing	1.94	0.64	1.71	0.61	-0.24	-2.30*	-0.45	-0.19	-0.56
Large-scale	2.89	0.89	2.86	0.81	-0.04	-0.23	-0.37	0.30	-0.06
Overall									
Summative	2.84	0.67	2.69	0.82	-0.15	-1.77^	-0.33	0.02	-0.23
Formative	4.13	0.59	4.32	0.52	0.19	2.67*	0.05	0.33	0.35
Testing	1.96	0.56	1.86	0.56	-0.09	-1.62	0.05	0.33	-0.21
Large-scale	2.78	0.82	2.74	0.86	-0.03	-0.34	-0.23	0.16	-0.04

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Level of Preparedness to Use Pedagogical Techniques

Table 9

Paired-Samples t-test Results on Pedagogical Preparedness Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade	2.88	0.54	4.31	0.32	1.43	9.02***	1.08	1.78	2.72
2nd–5th Grade	3.14	0.57	4.66	0.42	1.52	2.49***	1.25	1.78	3.46
Middle School	2.90	0.35	4.13	0.57	1.23	8.88***	0.94	1.53	2.04
High School	2.99	0.55	4.30	0.53	1.30	12.05***	1.08	1.53	2.92
Overall	2.98	0.49	4.33	0.51	1.35	20.36***	1.22	1.48	2.63

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

Diversity Dispositions

Table 10

Paired-Samples t-test Results on Teachers' Diversity Disposition Before and After PD

	Time 1		Time 2				95% CI		Cohen's d
	M	**SD**	**M**	**SD**	**Mean Δ**	**t**	**LL**	**UL**	
Pre-K–1st Grade	1.35	0.40	1.25	0.39	-0.10	-0.76	-0.41	0.20	-0.23
2nd–5th Grade	1.36	0.61	1.64	1.29	0.27	0.67	-0.62	1.17	0.19
Middle School	1.46	0.55	1.86	1.07	0.40	1.76	-0.08	0.87	0.41
High School	1.69	0.69	1.45	0.48	-0.24	-1.26	-0.65	0.17	-0.31
Overall	1.48	0.59	1.58	0.91	0.10	0.75	-0.16	0.36	0.10

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.10$

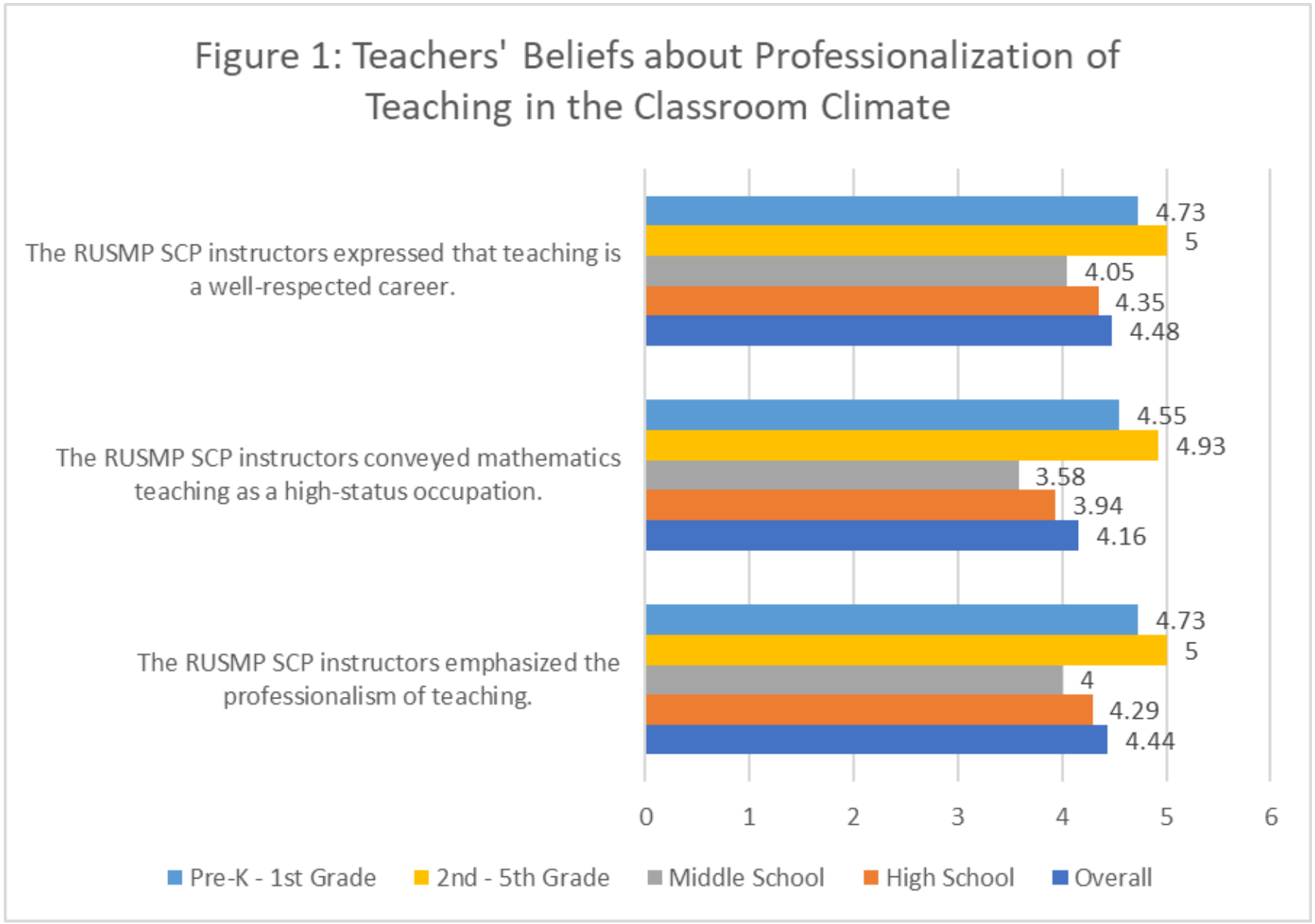
Figure 1: Teachers' Beliefs about Professionalization of Teaching in the Classroom Climate
The RUSMP SCP instructors expressed that teaching is a well-respected career.
4.73
5
4.05
4.35
4.48
The RUSMP SCP instructors conveyed mathematics teaching as a high-status occupation.
4.55
4.93
3.58
3.94
4.16
The RUSMP SCP instructors emphasized the professionalism of teaching.
4.73
5
4
4.29
4.44
0
1
2
3
4
5
6
Pre-K - 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

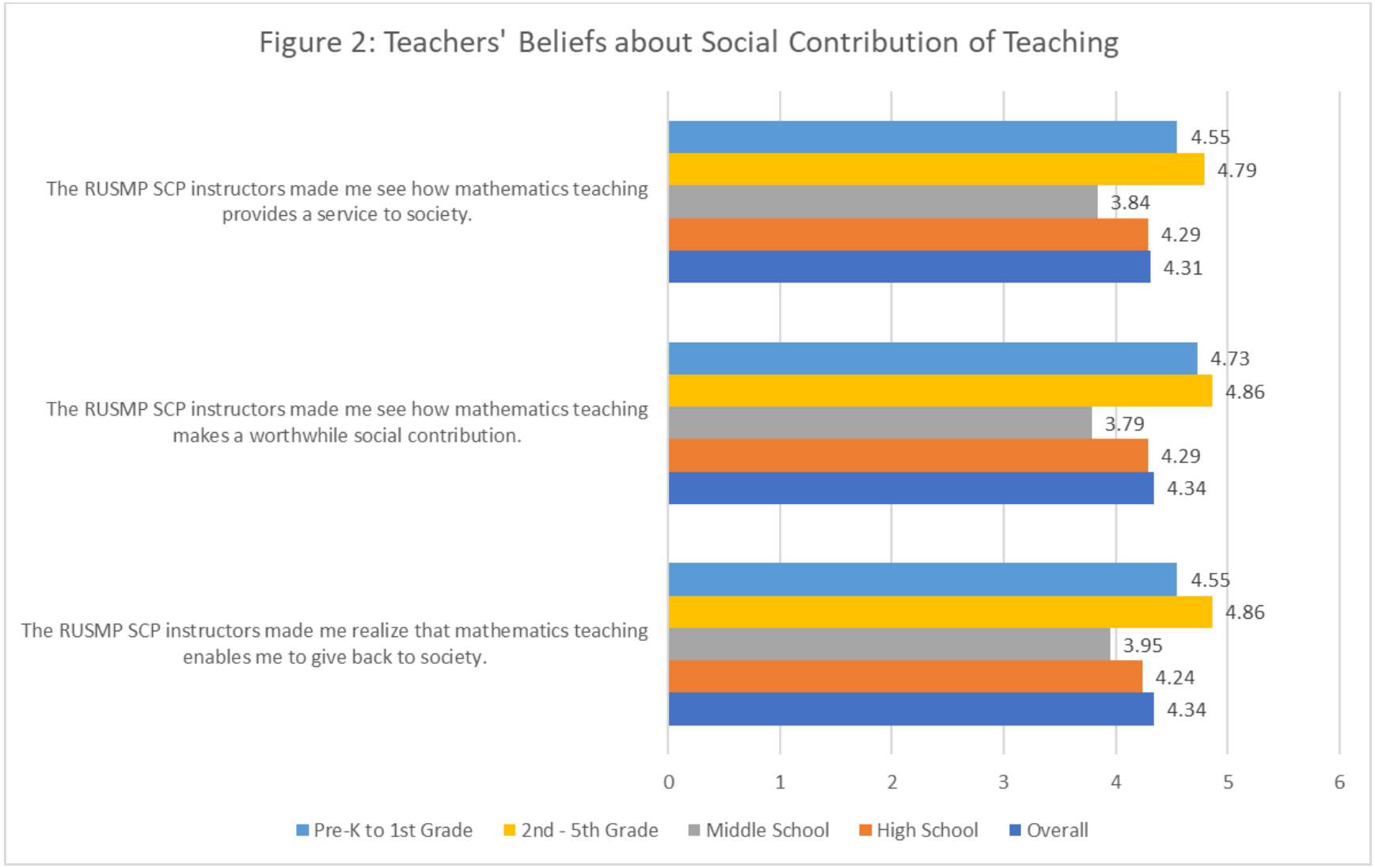
Figure 2: Teachers' Beliefs about Social Contribution of Teaching
The RUSMP SCP instructors made me see how mathematics teaching provides a service to society.
4.55
4.79
3.84
4.29
4.31
The RUSMP SCP instructors made me see how mathematics teaching makes a worthwhile social contribution.
4.73
4.86
3.79
4.29
4.34
The RUSMP SCP instructors made me realize that mathematics teaching enables me to give back to society.
4.55
4.86
3.95
4.24
4.34
0
1
2
3
4
5
6
Pre-K to 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

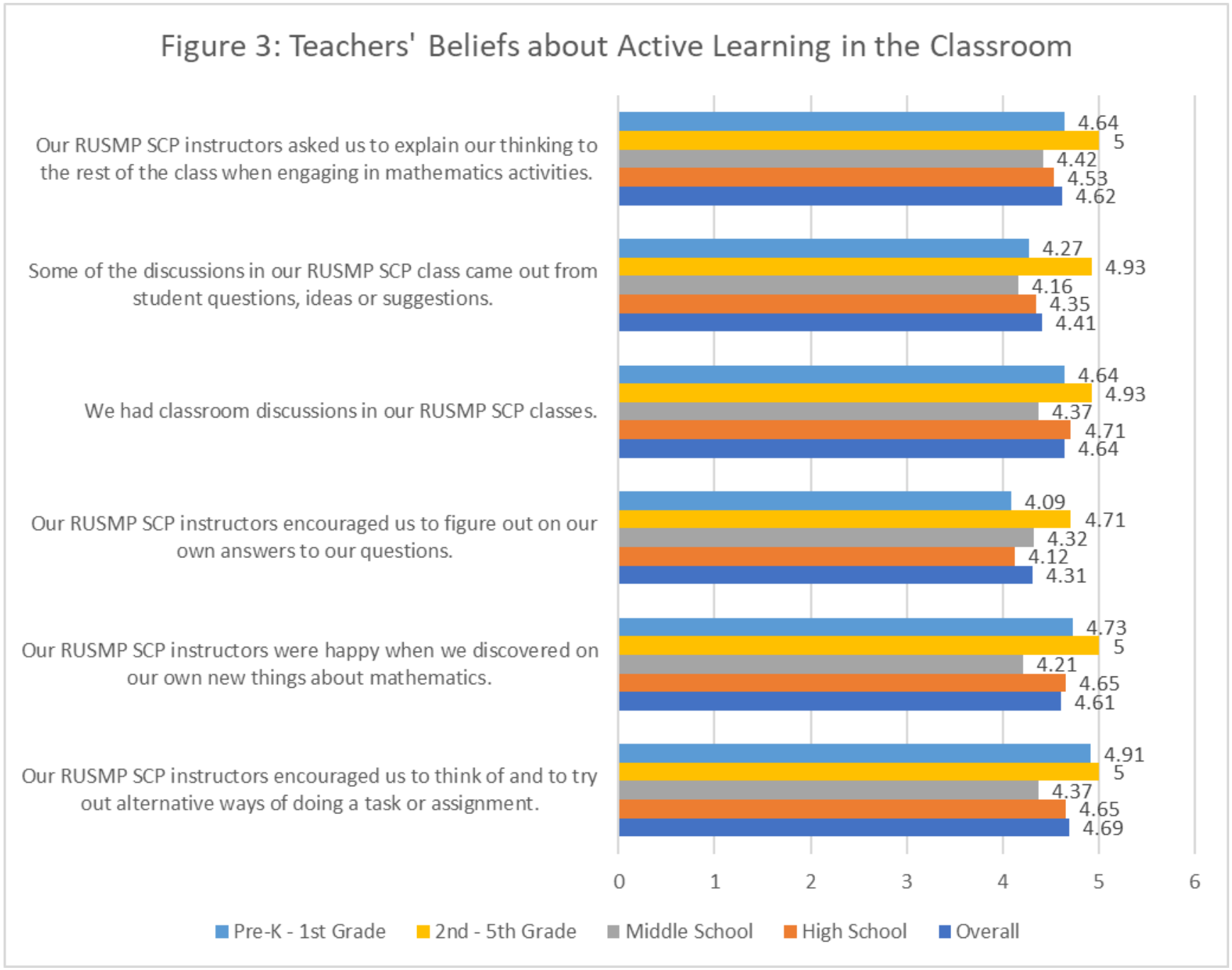
Figure 3: Teachers' Beliefs about Active Learning in the Classroom
Our RUSMP SCP instructors asked us to explain our thinking to the rest of the class when engaging in mathematics activities.
4.64
5
4.42
4.53
4.62
Some of the discussions in our RUSMP SCP class came out from student questions, ideas or suggestions.
4.27
4.93
4.16
4.35
4.41
We had classroom discussions in our RUSMP SCP classes.
4.64
4.93
4.37
4.71
4.64
Our RUSMP SCP instructors encouraged us to figure out on our own answers to our questions.
4.09
4.71
4.32
4.12
4.31
Our RUSMP SCP instructors were happy when we discovered on our own new things about mathematics.
4.73
5
4.21
4.65
4.61
Our RUSMP SCP instructors encouraged us to think of and to try out alternative ways of doing a task or assignment.
4.91
5
4.37
4.65
4.69
0
1
2
3
4
5
6
Pre-K - 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

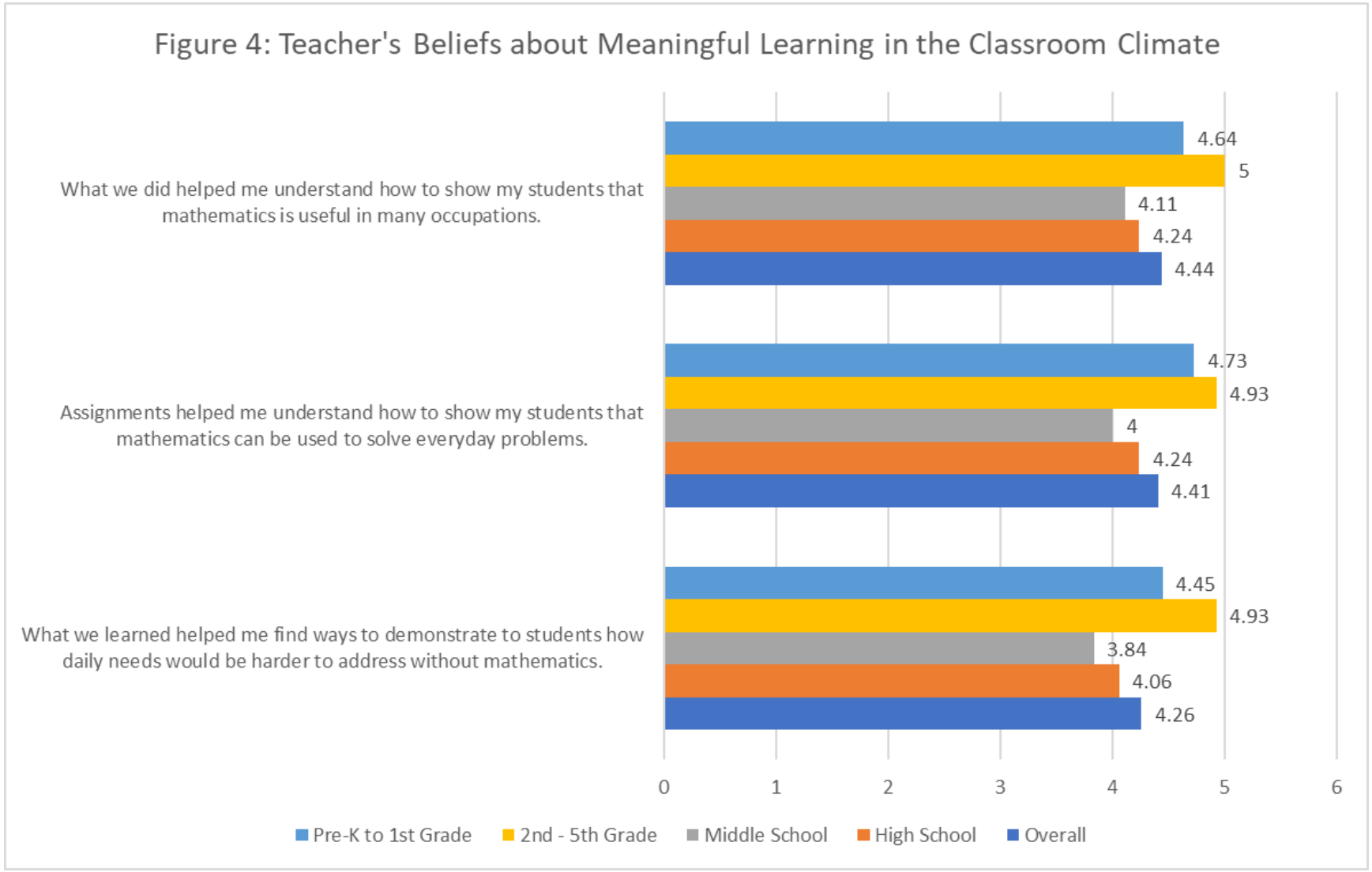
Figure 4: Teacher's Beliefs about Meaningful Learning in the Classroom Climate
What we did helped me understand how to show my students that mathematics is useful in many occupations.
4.64
5
4.11
4.24
4.44
Assignments helped me understand how to show my students that mathematics can be used to solve everyday problems.
4.73
4.93
4
4.24
4.41
What we learned helped me find ways to demonstrate to students how daily needs would be harder to address without mathematics.
4.45
4.93
3.84
4.06
4.26
0
1
2
3
4
5
6
Pre-K to 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

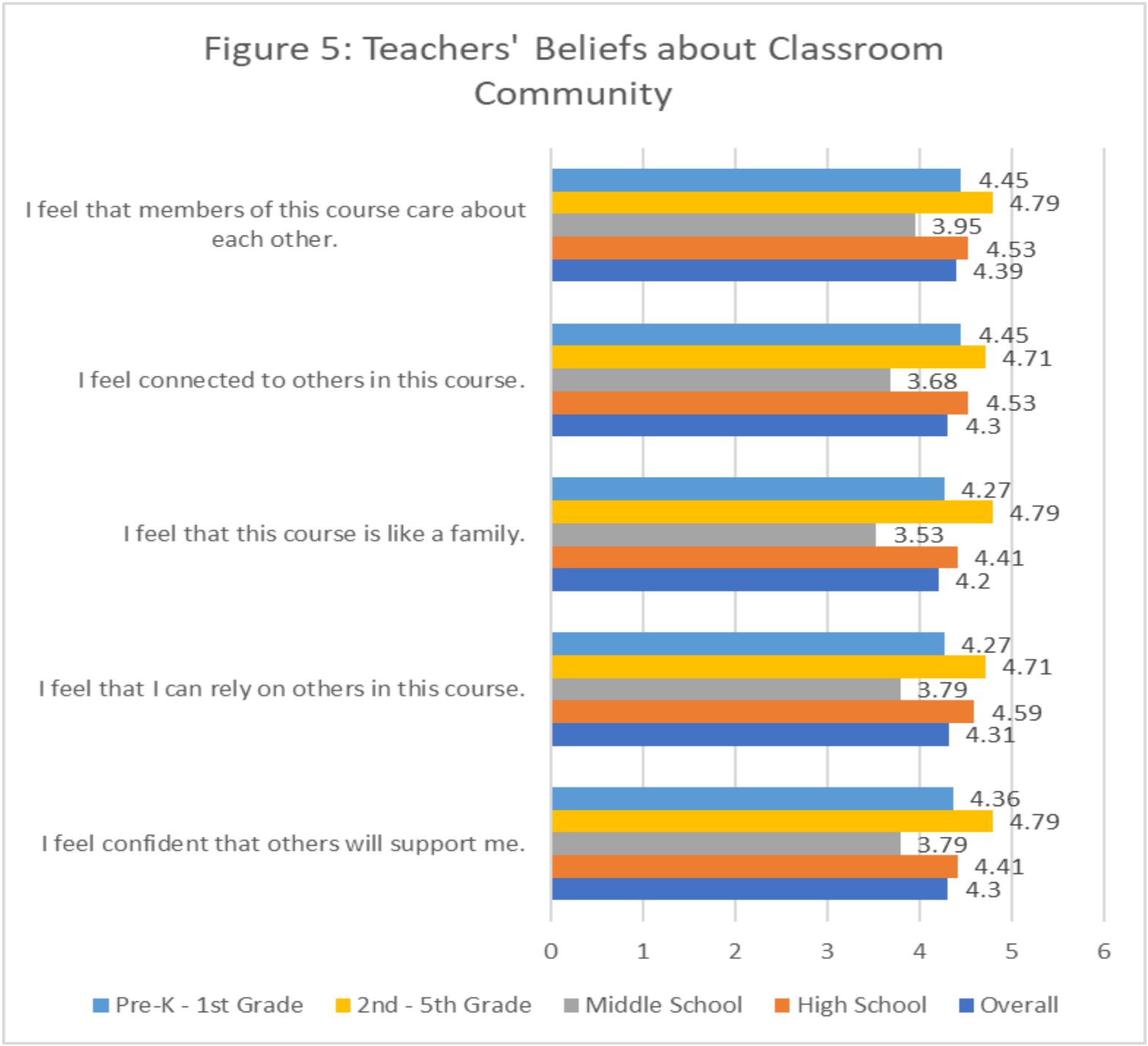
Figure 5: Teachers' Beliefs about Classroom Community
I feel that members of this course care about each other.
4.45
4.79
3.95
4.53
4.39
I feel connected to others in this course.
4.45
4.71
3.68
4.53
4.3
I feel that this course is like a family.
4.27
4.79
3.53
4.41
4.2
I feel that I can rely on others in this course.
4.27
4.71
3.79
4.59
4.31
I feel confident that others will support me.
4.36
4.79
3.79
4.41
4.3
0
1
2
3
4
5
6
Pre-K - 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

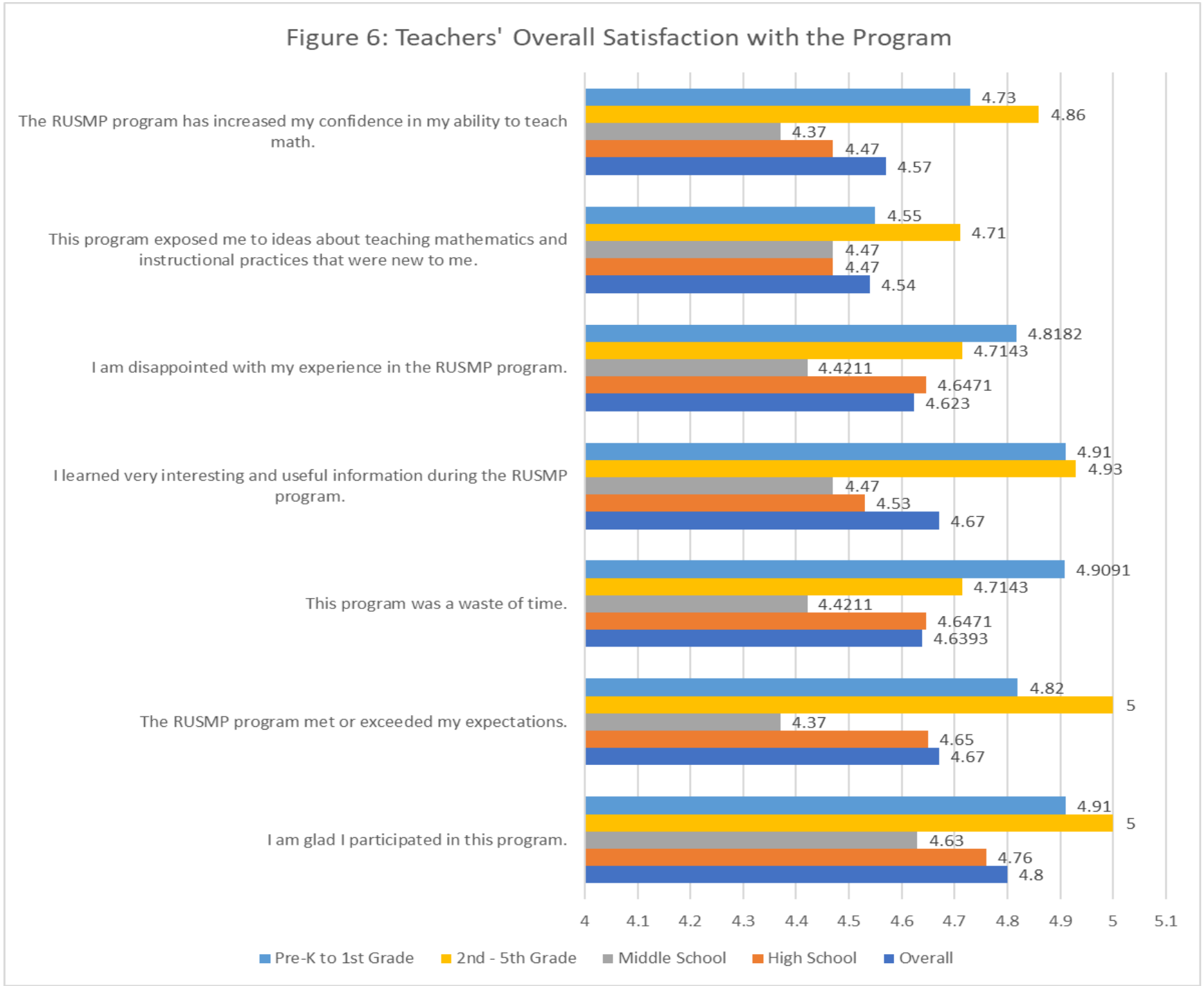
Figure 6: Teachers' Overall Satisfaction with the Program
The RUSMP program has increased my confidence in my ability to teach math.
4.73
4.86
4.37
4.47
4.57
This program exposed me to ideas about teaching mathematics and instructional practices that were new to me.
4.55
4.71
4.47
4.47
4.54
I am disappointed with my experience in the RUSMP program.
4.8182
4.7143
4.4211
4.6471
4.623
I learned very interesting and useful information during the RUSMP program.
4.91
4.93
4.47
4.53
4.67
This program was a waste of time.
4.9091
4.7143
4.4211
4.6471
4.6393
The RUSMP program met or exceeded my expectations.
4.82
5
4.37
4.65
4.67
I am glad I participated in this program.
4.91
5
4.63
4.76
4.8
4
4.1
4.2
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
Pre-K to 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

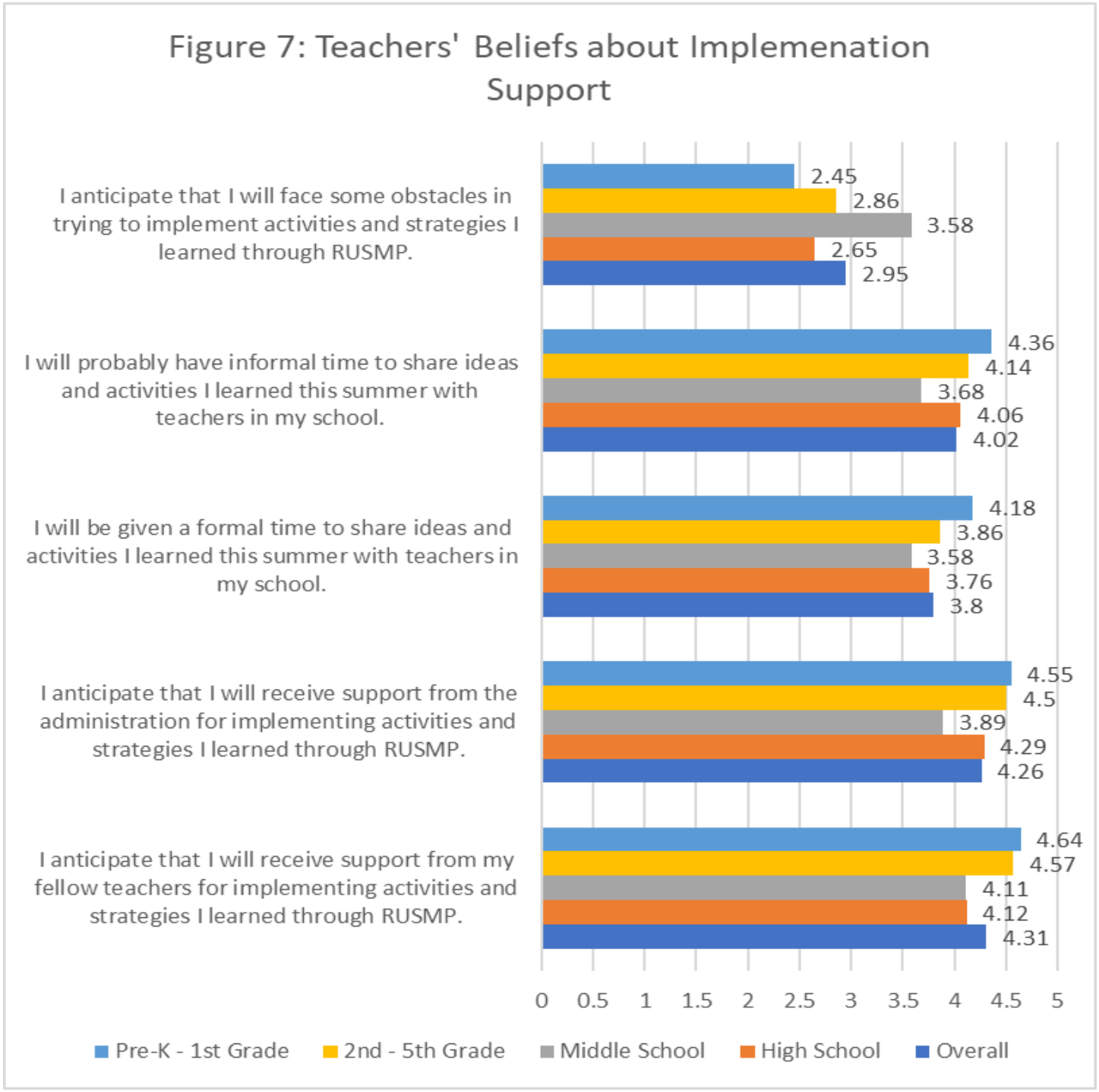
Figure 7: Teachers' Beliefs about Implemenation Support
I anticipate that I will face some obstacles in trying to implement activities and strategies I learned through RUSMP.
2.45
2.86
3.58
2.65
2.95
I will probably have informal time to share ideas and activities I learned this summer with teachers in my school.
4.36
4.14
3.68
4.06
4.02
I will be given a formal time to share ideas and activities I learned this summer with teachers in my school.
4.18
3.86
3.58
3.76
3.8
I anticipate that I will receive support from the administration for implementing activities and strategies I learned through RUSMP.
4.55
4.5
3.89
4.29
4.26
I anticipate that I will receive support from my fellow teachers for implementing activities and strategies I learned through RUSMP.
4.64
4.57
4.11
4.12
4.31
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Pre-K - 1st Grade
2nd - 5th Grade
Middle School
High School
Overall

Conclusion

Overall, the participants have benefited from the SCP in several ways. The paired-samples *t*-tests indicated some significant changes in teachers' beliefs, knowledge, and confidence in teaching mathematics. When analyzed as a whole group, K-12 teachers significantly improved their self-efficacy for teaching in terms of instruction and student engagement with moderate effect sizes (see Table 2). This improvement was most significant for high school teachers. The least improvement was observed in the middle school class.

Regarding content specific teaching self-efficacy, again, at the macro level, K-12 teachers significantly improved their self-efficacy for teaching mathematics with moderate effect sizes (see Table 3). Class level analysis indicated that middle school teachers' self-efficacy for teaching mathematics significantly worsened after the SCP for some reason. Teachers in all other three classes, however, significantly improved their self-efficacy for teaching mathematics with very high effect sizes.

Teachers' mathematics self-concept did not change after participating in the SCP (Table 4). Regarding epistemic beliefs (Table 5), although the changes by class level do not indicate much significant improvements, when all teachers taken together, teachers slightly improved their epistemic beliefs about mathematics from pre- to post-SCP.

Changes in teachers' technological pedagogical content knowledge (TPACK) collective of all teachers were statistically significant and positive (Table 6). At individual class level, the changes for PreK–1st grade teachers and high school teachers were also significant with moderate-to-high effect sizes. The change for 2nd–5th grade teachers and middle school teachers were all positive after participating in the SCP, though not statistically significant.

When all class levels are combined, teachers' beliefs about their own constructivist teaching practices improved significantly and positively after participating in the SCP. Constructivist teaching practices has four categories: student tasks, student-student interaction, teacher's role, and discovery. Collectively, all teachers significantly improved their perceptions of teaching practices in all the sub-categories of constructivist teaching with moderate to high effect sizes (Table 7). When the changes by each class level explored, for all classes except for the middle school class, constructivist teaching beliefs significantly improved in almost every sub-category with high effect sizes. Middle school teachers slightly improved constructivist teaching beliefs related to discovery subcategory only.

Regarding assessment, there were four categories for which teachers were asked to state their perceptions: summative, formative, testing, and large-scale. Macro level analyses (collective of all teachers) indicate a positive change for formative form of assessment (Table 8). In addition, teachers developed slightly more non-availing perception against summative forms of assessments. Lastly, perceiving assessment as more of a testing and a large-scale form weakened after the SCP, though this change is not statistically significant. In 2nd–5th grade class, however, teachers' beliefs about assessment significantly in the favor of formative form rather than a summative and testing-oriented form. Same change is observed for the high school teachers.

When teachers were asked about their level of preparedness to use pedagogical techniques aligned with constructivist mathematics teaching, they all significantly improved their self-perceptions of their preparedness to use these techniques with surprisingly high effect sizes (Table 9). This finding applies to both collective analysis (whole group) and for each class level.

Diversity dispositions was the last area of exploration for the impact of the SCP. Even though the changes were not statistically significant, collective analysis indicate that teachers had more availing beliefs about diversity in teaching and learning after participating in the SCP (Table 10). For PreK–1st grade teachers and high school teachers, the change was negative, though, again, not statistically significant.

Teachers were also asked about the overall classroom climate during the SCP, rating of their SCP instructors and overall SCP program rating. Overall, teachers had positive feedback about their experiences in the SCP. The SCP at RUSMP provided opportunities for these teachers to learn about and engage in activities and discussions about classroom climate including teaching professionalization and societal contribution of teaching as well as active and meaningful learning. The RUSMP's SCP helped teachers to see the value in the teaching profession and highlighted the importance of attending to the community's needs.

Appendix A
Scale Items and Their Sources

*Indicates reverse-coded items

Teaching Self-Efficacy (Instructional strategies) - Klassen et al. (2009)

How much can you do to craft good questions for students?
How much can you do to implement a variety of assessment strategies?
How much can you do to provide an alternate explanation when students are confused?
How much can you do to implement alternative strategies in your classroom?

Teaching Self-Efficacy (Student engagement) - Klassen et al. (2009)

How much can you do to motivate students who show low interest in school work?
How much can you do to get students to believe they can do well in school work?
How much can you do to help students value learning?
How much can you do to assist families in helping their children do well in school?

Self-Concepts in Mathematics - Marsh (1990)

Please indicated how much you agree or disagree with the following statements:

Compared to my colleagues, I am good at mathematics.
I usually received good grades in mathematics courses.
Work in mathematics courses was easy for me.
I struggle with mathematics.*
I learn things quickly in mathematics.
I have always done well in mathematics.

Epistemic Beliefs for Mathematics (Certainty of knowledge) - Hofer (2000)

Please indicated how much you agree or disagree with the following statements:

Answers to questions in mathematics change as experts gather more information.*
All experts in mathematics understand the field in the same way.
Truth is unchanging in mathematics.
In mathematics, most work has only one right answer.
Principles in mathematics are unchanging.
All professors in mathematics would probably come up with the same answers to questions in this field.
In mathematics, it is good to question the ideas presented.*
Most of what is true in mathematics is already known.

Self-Efficacy for Mathematics Teaching - Enochs et al. (2000)

Please indicated how much you agree or disagree with the following statements:

I'm continually finding better ways to teach mathematics.
Even if I try very hard, I don't teach mathematics as well as I teach other subjects.*
I know the steps to teach mathematics concepts effectively.
I'm not very effective in monitoring mathematics activities.*
I generally teach mathematics ineffectively.*
I understand mathematics concepts well enough to be effective in teaching mathematics.
I find it difficult to use manipulatives to explain to students why mathematics works.*

I'm typically able to answer students' questions.
I wonder if I have the necessary skills to teach mathematics.*
Given a choice, I would not invite the principal to evaluate my mathematics teaching.*
When a student has difficulty understanding a mathematics concept, I'm usually at a loss as to how to help the student understand it better.*
When teaching mathematics, I usually welcome student questions.
I don't know what to do to turn students on to mathematics.*

Technological Pedagogical Content Knowledge - Schmidt et al. (2009)

Please indicated how much you agree or disagree with the following statements:

I can teach lessons that appropriately combine mathematics, technologies, and teaching approaches.
I can use strategies that combine content, technologies, and teaching approaches that I learned in my coursework in my teacher preparation/certification program.
I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn.
I can provide leadership in helping others to coordinate the use of content, technologies, and teaching approaches at my school and/or district.
I can choose technologies that enhance the content for a lesson.

Constructivist Mathematics Teaching - Ross et al. (2003)

Please indicated how much you agree or disagree with the following statements:

I like to use math problems that can be solved in many different ways.
I regularly have my students work through real-life math problems that are of interest to them.
When students are working on math problems, I put more emphasis on getting the correct answer than on the process followed.*
When two students solve the same math problem correctly using two different strategies, I have them share the steps they went through with each other.
It is not very productive for students to work together during math time.*
In my classes, students learn math best when they can work together to discover mathematical ideas.
I often learn from my students during math time because my students come up with ingenious ways of solving problems that I have never thought of.
I teach students how to explain their mathematical ideas.
I don't necessarily answer students' math questions but rather let them puzzle things out for themselves.

Assessment-Summative - Brown (2004)

Please indicated how much you agree or disagree with the following statements:

The main purpose of assessment is to assign a grade or level to student work."
The main purpose of assessment is to place students into categories.
The main purpose of assessment is to determine if students meet certain standards.
Assessments should only be used to determine how much students have learned from teaching.

Assessment-Formative - Brown (2004)

Please indicated how much you agree or disagree with the following statements:

Assessment information should be used to modify ongoing teaching of students.

Assessments should be integrated with teaching in the classroom.
Assessments should be used to inform instruction for different student needs.
Assessments should be used to help students improve their learning.
Assessments should be used to provide students with feedback about their learning needs.

Assessment-Testing

Please indicated how much you agree or disagree with the following statements:

Assessment equals testing.
There is a lot more to assessment than just testing.*
There are different types of assessment including classroom discourse and observations.*

Assessment-Large-Scale - Brown (2004)

Please indicated how much you agree or disagree with the following statements:

Large-scale assessments are an accurate indicator of a school's quality.
Large-scale assessments are a good way to evaluate a school.
Large-scale assessments provide reliable information on how well schools are doing.
Large-scale assessments are an accurate indicator of teacher effectiveness.
Large-scale assessments are an accurate indicator of student learning.

Level of Preparedness to Use Pedagogical Techniques - Germuth et al. (2003)

Please rate each of the following statements about how prepared you feel to do the following in mathematics instruction:

Providing concrete experiences to introduce abstract concepts.
Developing students' conceptual understanding of mathematics.
Taking students' prior understanding into account when planning curriculum and instruction.
Practicing computational skills and algorithms.
Making connections between mathematics and other disciplines.
Having students work in cooperative learning groups.
Having students participate in appropriate hands-on activities.
Engaging students in inquiry-oriented activities.
Engaging students in applications of mathematics in a variety of contexts.
Using performance-based assessment.
Using questioning strategies to assess student understanding.

Diversity Deposition Index - Schulte et al. (2009)

Please indicated how much you agree or disagree with the following statements about diversity:

I look for new ways to teach difficult material.
I am reflective about how my actions affect student achievement.
I continually search for new knowledge within my content area.
I am responsible for creating an atmosphere where all students feel free to openly exchange ideas, thoughts, and opinions.
I believe in setting high standards for all students.
I am passionate about my own learning.
I believe that diversity enhances student knowledge.

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