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Student Teaching Practicum at Forest Grove Middle School

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**Student Teaching Practicum at
Forest Grove Middle School**

Yu Liang

C & D Term 2018

WORCESTER POLYTECHNIC INSTITUTE

Professor John Goulet & Jacklyn Bonneau

Table of Contents

Abstract	2
Acknowledgements	3
Chapter 1 - Background	4
Chapter 2 - Well-Structured Lessons	15
Chapter 3 - Adjustment to Practice	21
Chapter 4 - Meeting Diverse Needs	24
Chapter 5 - Safe Learning Environment	27
Chapter 6 - High Expectations	30
Chapter 7 - Reflective Practice	33
Chapter 8 - WPI Education	36
Chapter 9 - Classroom Dynamic	38
Conclusion	43
Works Cited	45
Appendices	
Appendix A: Student Survey Feedback	46
Appendix B: Lesson Plan Template, Sample Lessons	54
Appendix C: Student Sample Classwork/Homework	65
Appendix D: Sample Quizzes/Tests	70
Appendix E: Activities Created to Support Learner Diversity	73

Abstract

In C and D Term of the 2017-2018 WPI academic school year, I had the privilege to complete my Interactive Qualifying Project at Forest Grove Middle School as a student teacher. This paper documents my experience teaching there, as well as discussing the six CAP components used to evaluate my levels of competency in the classroom. These six components are: well-structured lessons, adjustment to practice, meeting diverse needs, maintaining a safe learning environment, keeping high expectations, and reflecting upon my practice. In addition, I have included sample appendices of various assignments, quizzes, and activities completed throughout this practicum, as well as various anecdotes and encounters I shared with students that I believe to have greatly enriched my experience. Those great interactions with the students was the fuel that kept me going along, looking forward to entering the classroom every day. Just as I hope my students learned a lot from me these past months, I can say for sure that I've learned a lot about the wonderful students at Forest Grove Middle School that have made this experience one to remember.

Acknowledgements

This paper is dedicated to...

My grandparents, both of whom worked as teacher in their native country of China for three decades. Their presence in my childhood taught me the values of respect to teachers, as well as the importance of having a good education. My desire to pursue a career in education is my way to give back for all they have done for me.

My second-grade teacher, Wendy Yaakov, who provided massive help to an eight-year-old boy that did not understand a word of English, to assimilate into the American culture seamlessly.

The staff of the WPI Teaching Prep Program, Shari Weaver for putting up with my constant, nagging questions throughout the practicum. As well as Katie Elmes, for hosting the weekly seminars that were, in a way, therapeutic and giving me a platform to reflect upon my teacher experiences.

Ms. Kaitlyn Hannen of Forest Grove Middle School, for providing guidance, advice, feedback, and support for an eager but nervous, novice student teacher.

The wonderful students of the Amcats cluster, as well as every staff member at FGMS that I had interacted with, for providing a welcoming environment for me to thrive in.

Chapter 1 – Background

Massachusetts Education Reform Act of 1993

The Massachusetts Ed Reform Act was passed in June of 1993 for the sake of improving the quality of education in classrooms throughout Massachusetts. This act established higher standards for students and teachers alike to meet in the classroom, a statewide assessment test to accompany a new curriculum, and holding school districts accountable for meeting progress in the new standards. In the decades thereafter, those fundamental changes provided a foundation upon which Massachusetts would build its sound reputation for quality education.¹

Change first must come from within the classroom itself. Prior to 1993, teachers were not required to take professional development courses in their specialty field often reduced the quality of teaching in the classrooms. To resolve this issue, teachers would then be required to pass two MTEL subject matter tests, one in their field, and one in communication/literacy skills before they were granted licensure. Additionally, teachers that seek to be certified to teach in a new field would also need to pass the additional MTEL test corresponding to that field.

Meanwhile, the goal of implementing the Common Core curriculum was to create a stable, common core of academic subjects taught across all schools. Before 1993, the only subjects with a statewide set of standards were history and physical education. The Reform Act extended the framework of statewide standards to cover science/technology, the language arts, mathematics, and foreign languages. Likewise, these guidelines became the core framework set in place for teachers to utilize during lesson planning.

¹ Chester, Mitchell D. (2014, November). Building on 20 Years of Massachusetts Education Reform

As a supplement to reflect the academic changes in the Massachusetts State Frameworks, the Massachusetts Comprehensive Assessment System(MCAS) was implemented to students in grades fourth, eighth, and tenth. Since then the MCAS has been extended to assess students yearly from the third to tenth grade. The goal of this test was to identify which students and which districts needed the most aid in specific fields of education. Furthermore, the Act mandated all high school students must pass the tenth grade MCAS test (in addition to meeting local school requirements) before graduating high school.

To hold districts accountable for its academic performance, the Act also created a Accountability and Assistance System Scale to assess general district performance. The scale ranks from the highest performing school at level 1 rating, down to the lowest performing schools at level 5. Furthermore, the Relative to the Achievement Gap was passed in 2010 to further provide support for this criteria system. In doing so, the state can identify and engage any schools on the lower ends of the criteria. Any district ranked as a level 5 on the scale would be subjected to state receivership.

In retrospect, the changes brought forth by the Massachusetts Reform Act of 1993 has been a significant catalyst in improving the quality of education in Massachusetts. In a recent 2017 rankings published by US News and World Report, Massachusetts ranked No. 1 in education. To quote governor Charlie Baker², *“Everyone should be proud that Massachusetts continues to lead the nation in... public education for all citizens, and our administration will continue to build on these accomplishments to bring more economic success to every corner of Massachusetts.”* The future for education in Massachusetts is promising for our next generations of youths hoping to make a positive impact in the world.

²Guilardi, J. (2017, February 28). Massachusetts was ranked as the No. 1 state in the country. Retrieved

TIMMS

TIMMS, which is abbreviated for “Trends in International Mathematics and Science Study.” measures the performance of fourth to eighth graders from Massachusetts in the STEM (Math and science) fields relative to other students all round the world. In 2015, TIMMS data was collected amongst students in fourth, and eighth grade. The findings³ in general showed that U.S. students improved by about a twenty to twenty-five-point increase in math and science TIMMs scores between 1995 to 2015.

Regarding performance relative to other nations, US students finished just within the top 10 in the TIMMs international benchmarks rankings. The following data below displays the percentage of fourth and eighth grade students reaching the TIMMs international benchmarks, respectively:

Figure 1. Percentage of 4th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2015

Education system	Percentage of students reaching each international benchmark							
	Advanced (625) s.e.		High (550) s.e.		Intermediate (475) s.e.		Low (400) s.e.	
Singapore ¹	50 *	2.1	80 *	1.7	93 *	0.9	99 *	0.3
Hong Kong-CHN ²	45 *	2.0	84 *	1.3	98 *	0.4	100 *	0.1
Korea, Republic of	41 *	1.3	81 *	1.0	97 *	0.4	100 *	0.1
Chinese Taipei-CHN	35 *	1.5	76 *	1.0	95 *	0.4	100 *	0.2
Japan	32 *	1.1	74 *	1.0	95 *	0.4	99 *	0.1
Northern Ireland-GBR ³	27 *	1.3	61 *	1.5	86 *	1.1	97 *	0.6
Russian Federation	20 *	1.8	59 *	1.8	89 *	1.1	98 *	0.4
England-GBR	17	1.2	49	1.5	80	1.2	96	0.7
Kazakhstan	16	1.8	47	2.6	80	1.5	96 *	0.5
United States^{1, 2}	14	0.8	47	1.1	79	1.0	95	0.5
Ireland	14	1.0	51 *	1.6	84 *	1.0	97 *	0.4
Norway (5) ⁴	14	1.1	50	1.6	86 *	1.0	98 *	0.4

³ Trends in International Mathematics and Science Study (TIMSS) - Selected Findings from TIMSS 2015. (n.d.).

Figure 2. Percentage of 8th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2015

Education system	Percentage of students reaching each international benchmark							
	Advanced (625) s.e.		High (550) s.e.		Intermediate (475) s.e.		Low (400) s.e.	
Singapore ¹	54 *	1.8	81 *	1.5	94 *	0.9	99 *	0.2
Chinese Taipei-CHN	44 *	1.2	72 *	0.9	88 *	0.6	97 *	0.4
Korea, Republic of	43 *	1.4	75 *	1.0	93 *	0.5	99 *	0.2
Hong Kong-CHN	37 *	2.3	75 *	1.9	92 *	1.3	98 *	0.6
Japan	34 *	1.2	67 *	1.0	89 *	0.7	98 *	0.3
Kazakhstan	15 *	1.7	41	2.6	71	2.1	91	1.1
Russian Federation	14 *	1.4	46 *	2.5	78 *	1.9	95 *	0.8
Israel ²	13 *	1.0	38	1.8	65 *	1.7	84 *	1.2
Hungary	12	1.2	37	1.7	67	1.7	88 *	1.1
United States³	10	0.9	37	1.5	70	1.4	91	0.7
England-GBR	10	1.1	36	2.4	69	2.4	93	1.2
Canada ^{3, 4}	7 *	0.6	39	1.4	78 *	1.1	96 *	0.5

As a note of interest, the top 5 countries in the TIMMs rankings all happen to be Asian countries, and the ones thereafter are all European countries with one or two Middle Eastern or Central Asian countries. The rankings seem to have sequential clusters of countries of a specific continent. This pattern perhaps is a general indicator that those countries must have something in common regarding education, whether it be the culture, style, and attitude towards education.

Overview and history of the Worcester district⁴

Worcester Public Schools is mainly consisted of public, open enrollment schools, totaling to 52 in the entire district. The county of Worcester has a population of roughly 819,000 according to the census of 2016. As of the same year, 24,740 students are enrolled and a budget of \$429.4 million is allocated to the schools. The current superintendent of WPS is Dr. Maureen Binienda, who has been appointed since 2016.

⁴ Worcester Public Schools District Profile, Massachusetts. (n.d.).

Information about Forest Grove Middle School

Forest Grove Middle School is a one of four middle schools here in Worcester. Located at 495 Grove Street, the campus is a two-story building with long hallways to host its 978 students and roughly 80 teachers or administrators. In terms of enrollment, the school exclusively rosters seventh and eighth grade students from the surrounding K-6 schools. The student body is grouped into clusters that share the same set of English, Mathematics, Science, History, and foreign language teacher. The teachers also keep the students for both years, as the extra year spent with the teacher and the same cluster is great for familiarity as well as building chemistry. The current principal is Mr. Kareem Tatum.

Socioeconomics and Demographics

As for the socioeconomic status of the student body, the most recent poll states that approximately 53% of the students at Forest Grove Middle School qualify for a free or reduced lunch program.

The following are tables obtained from the Massachusetts Department of Education website which demonstrates the demographics at Forest Grove Middle School for the current 2017-2018 school year.

Enrollment by Race/Ethnicity (2017-18)			
Race	% of School	% of District	% of State
African American	12.5	15.9	9.0
Asian	5.1	7.1	6.9
Hispanic	35.4	42.6	20.0
Native American	0.1	0.2	0.2
White	42.1	30.2	60.1
Native Hawaiian, Pacific Islander	0.0	0.0	0.1
Multi-Race, Non-Hispanic	4.8	4.2	3.6

Enrollment by Gender (2017-18)			
	School	District	State
Male	497	13,041	489,172
Female	481	12,265	464,753
Total	978	25,306	954,034

Enrollment by Grade (2017-18)																
	PK	K	1	2	3	4	5	6	7	8	9	10	11	12	SP	Total
District	1,225	2,110	1,938	1,838	1,927	1,985	1,818	1,847	1,765	1,650	1,841	1,854	1,726	1,722	60	25,306
Forest Grove Middle	0	0	0	0	0	0	0	0	486	492	0	0	0	0	0	978

Figures 1 & 2: Demographics data at FGMS (Massachusetts, 2017-2018)

Figure 3: Enrollment Data by Grade at FGMS (Massachusetts, 2017-2018)

In terms of enrollment by ethnicity, about 42% of the school is made up of white students. The school also has a fairly large percentage of Hispanic students at nearly 35.4%, and in fact makes up for exactly 20% of the Hispanic students in the state. Next, African American and Asian students combine to make up for just 18%, with the rest of the minority students classified under either multi-race/non-Hispanic or Native American at just under 5%. Given the amount of diversity in the school, it seems that many students are also bilingual, speaking a wide variety of languages such as Spanish, Portuguese, Vietnamese, Arabic, Albanian, etc. The school primarily enrolls students between the seventh and eighth grade.

As for gender, females make up for 49.18% of the student body, while males are at 50.82%. Anecdotally in my Math 7 Honors class, female students actually made up for 18 out of 26 students in the class.

How does our school's enrollment compare to the district and the state?

Total enrollment	Our school		Our district		Our state	
	997		25,479		953,748	
By high needs population	Our school		Middle Schools in our district		Middle Schools in MA	
	#	%	#	%	#	%
Economically disadvantaged students	449	45.0	1,791	55.3	46,310	26.9
Students with disabilities	198	19.9	653	20.2	30,164	17.5
English language learners	232	23.3	884	27.3	10,274	6.0

Figure 4: Demographics of students at FGMS compared to other schools in the district and the state (Massachusetts, 2017-2018)


Looking at students with high needs, Forest Grove Middle School currently sits at 45% with economically disadvantaged students, which is less than the district average by a difference of 10%. The percentage of students with disabilities is on par with other schools in the district and the state in general. Meanwhile, the amount of English Language Learners (ELLs) is

generally in the same range compared to other middle schools in the district. Although the ELL percentages here at Forest Grove is much higher at 17% more than the average ELL learners in MA, and this statistic is likely influenced by the large percentage of Hispanic, African American, Asian students, and students of all other minorities in the school. This statistic also displays that Forest Grove Middle School is more diverse than the average middle school in Massachusetts.

Academic Performance

2016 School And District Accountability

How is this school doing overall?



Not meeting gap narrowing goals

Most schools are assigned a level from 1-5, with those meeting their proficiency gap-narrowing goals in Level 1 and the lowest performing in Levels 4 and 5. A district is typically assigned a level based on the level of its lowest performing school. Placing schools and districts into levels helps districts know which schools need more support, and helps the state know which districts need the most assistance. More information is available here: <http://www.mass.gov/ese/accountability>.

According to the School and District Accountability scale, Forest Grove Middle School is classified as a level 2 school in as recent as 2016⁵. This puts FGMS in the upper echelons of the scale rating for schools, however the school should still aspire to meet its gap narrowing goals to advance further along this scale.

Based on the new curriculum frameworks adjusted for standardized testing, the MCAS exam is a comprehensive assessment test issued on a yearly basis to students in the state of Massachusetts. With that said, Forest Grove Middle School has opted to partake in the Next-Generation MCAS test⁶, which is an updated version of the current MCAS test. Currently offered for the English language arts and mathematics portions of the assessment, this Next-Generation MCAS test's emphasis is on better application of learned knowledge, measuring students' critical thinking abilities, as well as prompting students to make more significant connections

⁵ Massachusetts School and District Profiles. (n.d.).

⁶ Understanding the Next-Generation MCAS (n.d.).

while reading and writing. First issued in spring of 2017 to third to eighth graders, the Next-Generation MCAS test is also the first version of the MCAS test to be taken on a computer. In fact, the administrators behind the MCAS tests aims to eventually replace the current, ‘legacy’ MCAS tests for all students in the near future.

The following displays the performance of Forest Grove Middle School in the most recent 2017 MCAS⁷.

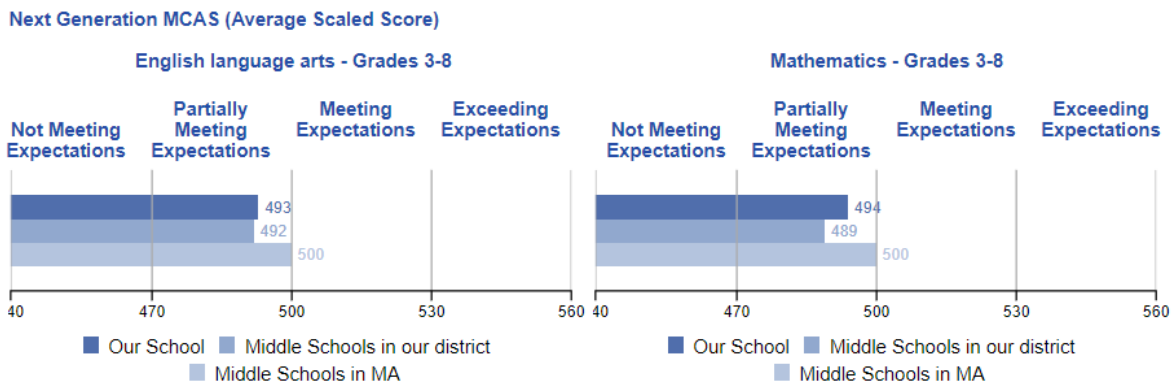


Figure 5: Student Performance on Next Generation MCAS Test at FGMS compared to other middle schools in the district and state (Massachusetts, 2017-2018)

According to the data⁸ given, Forest Grove Middle School is on the cusp of ‘Meeting Expectations’ for both the Math and English MCAS tests, the school is doing slightly better than the other middle schools in the district, while slightly underperforming compared to other middle schools in Massachusetts.

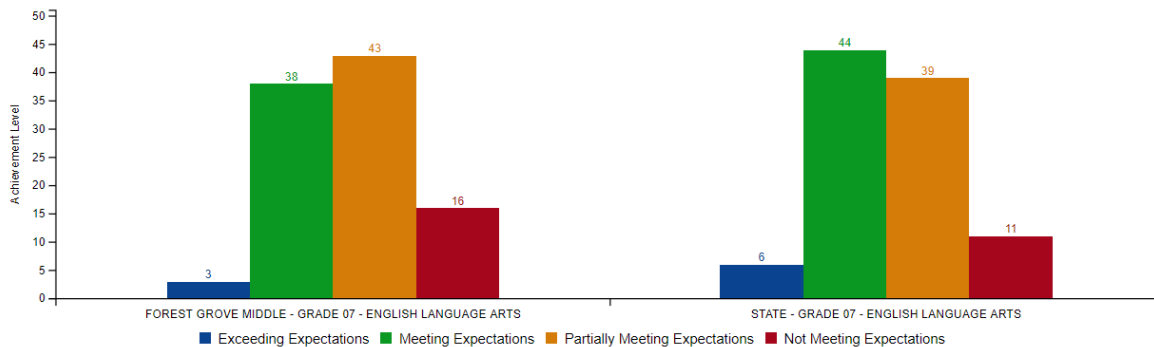
The following graph is a more in-depth look at percentages of student performance within the school:

⁷ The Next-Gen MCAS grading thresholds also received a name change from: Warning, Needs Improvement, Proficient, Advanced to Not Meeting Expectations, Partially Meeting Expectations, Meeting Expectations, and Exceeding Expectations, respectively.

⁸ Massachusetts School and District Profiles. (n.d.)



[More about the data](#)



Grade and Subject	Meeting or Exceeding Expectations		Exceeding Expectations		Meeting Expectations		Partially Meeting Expectations		Not Meeting Expectations		Included	Avg. Scaled Score	SGP	Included in SGP	Ach.Pct
	School	State	School	State	School	State	School	State	School	State					
GRADE 07 - ENGLISH LANGUAGE ARTS	41	50	3	6	38	44	43	39	16	11	461	494.6	43.0	427	35
GRADE 07 - MATHEMATICS	38	47	4	9	34	38	45	42	17	12	462	493.4	40.0	427	37
GRADE 08 - ENGLISH LANGUAGE ARTS	34	49	3	8	31	41	50	39	15	11	471	491.9	42.0	438	30
GRADE 08 - MATHEMATICS	35	48	5	9	31	39	51	42	14	11	474	494.1	45.0	437	33
GRADES 03 - 08 - ENGLISH LANGUAGE ARTS	38	49	3	7	34	42	46	41	16	10	932	493.3	42.0	865	25
GRADES 03 - 08 - MATHEMATICS	37	48	4	8	32	40	48	41	15	12	936	493.7	43.0	864	28

Figure 6: In-depth look at student Performance on Next Generation MCAS Test at FGMS compared to other middle schools in the district and state (Massachusetts, 2017-2018)

Looking at the entry pertinent to my student teaching placement for Grade 07

Mathematics, the data matches the graph above in that FGMS scores lower than the state average in the thresholds such as Meeting or Exceeding Expectations, Exceeding Expectations, Meeting Expectations. While having a higher percentage of students Partially Meeting Expectations or Not Meeting Expectations. As informed by my supervising teacher, the school is utilizing resources (such as implementing the Numeracy class) in an effort to get the percentage of Meeting Expectations and above to be much higher than the percentage of Partially Meeting Expectations and below.

As an additional note of interest, seeing that the scores above are the results of an exam issued via electronic means for the first time, perhaps the students were not yet accustomed to the newer means of testing compared to the paper tests in the past. It may be worthwhile to

revisit these scores come this year and the next year to compare whether the newer means of testing can impact student performance.

Other Pertinent Information

During my time student teaching, I was responsible for three classes: Pre-Algebra(Green), Math 7 Honors(Orange), and Math 7 Regular(Blue). The Pre-Algebra class was the most advanced of the three in terms of content taught, and the class utilized the accelerated textbook for the advanced content. The Math 7 Regular class utilized the non-accelerated version of the textbook, and adjustments as well as accommodations in terms of lesson planning and content taught for ELL students was necessary.

The Math 7 Honors class also utilized the accelerated textbook, albeit at a slower pace, and in addition had a supplementary ‘Numeracy’ class once a day. Numeracy class mainly consisted of completing work on the IXL.com website, which served as a resource to enrich and reinforce student’s knowledge in various mathematical topics in all grade levels(K-12). Students in the class often were directed to complete assignments under Seventh Grade on the website, and occasionally eighth grade for an increased challenge. Overall, the website was a great resource because of its convenience, scope of content, and it was generally well liked by the students.

I was also very impressed with the school’s strict policy on phones. Over the course of the practicum, I did not have one issue with phones being distractions during class, even in my most challenging class. This is a huge boost to the level of productivity in the classrooms. Furthermore, we live in an age where technology is ever more so convenient with items like

smartphones, tablets, and computers at our fingertips, and it is certainly a great responsibility to utilize those resources efficiently but also respectfully.

These are the standards that I was responsible for covering during my time student teaching:

Overview of Grade 7 Standards

Ratios and Proportional Relationships

A. Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System

A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Expressions and Equations

A. Use properties of operations to generate equivalent expressions.

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Geometry

A. Draw, construct and describe geometrical figures and describe the relationships between them. B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Statistics and Probability

A. Use random sampling to draw inferences about a population.

B. Draw informal comparative inferences about two populations.

C. Investigate chance processes and develop, use, and evaluate probability models.

In my time student teaching, I was able to complete the following units: Ratios and Proportional Relationships, Percents, Geometry, and Statistics and Probability.

Chapter 2 - Well-Structured Lessons

The first step to having a successful day in the classroom lies in the planning prior to entering classroom. Being prepared is even more important for a beginner teacher like myself, as I quickly realized that spend my prep time outside of the classroom wisely translated to an easier time when executing the lesson. With that said, well-structured lessons should provide organization and clarity. The opening is often the Bellwork/Do-Now, where students are asked to either recall the previous day's content, or in general content learned in the previous grades. This opening is key because it connects the previous day to the current day and sets the tone for the rest of the lesson, as the content in the Bellwork should more or less transition the students to what they should expect for the better part of the later lesson. This is also a good time to clarify students' understanding, especially so if there are questions that students may have lingering from the day before.

The 'body' is the most crucial part of the lesson, as teachers will dedicate the most time to this portion to delve into the daily content. This is the part where teachers will look to model, rationalize, provide connections, give students opportunities to tackle problems, work cooperatively, and most importantly implore students to think critically and creatively. This is where questions such as "Can you use what you just learned? Can you explain in own words? Can you teach to someone else?" are often asked, directly or indirectly.

The end of the class is where the teacher should aim to wrap up and redirect the students' attention towards the main purpose of the lesson. Repetition might also be necessary, as this brings closure to the lesson, as well as providing additional reinforcement for students to retain the content taught that day. Likewise, informal assessments such as exit slips can be effectively

utilized to ‘summarize’ the content taught and should aim to either reinforce or steer the student’s focus back towards the important concept(s) taught during the lesson.

The Lesson Plan Template

The template that I followed for all my lessons during this practicum can be seen in Appendix B. When considering its structure, the lesson plan template comprises of three different stages. The first stage, ‘Desired Results’ was utilized to state my overview and motivation for the lesson, as well as what the lesson would adhere to in the corresponding sections of the Massachusetts Mathematics Curriculum Framework. Within this stage, I also looked to address the key essential questions my lesson sought to focus on. For example, in my first unit with Ratios and Proportions, one of the most common questions would be something along the lines of, “How can we use our knowledge of equivalent fractions to help us identify, and solve for rates?” Later on in the unit, I would expand the aforementioned question to “How can we use our knowledge of equivalent fractions and rates to help us solve for proportions?” Personally, I believe the level of scaffolding within those questions exemplifies the idea that middle school mathematics is a subject that simply builds upon the foundation of prior knowledge. Throughout the lesson I also look to repeatedly utilize the vocabulary words listed in the lesson plan and often phrase questions in a way that prompts the students to use those vocabulary words when they are answering me or showing me work on paper. I’ve personally found that incorporating vocabulary is easier, but what is more difficult is asking the right type of question.

The second stage in the template is dedicated for ‘Assessment Evidence’, this section was mainly used to describe the progress my students are expected to make concerning various

performance tasks, or key evidence, and furthermore, the key criteria that is used to measure whether the such performance tasks or key evidence is adequate. I personally chose to use the latter criteria as a means of scaffolding where I set my baseline expectations in the ‘Performance Task or Key Evidence’ section, then use the ‘Key Criteria’ portion to set an additional goal to aim for once the performance task/key evidence is fulfilled. Ideally, I would expect students to fulfill both criteria, but realistically I would often identify students that are struggling to reach the ‘Key Criteria’ portion, or even just struggle to fulfill the first section. To address these issues, I would dedicate time during the Bellwork, or provide additional explanations when going over problems on the board and allow students to work in pairs with peers.

Stage Three of the template is the ‘Learning Plan’. This encompasses the content covered in class that day, as well as providing additional details such as application of the concept learned, intelligence styles addressed, delivery methods, student grouping, accommodations made to the lesson if necessary, homework activities, and materials used during class.

Diving into the Lesson - What are the challenges?

As for the daily lessons’ contents, a staple for me has been the Bellwork at the beginning of every lesson. Teachers can use prior knowledge to gauge the level of success for a specific activity or assessment. For students, teachers can lesson plan Bellwork or lesson openers to incorporate prior knowledge content. These assessments are often low-pressured and sometimes uses group discussion to allow for students to help one another, especially if any students need reminding of previous topics learned. Gauging the level of prior knowledge is important because math as a subject is layered in a way that past topics often come up again and again in newer

concepts. Teachers can then use this information to set a solid baseline for what needs to be covered before diving into the topic.

It is also crucial to develop lesson plans also that incorporates multiple intelligences⁹. Based on the theory developed by Dr. Howard Gardner in 1983, teachers can optimize students' understanding of material by presenting lessons that appeal to a wide range of intelligences. These eight intelligences are as follows: visual, verbal, logical (in some cases, mathematical), bodily (hands-on learning), interpersonal (cooperating with others), intrapersonal (within the self), naturalistic (individuals that interact with nature or the environment), and musical. Over the course of the practicum, I found that visual, verbal, logical/mathematical, intrapersonal, and interpersonal intelligences were utilized the most in my lessons. It was easy to implement visualization in my lessons through presenting the likes of shapes, figures, net drawings, diagrams, and so on. I had also made sure to colorize some of the formulas that I had presented in class, choosing to represent each different variable in the formula with a different color to illustrate what values end up going where (Appendix B, Sample Lessons - 3/6 Lesson on Percents with Equations). Likewise, verbalization, and logical/mathematical application were utilized in conjunction as I often look to gauge student learning through questions of various mathematical concepts. Those concepts ranged anywhere from formulas, to steps in the problem-solving process, to application of past learned concepts. Similarly, I would also have my students discuss those topics in depth in pairs or groups with others, and this promotes the interpersonal style of learning through interactions with their peers. Furthermore, intrapersonal learning can often be applied when I had asked students to relate mathematical concepts to their daily lives,

⁹ *Howard Gardner's Theory of Multiple Intelligences*, Northern Illinois University, Faculty Development and Instructional Design Center.

this was utilized most notably in topics such as discounts when purchasing items and probability (Appendix B – 4/9 Lesson on Probability).

While it is idealistic to say that I can make an effort to appeal to as many of the intelligences as possible, the reality is there are limits like time and requirements from the curriculum frameworks which dictates what content goes into the lessons. On the other hand, some of the intelligences such as musical, bodily, and naturalistic intelligences were simply too difficult to cover on a consistent basis, and the best a teacher can do in this scenario is to try to encourage students to do learning of their own out of class as a supplementary means.

The other obstacle I see is engagement, a teacher might figure out which intelligence style a student is good at, but that student may also be difficult to engage and cooperate. In this case, a teacher needs to find out what motivates a student to do work, and perhaps use that to convince the student to stay engaged. Now of course, at the end of the day, a teacher simply cannot babysit an uncooperative student either, and it is still up to the student to put the effort forward.

Accountability for Learning

While Bellwork had consistently been my go-to tool for learning assessment, over the course of the practicum, I found myself not utilizing exit slips as often as I could've been. In the beginning I had attempted to adjust to teaching to the bell (explained below), and in doing so I fell into the habit of over-preparing lessons where I would still be covering a topic or going over a problem by the time the bell had sounded. Once I had gotten better at teaching to the bell, my mentor teacher mentioned to me that I also need to incorporate a form of assessment on a weekly basis to hold my students accountable for learning at the end of a period.

I believe I have demonstrated partial competency in this area through my wide variety of activities implemented in my lesson plans on a daily basis. However, I need to increase the scope of my methods of assessments to better account for my students' learning.

Chapter 3 - Adjustment to Practice

While having a stellar lesson plan on paper is a great first step to success in the classroom, it is also important to know how to make appropriate adjustments in the classroom when need be.

Energy

Personally, the first three weeks when I was only responsible for teaching one class seemed to be the easier weeks of the practicum because I could narrow my focus and expand my energy onto planning for the Honors class. However, as I picked up my second class (Regular Math 7/Blue), I started to see the effects of an increased workload, as well as a more divided approach to lesson planning. The classroom behavior was also more challenging in Blue, and thus it became more taxing for me with more energy spent towards classroom management. In Week 5 or so, there were multiple delays and snow days due to an inclement weather in combination with testing. In an attempt to make up for some of those lost hours, I had asked Ms. Hannen to take over the Numeracy¹⁰ class to make up for lost ground from the normal class, effectively making it my third class taught during the day during that week.

Thus, maintaining a good level of energy throughout the day would be even a bigger for three classes. I think I did well in this regard but one issue that did come up was lesson planning. Over the course of that week I found out that lesson planning for two 55-minute periods with the same class was quite the challenge. I knew I didn't want to bore the class with 110 minutes of textbook/workbook work, but I still needed to get through content. I ended up dedicating about 75-80 minutes to teaching content, and the remaining minutes for activities such as group work,

¹⁰ Numeracy usually took place in a computer lab as a supplementary class for the Honors students. This class' purpose is to give those students more opportunities to improve their mathematical knowledge via the IXL.com website, where they would receive weekly assignments to complete.

station work, and a Quizlet matching game (Appendix E). Turns out, the quick turnaround time between the first period I see my students, and the second period was helpful in that I could use the beginning of the second period to get the students to recall the information from the first period more quickly than usual. Nonetheless, I was also happy to have covered the progress I had planned and a little more during that week using the extra time given.

‘Flipping a Switch’

When I had fully taken over my final class(Pre-Algebra), the schedule had it that I would have the Pre-Algebra class directly before my Regular class. In doing so, I would essentially have my most advanced and challenging class back to back, thus I often needed to ‘flip a switch’ mentally to accommodate for the different pace of learning with the students. In Pre-Algebra class I was used to going through the material without much stoppage, where in the Regular class I found myself not only needing to accommodate to a slower pace, but to also constantly deal with classroom management issues such as lack of preparedness, inattentiveness, distractions, and bickering amongst the students. Looking back in my days as a middle school student, I was not even aware of the such a wide range of distractions that my teachers would’ve most likely had to deal with this as well in their daily jobs. Now that I’ve seen this through my own perspective, I have an even greater sense of respect for the work they did.

Gradual Release of Responsibility

Ms. Hannen pointed out to me that I was often doing too much work at the board and not giving my students enough opportunities to tackle problems independently. I realize that I am often times having this issue because I feel obligated to make sure that every student in the class can see every step in every problem. However, when I do this, it seems as if I am not giving

enough trust to my students that they can confidently do the problem(s) on their own correctly. When test day arrives, the students are expected to perform on their own. I cannot be there to help them work out the steps along the way, thus it is crucial that I trust my students with their abilities to solve the problems on their own. Because at the end of the day, the joy of learning is often derived not from the final result, but rather the path that gets one there.

In terms of competency in this regard, my areas of improvement are centralized around the gradual release of responsibility, as well as the need to extend the scope of my informal assessments. To elaborate, Ms. Hannen had observed that I was only giving out quizzes/tests or homework checks, yet I needed to incorporate a wider variety of other assessment methods, such as exit slips, collecting homework to be graded, selecting a specific homework question to be graded, and so forth.

Chapter 4 - Meeting Diverse Needs

Heading into the Teaching Practicum, meeting diverse needs was one of my prioritized goals because of my personal background. When I immigrated to the United States in second grade, I did not understand much English and was placed into an ESL class. I believe my firsthand experience in overcoming the language barrier can be an asset as I can say that I was once in my students' shoes. After all, preparing lessons and assessments that are accessible to students from diverse backgrounds is certainly important in lowering language barriers when lesson planning. This is a stage where teachers must mind the content they intend to put into the lesson and realizing the comfort level of the students when faced with such content. It is always a challenge to find a right balance to teach the content you're expected to teach, but also in a way that does not alienate the students due to pace or lack of understanding.

My primary focus was to deliver and present material in a way that accommodates for the wide range of intelligence and learning styles amongst my students. Realizing the eight different types of intelligences as described above goes a long way towards promoting equity and diversity because the wide array of those styles puts learning in the interest of the learner. For example, a student that is great at thinking logically in terms of mathematics but struggles with visual spatial should not be misidentified as a poor student. Or perhaps a student that is a great musical learner but might be dreadful at logical/linguistic intelligence. Tying in the concept of bias, sometimes I feel teachers might also fall into a trap of developing negative biases towards students that may not excel at the subject taught by that teacher while completely overlooking other preferences/aspects of their intelligence. Acknowledging this also contributes towards promoting equity and diversity through respecting students for what they are good at.

One of the notable lessons I did to meet diverse needs was in the Probability unit. The lesson plan, referenced in Appendix B, Sample Lesson - 4/9 Start of Probability) involved finding probability of picking out various cards in a standard playing cards deck, and the expected versus theoretical probabilities of results in a rock-paper-scissors game. The objective of the lesson was to give students an in-depth introduction into the construction of probability ratios (# of desirable events / # of total outcomes). The concepts addressed in the lesson were: ratios, fractions, expected outcome, and actual outcome. The two end goals from the lesson were to: Allow students to become more familiar and comfortable setting up probability ratios through real-life applications, as well as to begin to see that expected probability ratios may differ from experimental probability ratios from real results.

The lesson utilizes four examples of games or events that involves probability. Overall, I believe these following examples provide a wide variety of real life applications that not only effectively illustrate the concept of probability, but also are popular enough that all students will have seen or encountered such events/games beforehand. Therefore, this reduces the lack of understanding barriers that may come with any challenging mathematical concept.

- 1) Playing cards - This is a fairly popular and well-known game for many students. The probability questions being asked in the lesson, such as: “What are the odds of drawing a specific suit/card?” should not be foreign concepts as students are familiar with the four suits (Spades, Hearts, Diamonds, Clubs) as well as the cards from each suit (Ace, King Queen, Jack, 10....2). This part of the lesson gives opportunities for students to practice setting up probabilities (# of desirable events / # of total outcomes) and can give students further insight about the game the next time they play cards.

2) Rock/Paper/Scissors - This is a game that everyone already understands or is straightforward to understand. The lesson aims to give students insight on why R/P/S is considered to be 'fair' when the students are asked to construct an outcome probability chart. Theoretically, it seems apparent that there's an equal amount of probability($\frac{1}{3}$) to win/lose/tie. However experimentally, students will also see that their exact results may not necessarily match the exact theoretical probability.

3) Miscellaneous

a) One of the problems in the first part of the lesson asks students the probability of guessing the 'right' answer on a multiple choice. I feel this inclusion is appropriate with the MCAS test around the corner. I also included an additional question asking students why elimination is a good strategy, hopefully this will prompt students to think of the statistical implication of elimination where it essentially can give them a greater chance of picking the right answer.

I believe I have achieved partial competency in this area via lesson planning and scaffolding learning material in a way that is accessible to learners of all different levels. However, an area of improvement for me in this regard is being careful with how many words I use during explanations. I realized that convoluted wording was a habit I tend to fall towards especially in my Regular ELL class where I feel the need to explain a topic more in depth to struggling students, but at the same time presenting the topic in a way that might also be vague or unclear due to excessive wording.

Chapter 5 - Safe Learning Environment

In my first two weeks observing Ms. Hannen's classes, I was very impressed at the level of maturity in almost all students in her Pre-Algebra (High Honors) and Math 7 Honors class. The students in general were very respectful of one another, as well as to me and Ms. Hannen. As a result, rarely any arguments or conflicts broke out. This demonstrates to how well Ms. Hannen has set the tone with her demeanor throughout the year thus far and having those high expectations for a safe, productive learning environment was a great asset that I was able to benefit from as I settled into my time teaching at FGMS.

Routines

Maintaining consistency in the classroom goes a long way towards fostering a safe learning environment for students. Since I came into the classroom during the middle of the year, it was important for me to uphold the routines Ms. Hannen had in place with her students. I made my expectations clear in my first week of teaching, reminding my students that I expected them to share the same amount of respect they had for Ms. Hannen with me as well. In return, I also asked for patience as I slowly acclimated myself into their classes and routines. Furthermore, I was able to consistently hold the routine of having bellwork at the beginning of class, and towards the later weeks, implementing an exit slip at least twice a week to keep students engaged towards the last minutes of class.

In addition, the bathroom policy in Ms. Hannen's class was that only one student could leave the room at a time and going to the bathroom was not permitted in the first five and last five minutes of class. There were no issues with this policy in the Pre-Algebra class, and rarely any in the Honors class. However, bathroom-going was often an issue in the Blue class, as

usually the same students would try to abuse this privilege to go wander out in the halls, as well as students trying to goad me into letting them go even in the first or last five minutes of class. Another issue that caught me off guard was the lack of maturity from some of the students that had asked me to go to the bathroom, as often times I would get two or three students almost simultaneously raising their hands to ask to go, and when I pick on one student, one or both of the uncalled students would then complain about me not calling on them because they believed that they were the 'first' ones to raise their hand. This was detrimental to productivity in the classroom as it often wasted time and usually interrupted me when I am going over instructions on the board or helping a student one-on-one. My initial solution to this issue was to keep track of the names of students that goes to the bathroom and limit the same from going more than twice a week whenever they were in my class. While this was able to limit the frequency, the immaturity remained as students continued to argue with each other about who gets to go first. Unfortunately, this continued to be a source of frustration that persisted for me, where ultimately Ms. Hannen and I decided that students will only be permitted to go to the bathroom if they ask Ms. Hannen and not myself, thus letting me focus more of my attention towards delivering lessons.

Dealing with non-English languages used in class

In my ELL class, one of my difficulties in maintaining a safe learning environment involved the tolerance of non-English languages being spoken in class. The reason why I chose to address this issue was that occasionally I had noticed a few of my students would chat off to the side as I was at the front of the board, and it was evident that they were not paying attention nor being on topic with their discussion with their giggles or smirks. While I am certainly

supportive of my students using their native languages to communicate productively to help to fellow classmates, I am also cognizant of the possibility for drama to arise due to the wide range of languages that may go misunderstood by many students and me.

Accepting Mistakes

The hardest part to this challenge is ‘learning how to say no’. In the first week, it was figuring out how to tell a student they are wrong, especially when they are giving answers in front of their peers. Seventh grade means most of the students are entering their adolescent stage of their lives, and factors such as self-perception, self-esteem, and confidence will come into play. I knew I didn’t want to pressure or embarrass the student about their mistake in front the whole class, while still trying to acknowledge that the student had made a mistake. I noticed this and made the conscious effort to start making comments like “I’ll come back to you,” “You are on track but I’m looking for something a bit more here,” “Can anyone help [student name] out on this?” etc. I believe it’s important to be as supportive to the student volunteering an answer as much as possible, while giving them an option to alleviate the pressure by calling on a friend should they really struggle to answer a given question. Likewise, if a student does come up with an answer but is incorrect, I would also try my best to at least consider that answer and perhaps use it to steer back into or add to the conversation.

Chapter 6 - High Expectations

Given the various levels of abilities from my three classes, it was at times a challenge to readjust my teaching style and lesson pacing to accommodate for such differences. This was an area where I was often prompted to reassess and readjust.

Regular Math 7 (Blue)

Review was usually needed to remind students of previously learned topics, was a great way to gauge level of understanding prior to teaching the topic. This was more so needed than my other two classes.

Later, I had noticed that two of my best performers in the class would often finish their assigned work much earlier than everyone else and would proceed to sit in their seats in a seemingly bored mood. It occurred to me that perhaps giving them the planned classwork ahead of time for them to do was a good idea because I found that the rest of the class can be very challenging to manage, and thus increase the amount of time needed to go through activities while reducing the time for other planned work.

Honors Math 7 (Orange)

I recall the day I decided to include a multiple choice and short answer question (Order of operations) from a tenth grade MCAS sample test as a means of MCAS review. This was a week before their actual MCAS test, and I had not revealed to the students about the actual level of the exam I had obtained the question from beforehand, while allowing them to complete the questions on their own. As I walked around, I was proud to see that many students were doing well on the problem, when I finished reviewing the questions on the board, I revealed to them

that I actually picked a problem from tenth grade rather than the usual seventh grade questions. Many of the students were shocked in a pleasant way and some of the students were even laughing in disbelief that they were able to do the problem so well. I took this opportunity to remind the students of their academic potential in class, that sometimes we limit ourselves when faced with challenges, because of information that might tell us we are not yet at the adequate level required to accomplish the task. But when we do not see this barrier, we often tend to achieve above and beyond our expectations. I concluded by saying, "If you can do this tenth-grade problem right now, believe that you can also do the seventh grade MCAS next week."

However, my honors class did go through a rough stretch of time in the latter weeks of the practicum, when those weeks coincided with the additional stress of standardized testing, and there were a few occasions where I received grumblings about issuing homework on a Friday in attempt to make up for the lost time. I took this opportunity to remind the class that at the end of the day, they were still the honors class, and that I was not going to lower expectations.

Occasionally, there were also a few students in my honors class that I personally felt was not giving me an adequate level of effort, such as refusing to do work unassisted or not turning in homework consistently. On occasions, I made sure to make eye contact, and remind the student, that "I need better effort from you, [student name], I've seen you do a similar level of work in the past." Now early in the practicum, I would've also attempted to explain the initial steps of the problem to the student as well, but as time went on and I became more aware of the need for gradual release of responsibility. Heeding advice from Ms. Hannen, I've come to see that many students simply just need some form of motivation to start doing their work, rather than gifting them the answer to 'step one' of the problem as well along the way, because Honors students should have the expectations that they can handle the work independently on their own.

Pre-Algebra (High honors)

For the High Honors class, their pace of learning was by far the fastest amongst the three classes. It was certainly much easier to keep high expectations given their willingness to learn while not needing me to spend extra time on classroom management. In terms of content, early on in the practicum I was inconsistent in finding a right level of scaffolding that is appropriate to the High Honors level of learning. The positives were that I was able to lesson plan enough challenging material for the most part, however the negatives were that I was spending too much time going over individual problems. I initially had the mindset that most, if not, all of the students in the class should be doing exceptionally well on the work, especially since they are the Pre-Algebra class. And if some of them weren't, it was my responsibility to get them up to speed. But unfortunately, it's going to be difficult to get everyone to get every question right with the amount of time given, and I quickly learned that instead of spending so much time in class going over every little detail, I could also entrust my students to learn the material outside of class as well.

Individually speaking, there was a student in my Pre-Algebra class that had quickly impressed me by his good performance on assignments, his eagerness to participate, and overall his level of maturity. I recall one day during lunch when he had come in to ask my advice for an extra credit presentation that was due the day after the next (It was great of him to do it a day in advance!). The presentation was about his research on Pythagorean right triangles that he had planned to share in relation to the Geometric unit we had been covering then. I expressed to him that I really respected his willingness to learn new topics he wasn't even expected to learn at his age and commended him to keep up his hard-working attitude.

Chapter 7 - Reflective Practice

Throughout the practicum, my growth in the classroom was largely impacted by my ability to figure out what worked and what didn't. Along the way, I was not only eager to ask for and be receptive of the feedback given to me by my supervising practitioner, I also took some time to write and reflect on the experiences and emotions that I had felt throughout the practicum.

Finding Initial Confidence

Prior to starting the practicum, one of my first goals was to learn every student's name within the first two weeks. I felt that if I could address a student by his/her name, it goes a long way towards preventing awkward interactions, as well as indicating to the students I care enough about them to learn their names properly. Furthermore, having the peace of mind to confidently call on students relieved a lot of pressure on me in front of my students in those first two weeks.

Early on in my first week taking over a class, I had incorporated a Jeopardy game (more details in Appendix E) into the lesson plan to review Ratios and Proportions for an upcoming quiz. The game was very successful, and I was very happy with multiple aspects of it. In terms of engagement, I had noticed immediately that the students looked more energized, and it offered a different way to learn besides the usual textbook work. It was also important for me personally because it helped me find my 'voice'. Prior to the practicum, one of my worries was not being loud enough to get my students' attentions in a noisy environment. This was an area that I struggled with the most working as a summer counselor in my high school years, and often my co-counselor was the one that had to use his booming voice to get everyone's attention. As expected, my class was loud during the Jeopardy game. But this time around I felt much more

confident about being vocal in a noisy classroom environment, because I realized that I knew I had already gained the rapport and support from my students, and simply given the fact that if I couldn't be vocal here, then no one else would help me in this regard (I had asked my supervising practitioner to not intervene to help me in this regard beforehand.). As a result, I felt that this added pressure was necessary to help me make that 'leap', and overall, I didn't really feel that I had lost control of the classroom by any means. I am much more confident in this regard moving forward.

'Teaching to the Bell'

I found myself leaving no time at the end of the class to give out the homework assignment for my first couple classes, so in an attempt to find a solution, I would let the students copy down the homework a bit earlier before the end of the class. As it turned out, this also had a psychological implication as many of the students that did so ended up closing their notebooks and packing up to leave, even though there was still time left in the class. They were used to the habit of copying down homework was often the last thing they did in class, but unfortunately it wasn't the last thing to do that day. I was glad that my supervising practitioner and program supervisor was able to see this and immediately bring up this issue to me. This was an interesting lesson to learn, as it had caught me off guard given my own experiences in middle school. I had assumed that my students would still continue to work after copying down the homework, since that would have exactly been what I would have done back when I was a student. But I quickly realized that my former habits in the classroom wouldn't exactly translate over to other twenty-five students. In their mind, they were used to copying down homework as the last thing to do in a class, hence they would then start packing up even if there was still time remaining.

As I look back now, I believe this to not just be a valuable lesson about effective classroom strategies, but also a lesson about perspective. This proved to be a key turning point in my transformation from a student to a teacher, as I simply could not assume that every one of my students would behave the way I did when I was a student.

Mental Fatigue

Prior to the practicum, I anticipated that my most difficult weeks would perhaps come in the first two weeks of teaching. As it turned out, the first two weeks exceeded my own expectations surprisingly, but rather the most difficult weeks of the practicum ended up being around Weeks 12-13 where I was feeling the pressure of creating and presenting lessons for all 3 classes, as well as juggling workload with a looming final paper and exam from my WPI class. I noticed that I became a little more impatient in the classroom, and as a result my classroom management skills deteriorated a little as well. I recall from the final three-way meeting where I made note of this issue to my program supervisor, and she had pointed out that I could certainly try to reflect on what worked for me earlier on during the practicum, to regain those good habits that she saw me formed early during the practicum. Hearing this from her gave me an additional boost of confidence, as I needed to remind myself that if I could handle it before, I can certainly handle it again.

Chapter 8 - WPI Education

Throughout my K-12 years, I had always enjoyed my math classes and my interest in the subject has led me to pursue in degrees in Mathematical Sciences at WPI. At WPI, I was also exposed to the project-based curriculum here that valued learning through real world experience. Most notably, I took the BUS 1010 Leadership Course in B term of 2017 as a means to improve my leadership and management skills for the practicum that was upcoming. The course proved to be insightful in that I was given the opportunity to work in a group with four other peers. The shared responsibilities as well as mediating egos and duties amongst ourselves also prepared me to work in a situation like a classroom where I would be sharing my leadership role with my mentor teacher. Furthermore, the rigorous presentation assignments throughout the course gave me more confidence in my public speaking, and in hindsight this was valuable as I would need every bit of this confidence speaking in front of twenty-five students on a daily basis.

Prior to this practicum, I also enrolled in various courses related to teaching that contributed in some way to this practicum.

- ID 3100 - Working with John Staley and Renah Razzaq from Doherty High gave me a lot of insightful on the nitty-gritty aspects of lesson planning, as well as participating in a couple teaching simulation sessions that had given me my first try at teaching in a real classroom.
- ID 3200 - Likewise, working with Professor Esther Boucher Yip in the SEI training course gave me some helpful tips in regard to presenting material in an approachable way to ELL students.
- In C Term of 2018, I took PSY 2050 (School Psychology) and this turned out to be quite the insightful class. Instead of having lectures, the professor had asked us to form groups,

assigned each group with a specific topic, and have each group ‘teach’ the class by presenting such topic. I found this unique take on presenting lecture material to be helpful in that I had an opportunity to partake in a mock, simulated classroom setting. Likewise, sharing this perspective with other peers allowed all of us to learn strengths and weaknesses from one another for when we would finally step into a classroom for the first time.

- PSY 1401(taken simultaneously with practicum) In D term of 2018, I took Cognitive Psychology. The class took place an hour after my last class ended at FGMS, so often times I would commute straight back to WPI campus for the lecture. Professor Laplante was always very lively during class and kept me engaged quite often during lecture after usually a long day of teaching at FGMS. This was significant because I had both perspectives of being the teacher and the student in that regard, and I figured that I could certainly pick up on factors such as tone and body language from Professor Laplante to use in my own classroom to engage my own students. In terms of content, the course provided further insight on topics such as memory, development of speech, and various topics that related to learning. Having knowledge of those topics gave me a window of perspective on how learning differs from person to person.

Overall, those classes at WPI culminated into an experience for me where I was able to further develop my abilities to work cooperatively with other peers, as well as providing me further insight into the psychological aspect of education in general.

Chapter 9 - Classroom Dynamic

Heading into the practicum, I was confident in my one-on-one conversational abilities with students that I had obtained through my experience working as a summer enrichment program tutor and counselor. In that job I was often required to sit down with individual students during a daily one-hour homework session to provide guidance. I believe it is from there that I was able to develop my enthusiasm for conversing with students one-on-one, and along the way discovering various effective strategies that I would later use in my classroom at FGMS.

In my Honors class, there was a student on a 504 plan that had often required me to repeat instructions. In our few first interactions, the student prefaced her question by telling me in advance that the ‘question might be stupid’, however I was quick to reassure her that any question was worth asking regardless. Most of the time her questions were usually the clarification type, nonetheless I was happy to repeat my instructions as needed. I even recalled an instance where she had pointed out my mistake on an example math problem and I complimented her thereafter for her keen eye.

There was another student in the same Honors class that was on an IEP plan for testing anxiety. When I walked by her during a quiz, I noticed she had erased her work from the entire front page. Alarmed, I asked her in a low voice why she had done that, and she explained she did so because of frustration over a challenging problem towards the end. She expressed further concern to me that she expected to get everything wrong on the front page as well. I took a glance at the work she had erased, and I assured her that a majority of the work was in fact correct. Seeing it was close to the end of the class, I gave her the chance to come in during a later period to finish and made sure to remind her that difficult problems will always exist in some form, whether it be a test or just a real-life scenario, but what’s more important is how we

confront those problems. By admitting defeat and eliminating all the hard work we've done prior, we would not make any progress because at the end of the day, failure to solve a problem is not the end of the road, but rather part of a longer journey that all humans will experience in our goals to improve for the better.

Classroom Management

For classroom management, the High Honors(Pre-Algebra/Green) class was usually not an issue, the classes ran smoothly, and kids were eager to learn and participate for the most part. However, there was one student in Pre-Algebra that routinely sought my attention. His frequent outbursts in class stood out because the rest of the students were all often cooperative and respectful. Eventually I decided to have a private conversation with the student after class, and together we sat down to discuss about the reasons why he is insistent on being disruptive. He admitted to me that he liked joking around, and just wanted to get my attention and for me to laugh at his jokes. I had to remind him that my job here was to be a teacher, while certainly I can show a different, but appropriate, side of myself to students at times, I would like to generally maintain a professional relationship with my students. Thus, I cannot laugh along with him as if I was his friend, but he was more than welcome to share his jokes and comments with his friends instead.

As for the Honors(Orange) class, I was fortunate to see them twice a day due to the Numeracy class, and so I believe I had the strongest rapport with this group. Participation was great although usually the it was the same 'group' of students volunteering the answers most of the time. At first, I was reluctant to cold call on my students, but later in the practicum I figured that since the students are more comfortable with me, I decided to try to have them step out of

their comfort zone a little via cold calling. However, towards the end of the practicum, it was a little more difficult to keep the Honors class engaged presumably due to the added stress of standardized testing season.

The Regular Math 7(Blue) class was often the toughest class to manage due to lack of focus and engagement from multiple students. Student 'B' was one of my best students in the Regular class. He passed in homework on a consistent basis, and routinely performed exceptionally well on quizzes, often scoring in the high B to high A ranges. 'B' was often very enthusiastic and eager to participate in class as well. However, at times there were other students in the class that seemed to belittle him for his eagerness to participate. And to make matters complicated, at times student 'B' was a little too eager to chastise his fellow classmates for being too rowdy. As one may expect, some of his peers were quick to argue back to exacerbate the conflict. Thus, one of my biggest challenges in terms classroom management for Regular class was stemming the arguments that would come from students that became irritated at 'B' (and others as well) for calling them out in front of other peers. When I spoke to 'B' in person, I made sure to tell him that while I appreciate his passion for trying to get others to maintain a safe and productive learning environment, I also reminded him that he didn't need to take on such a big responsibility, that classroom management falls much more on me as my responsibility.

Student Feedback Surveys

Towards the middle weeks of the practicum, I issued a CAP Student Teacher Feedback Survey to my Honors and Regular class (Appendix A). The contents of this anonymous survey asked students to rate my performance in the classroom concerning factors such as my teaching style, supportiveness, clarity, time management, and maintaining a productive, safe learning

environment. I also included an additional, optional question where students could respond to what topics that they wanted to review more. Overall, the feedback I received from those two classes was insightful as I was able to pinpoint what I was doing well and what I was not doing well in. For the most part, the students were appreciative of my supportive tone in demonstrating that mistakes were part of learning, as well as strongly agreeing or agreeing that I was effectively using questions that gave students multiple ways of answering. Likewise, the students also believed that I was also quick to readjust how I had taught the lesson should students not understand the content.

On the other hand, I had received conflicting responses in areas such as time management, where my students believed that the class often struggled to stay on task to not waste time. This was especially the case in my Regular Math 7 class where I had to spend a majority of my energy to constantly redirection my students' attention away from side conversations to the classwork at hand. The students wished to be given more opportunities for group work, as well as given more challenging work if they finish work early. I was also asked by quite a few students to take more time in the beginning of class to review the homework from the prior day. Altogether, I took these suggestions to heart and made sure to implement more interpersonal, group related activities in the later units of my teaching, as well as providing additional work for students that finish early (referenced in Chapter 6 High Expectations - Regular). Furthermore, I found that taking a little bit of time to review the homework on the next day of class was usually a great way to link the previous day's learning material to the current day, as well as providing additional reinforcement, or closure to the topics taught on the previous day.

Browsing through the feedback, an interesting note was that I had received mixed responses about my pacing while teaching content. There were a few students that believed my pacing was good, but quite a few others that believed I went too fast and wished for me to slow down a little more. I also discussed this issue with my supervising practitioner, who actually told me that I was going too slow at times with the content. At first, it was quite the conundrum with the conflicting feedback from the multiple perspectives, but I believe this is still natural because of the different learning speeds of my students, and at the same time I realized that it was certainly going to be difficult to please everyone. Nonetheless, I made an effort in the ensuing weeks to dedicate more time in the lesson to ask whether students wished for more clarity, as well as dedicating more of my time walking around the classroom to monitor student progress and initiate one-on-one conversations to help students as much as I could.

Parent Interaction

On an occasion, I also had an interesting talk with one of the parents that worked at the school. The parent had a daughter who once attended FGMS and is now attending WPI in fact. He expressed to me his concerns about his daughter traveling to another continent to complete her IQP and was worried about the long distance and time that she would spend away from him. While I responded that I am yet to be a parent, I could certainly relate to his situation to some extent. Internally, our conversation had also sparked thoughts on my own dilemma with the gradual release of responsibility. We both found ourselves in situations where we care for the growth of students/child, but we also needed to give enough room for that students/child to be independent and to manage schoolwork/life on his or her own.

Conclusion

Looking back at this experience, I am grateful for the WPI Teaching Preparation Program and its staff for giving me this wonderful opportunity to officially teach in a classroom for the first time. From elementary school up until sophomore year of high school, I was a shy and introverted student that rarely spoke up. I only became more comfortable speaking up after taking an Oral Communications course in junior year of high school. The speaking aspect of it is an even bigger deal to me because English is not my first language, and thus the need to speak it confidently and precisely in front of students on a daily basis was even more so important. I signed up for this practicum because of my passion for teaching students, but to be honest at the beginning I did have my doubts about my ability to speak up at all times. The passion was there, but I was unsure whether the authoritative presence was there as well. As I conclude the practicum, I am satisfied with the great strides I made in this regard, as my level of comfort within the classroom went above and beyond what I had expected.

My experience in the classroom for these past months have also opened my eyes to the culture of profession teaching. In my opinion, one of the greatest ways teachers can impact student success is taking the time to develop a relationship with every student if possible. My goal early on in the practicum was to learn every student's name by the second week, and in doing so I believe that this demonstrates to the students that I care by always addressing them by their name. As I conclude the practicum, one of my takeaways is that I can pull out my seating chart, look at every name and can conjure up a memory of an interaction I had with that student one-on-one.

My other big takeaway here from the practicum is witnessing the transformation of myself and my mindset from that of a student to a teacher, as I've experienced many challenges first-hand as a teacher that I would not have thought of as a student. Having such perspective, as well as having the energy and patience to deliver content alongside classroom management can be very demanding. With that said, I have the utmost respect for teachers who do just that at their jobs and perhaps even more.

As the practicum draws to a conclusion, I have set a professional goal based upon essential CAP elements for once I begin teaching in my own classroom sometime in the future. This was done with the central focus around fostering a learning environment that better supports the gradual release of responsibility, as I believe this area to be my biggest need for improvement moving forward. For adjustment to practice, I need to encourage a consistent level of accountability for learning from my students to ensure that they can retain the information learned in class. I can achieve this by adapting assessments on a more frequent basis that tests for student understanding via independent work. I believe that the joy for learning is not simply a means to an end, but the joy is rather derived from the path to learning. I wish to foster an environment that is accepting of mistakes, but also can utilize the lessons learned from those mistakes as a means to motivate students to improve for the better.

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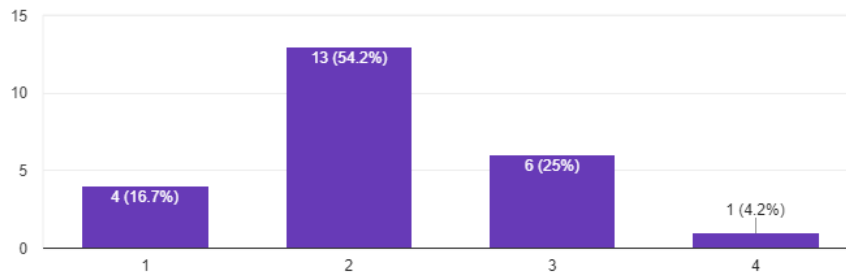
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Appendices

Appendix A: Student Survey Feedback: Scale of 1(Strongly agree), 2(Agree), 3(Disagree), 4(Strongly Disagree)

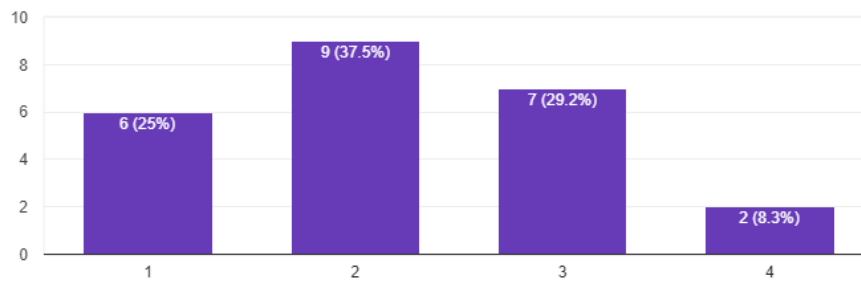
1) My teacher demonstrates that mistakes are a part of learning.

24 responses



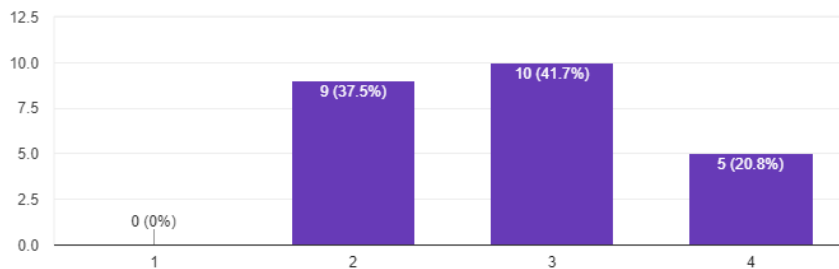
2) My teacher asks us to summarize what we learned/have learned before in a lesson

24 responses



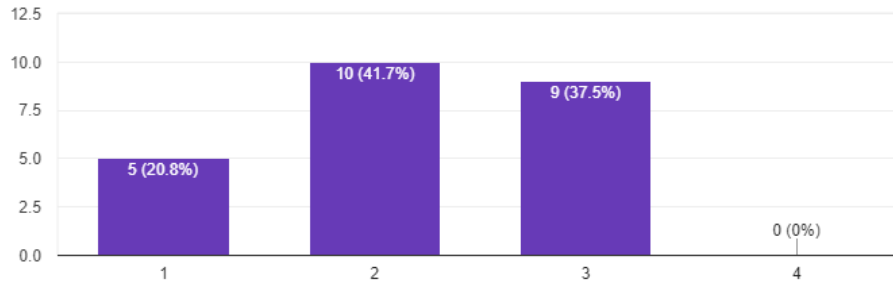
3) Students push each other to do better work in the class

24 responses



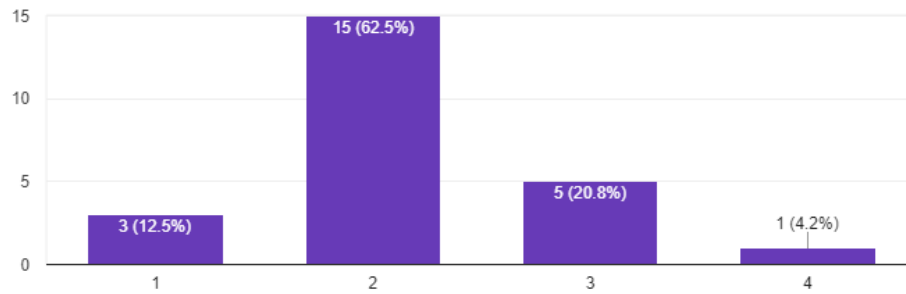
4) I am able to connect what we learn in this class to what we learn in other subjects.

24 responses



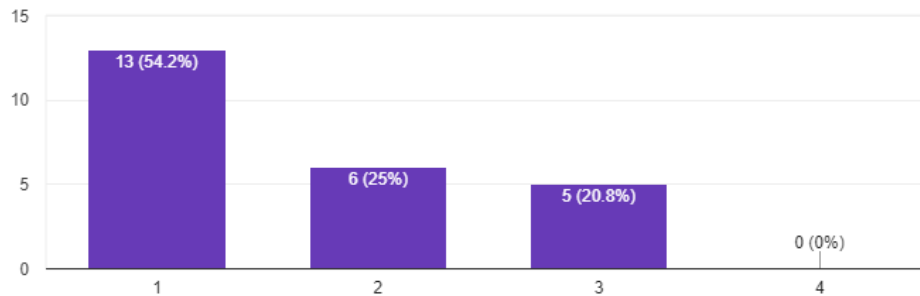
5) My teacher uses open-ended questions that enable me to think of multiple possible/choice answers

24 responses



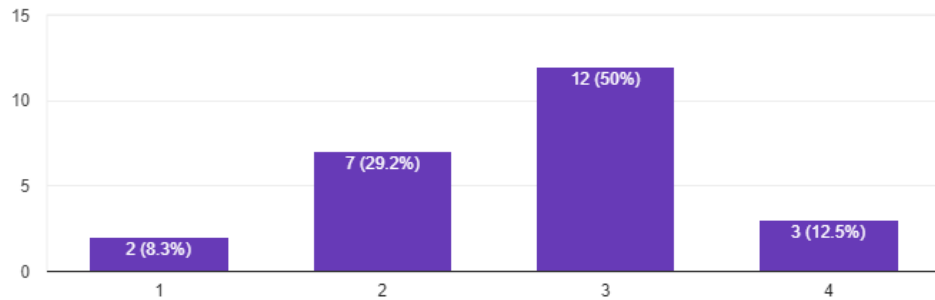
6) When discussing my work, my teacher uses a positive tone even if my work needs improvement.

24 responses



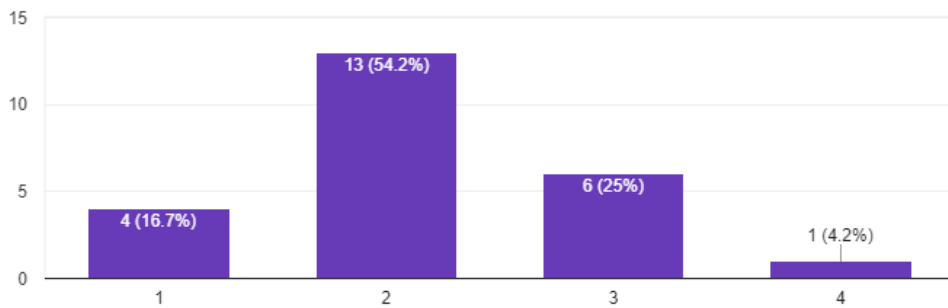
7) In this class, students review each other's work and provide each other with advice on how to improve their work.

24 responses



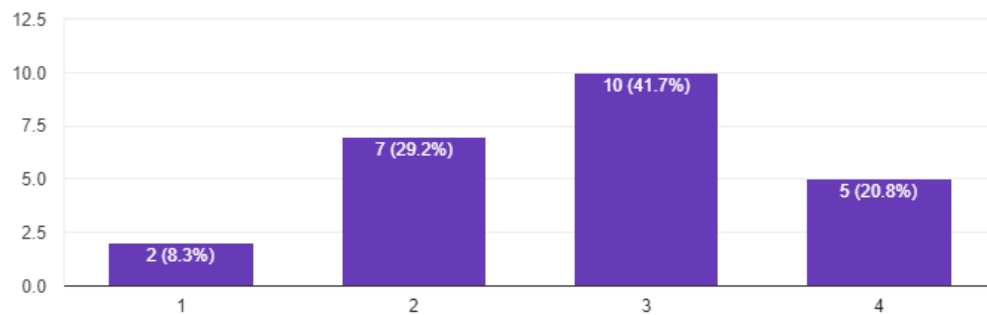
8) When asked, I can explain what I am learning/doing and why.

24 responses



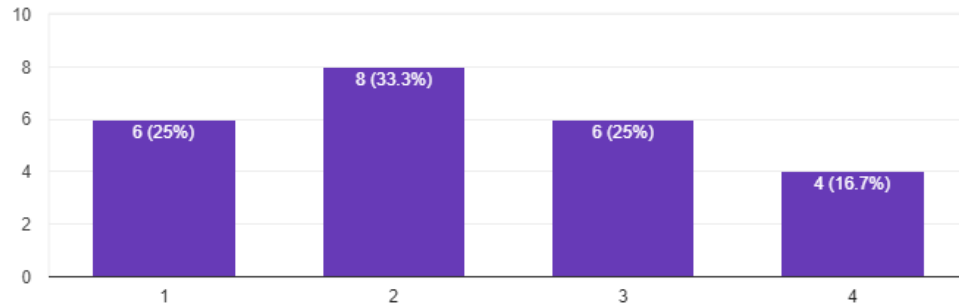
9) In this class, other students take the time to listen to my ideas.

24 responses



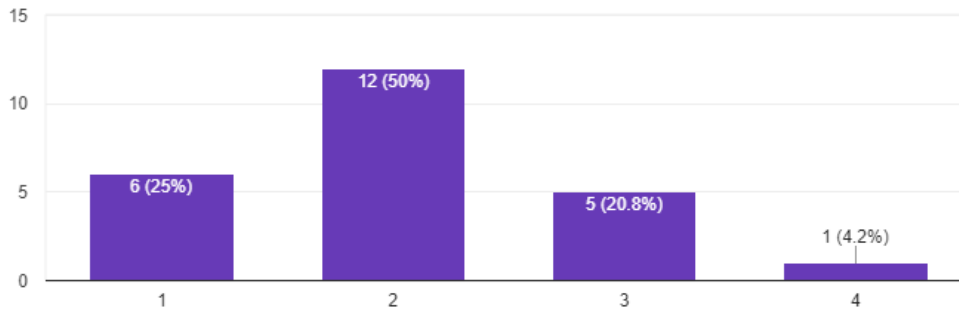
10) The level of work in this class goes beyond what I thought I was able to do.

24 responses



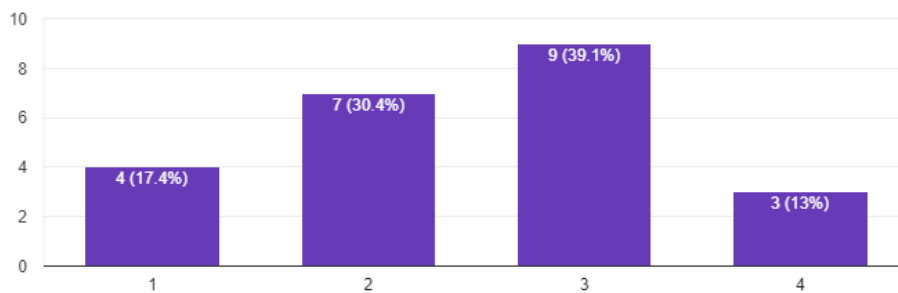
11) The material in this class is clearly taught.

24 responses



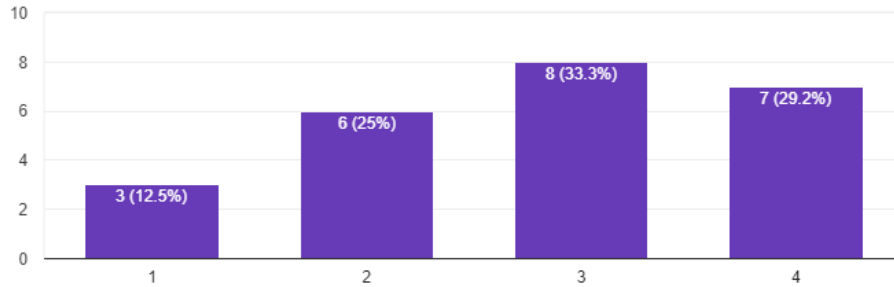
12) If I finish my work early in class, my teacher has me do more challenging work.

23 responses



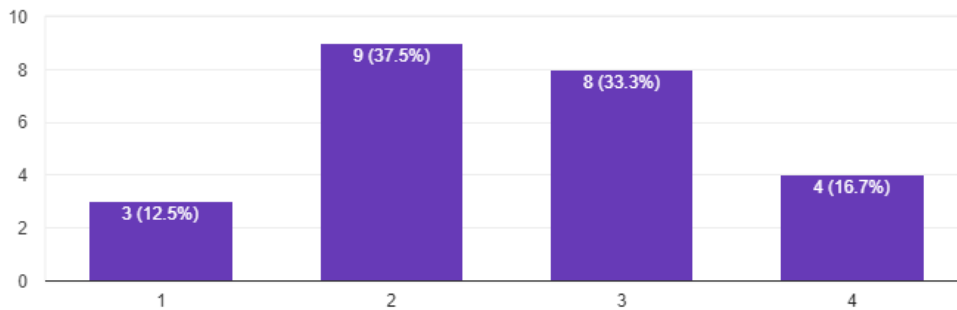
13) My teacher asks me to rate my understanding of what we have learned in class.

24 responses



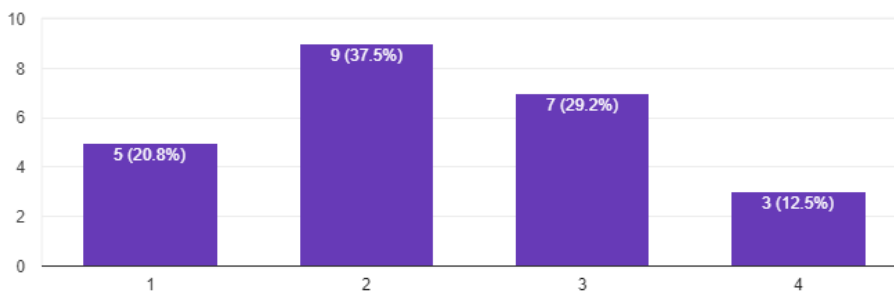
14) To help me understand, my teacher tries to use/relate my interests to explain difficult ideas in class.

24 responses



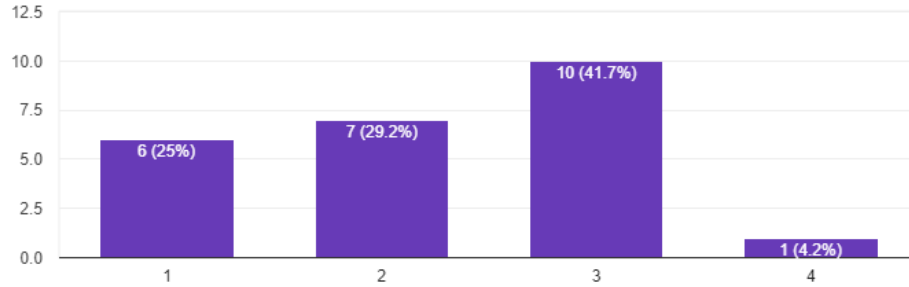
15) In this class, students work together to help each other learn difficult content.

24 responses



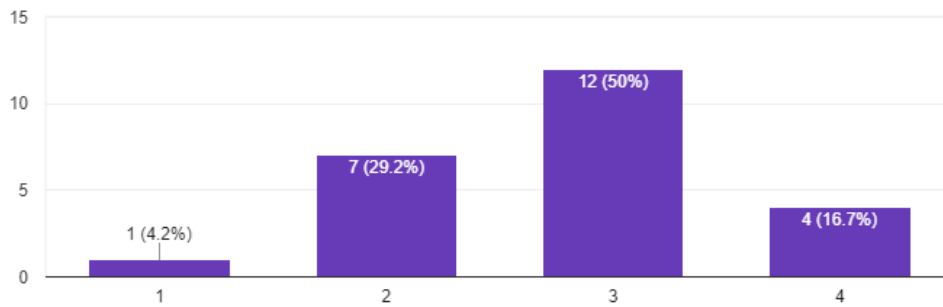
16) In this class, students are asked to teach/model/explain examples to other classmates a part of the lesson.

24 responses



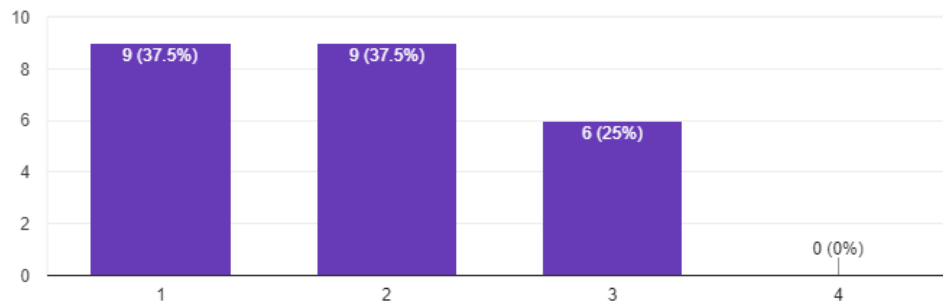
17) Our class stays on task and does not waste time.

24 responses



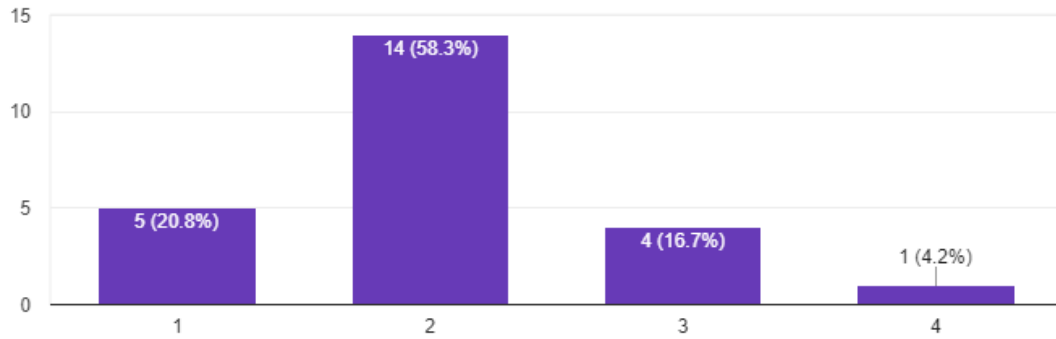
18) During a lesson, my teacher is quick to readjust how he teaches if the class doesn't understand. (Ex: going from written/words to pictures/diagrams)

24 responses



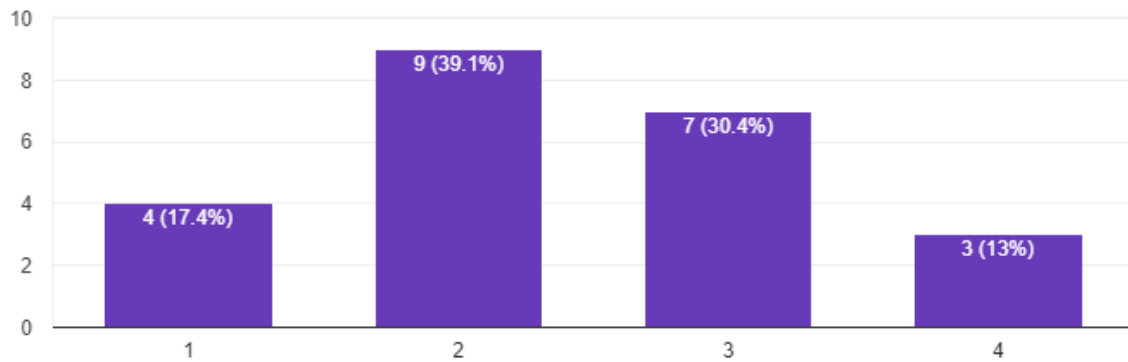
19) My teacher encourages us to accept different points of view when they are expressed in class.

24 responses



20) I can show my learning/knowledge in multiple ways (Ex: Writing, graph, pictures) in class.

23 responses



(Optional) For any additional feedback, please share it here. (For example: Am I going too fast/slow? What topics would you want me to cover more? Do you get enough time in class to do examples?)

i wish we didn't have as much homework

You are going just a little bit too fast for my liking, but I don't know if others are thinking the same exact thing. I would like you to cover how to do proportional

i don't get what is taught in class...

sometimes too slow

i wish my teacher would go over certain things in small groups in class

Maybe more time should be spent on learning certain parts of a subject, for example when we are learning a subject off another, you could help us understand that more.

I think that you could explain more and explain how to do the homework. Also I think that the class is way too loud for me to be able to learn and think. Also you could spend more time reviewing but not like the silly games, those don't help me.

i get more than enough time in class and find it easy

more groups in class

Appendix B: Lesson Plan Template, Sample Lessons

Lesson Plan Title:

Teacher's Name: Mr. Liang
Unit: Ratios and Proportions

Subject/Course: Mathematics
Grade Level: 7

Overview of and Motivation for Lesson:

Stage 1 - Desired Results	
Standard(s):	
Aim/Essential Question:	Understanding(s): <i>Students will understand that...</i>
Content Objectives: <i>Students will be able to...</i>	Key Vocabulary
Stage 2-Assessment Evidence	
Performance Task or Key Evidence	Key Criteria to measure Performance Task or Key Evidence
Stage 3- Learning Plan	
Do Now:	
Learning Activity 1	
Conclusion:	
Application:	
Skills Addressed:	Instructional Delivery Methods:
Student Grouping:	
Accomodations	Language Objectives: ELD Level _
Homework/Extension Activities:	Materials and Equipment Needed:

Sample Lessons

3/2 Percents with Proportions Stations

Teacher's Name: Mr. Liang

Subject/Course: Mathematics

Unit: Percents

Grade Level: 7

Overview of and Motivation for Lesson: Students will begin to look at percents as a means to find proportions of a whole.

Stage 1 - Desired Results	
<p>Standard(s):</p> <ul style="list-style-type: none"> ● MS-7.EE.3 <ul style="list-style-type: none"> ○ Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. 	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> ● How does the decimal point move when you rewrite a percent as a decimal, and decimal as a percent? ● What methods can you use to sort decimals/fractions/percents? ● How can you find a percent of a number? 	<p>Understanding(s): <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● Decimal point moves two spaces left when percent -> decimal. ● Decimal point moves two spaces right when decimal -> percent. ● You can convert percents to fractions and decimals to help you find proportions of a whole.
<p>Content Objectives: <i>Students will be able to...</i></p> <ul style="list-style-type: none"> ● Convert back and forth between decimals and percents. ● Convert to a common decimal/percent to effectively sort lists. ● Find the percent of a number. 	<p>Key Vocabulary</p> <ul style="list-style-type: none"> ● Decimal, percent, tenths, hundredths, fractions, least, greatest, proportion
Stage 2-Assessment Evidence	
<p>Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● Recall how to write halves, fourths, tenths, and hundredths as percents. ● Students also need to be able to convert between fractions and decimals, and multiply and divide decimals by powers of 10. ● Students are able to relate percents to proportions. 	<p>Key Criteria to measure Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● Students are able to demonstrate that they understand when to move the decimal left, and when to move the decimal point right. ● Students are able to relate percents to proportions and correctly to find percents of whole numbers.

Stage 3- Learning Plan

Do Now(10 mins):

Students will see 3 examples of finding a percent, a whole, and a part side to side. They are expected to complete those problems and the teacher will reiterate what makes them different.

Clarify any issues from homework if need be.

Activity 1 (30-40 mins)

<https://docs.google.com/document/d/1004ZdPYjGjVbftMudB3cuhqrNvCOkrqv1JSa-adgRok/edit>

Students will solve the 5 different problems posted around the room in groups of 5. This activity aims to apply student’s learned skills from this chapter to real life examples, as well as giving them opportunity to work(productively) with their peers.

Application: Fractions and percents illustrate proportions of a whole. They are seen in a wide range of real life applications anywhere from grades, discounts at a store, mortgage/loan/rental rates, to money, food, etc.

Skills Addressed:

- Problem Solving
- Interpersonal
- Logical

Student Grouping:

- Individual
- Groups of 5
- Whole Class

Instructional Delivery Methods:

- Teacher Modelling
- Discussion

Accommodations

- Keywords and concepts will be used repeatedly in examples.
- Brief review of prior topics utilized in this lesson during Do Now.

Homework/Extension Activities:

P. 240 Journal #1-5, 7-10

Materials and Equipment Needed:

- Writing utensils
- Projector
- Textbook/Journal
- Stations problems

Stations Work Problems for 3/2 Lesson Plan

Station 1 - Concept Check

Vocabulary and Concept Check

- NUMBER SENSE** Copy and complete the table.
- NUMBER SENSE** How would you decide whether $\frac{3}{5}$ or 59% is greater? Explain.
- WHICH ONE DOESN'T BELONG?** Which one does *not* belong with the other three? Explain your reasoning.

40%

$\frac{2}{5}$

0.4

0.04

Fraction	Decimal	Percent
$\frac{18}{25}$	0.72	
$\frac{17}{20}$		85%
$\frac{13}{50}$		
	0.62	
		45%

Station 2 - Sleeping Patterns

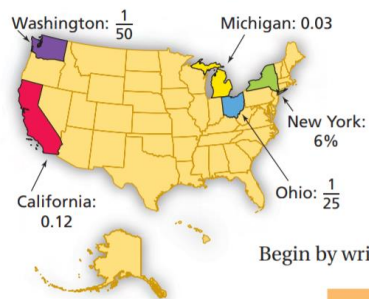


Animal	Portion of Day Sleeping
Dolphin	0.433
Lion	56.3%
Rabbit	$\frac{19}{40}$
Squirrel	$\frac{31}{50}$
Tiger	65.8%

- SLEEP** The table shows the portions of the day that several animals sleep.
 - Order the animals by sleep time from least to greatest.
 - Estimate the portion of the day that you sleep.
 - Where do you fit on the ordered list?

Station 3 - Ordering States

EXAMPLE 3 Real-Life Application



The map shows the portions of the U.S. population that live in five states.

List the five states in order by population from least to greatest.

Begin by writing each portion as a fraction, a decimal, and a percent.

State	Fraction	Decimal	Percent

Station 4 - Conversions

3

15. 75% of 124 is what number?

16. 110% of 90 is what number?

17. What number is 0.4% of 40?

18. 72 is what percent of 45?

X

$$\begin{aligned}\frac{a}{w} &= \frac{p}{100} \\ \frac{a}{34} &= \frac{40}{100} \\ a &= 13.6\end{aligned}$$

19. **ERROR ANALYSIS** Describe and correct the error in using the percent proportion to answer the question below.

“40% of what number is 34?”

Station 5 - Declaration of Independence Puzzle

PUZZLE There were n signers of the Declaration of Independence. The youngest was Edward Rutledge, who was x years old. The oldest was Benjamin Franklin, who was y years old.

23. x is 25% of 104. What was Rutledge's age?

24. 7 is 10% of y . What was Franklin's age?

25. n is 80% of y . How many signers were there?



3/6 Percents with Equations

Teacher's Name: Mr. Liang
Unit: Percents

Subject/Course: Mathematics
Grade Level: 7

Overview of and Motivation for Lesson: Students will revisit the concept of multiplying/dividing with decimals to obtain percents /whole/part from previous week.

Stage 1 - Desired Results	
<p>Standard(s):</p> <ul style="list-style-type: none"> ● MS-7.EE.3 <ul style="list-style-type: none"> ○ Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. 	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> ● How can you find part of a whole/percent/part? 	<p>Understanding(s): <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● You can convert percents to fractions and decimals to help you find proportions of a whole. ● Use cross multiplying or equations to figure out part, percent, and whole.
<p>Content Objectives: <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● <i>Convert back and forth between decimals and percents.</i> ● <i>Find the whole/percent/part of a number.</i> 	<p>Key Vocabulary</p> <ul style="list-style-type: none"> ● Decimal, percent, tenths, hundredths, fractions, least , greatest, proportion
Stage 2-Assessment Evidence	
<p>Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● <i>Students also need to be able to convert between fractions and decimals, and multiply and divide decimals by powers of 10.</i> ● <i>Students are able to relate percents to proportions.</i> ● <i>Students are able to fill in the cross multiplying formula with "apw".</i> 	<p>Key Criteria to measure Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● Students are able to relate percents to proportions and correctly to find percents of whole numbers. ● Students are able to correctly fill in cross multiplying formula with "apw". ● Students are able to reason which problems look for part/percent/whole.
Stage 3- Learning Plan	
<p>Do Now(5 mins): MCAS review</p>	

- 5 An art teacher spent 7% of the art supply budget on colored paper. The art supply budget was \$1000. What was the total amount of money, in dollars, the art teacher spent on colored paper?

Activity 1 (10-15 mins)

Students will be reintroduced to the method of finding part/percent/whole using an equation as mentioned in the previous week. I will make an effort to explain this much better than last week!

EXAMPLE 1 Finding a Part of a Number

What number is 24% of 50?

Estimate



Common Error

Remember to convert a percent to a fraction or a decimal before using the percent equation. For Example 1, write 24% as $\frac{24}{100}$.

$$a = p \cdot w$$

Write percent equation.

$$= \frac{24}{100} \cdot 50$$

Substitute $\frac{24}{100}$ for p and 50 for w .

$$= 12$$

Simplify.

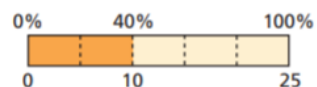
So, 12 is 24% of 50.

Reasonable? $12 \approx 12.5$ ✓

EXAMPLE 2 Finding a Percent

9.5 is what percent of 25?

Estimate



$$a = p \cdot w$$

Write percent equation.

$$9.5 = p \cdot 25$$

Substitute 9.5 for a and 25 for w .

$$\frac{9.5}{25} = \frac{p \cdot 25}{25}$$

Division Property of Equality

$$0.38 = p$$

Simplify.

Because 0.38 equals 38%,
9.5 is 38% of 25.

Reasonable? $38\% \approx 40\%$ ✓

Activity 2 (rest of class)

Teacher will ask students to think about part/percent/whole as non-static numbers, what happens when they change?

Application: Fractions and percents illustrate proportions of a whole. They are seen in a wide range of real life applications anywhere from grades, discounts at a store, mortgage/loan/rental rates, to money, food, etc.

<p>Skills Addressed:</p> <ul style="list-style-type: none"> ● Problem Solving ● Interpersonal ● Logical <p>Student Grouping:</p> <ul style="list-style-type: none"> ● Individual ● Groups of 5 ● Whole Class 	<p>Instructional Delivery Methods:</p> <ul style="list-style-type: none"> ● Teacher Modelling ● Discussion <p>Accommodations</p> <ul style="list-style-type: none"> ● Keywords and concepts will be used repeatedly in examples. ● Brief review of prior topics utilized in this lesson during Do Now.
<p>Homework/Extension Activities: P. 236(textbook) 10-17</p>	<p>Materials and Equipment Needed:</p> <ul style="list-style-type: none"> ● Writing utensils ● Projector ● Textbook/Journal ● Stations problems

4/9 - Start of Probability

Teacher's Name: Mr. Liang
Unit: Probability and Statistics

Subject/Course: Mathematics
Grade Level: 7

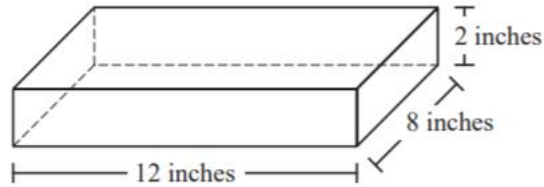
Overview of and Motivation for Lesson: Students will start exploring the concept of probability of events and outcomes.

Stage 1 - Desired Results	
<p>Standard(s): MS.7.SP. C. Investigate chance processes and develop, use, and evaluate probability models. Massachusetts Curriculum Framework for Mathematics 66 5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. 6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.</p>	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> ● How can we determine the likelihood of an event through numbers? ● What is a 'fair' event? 	<p>Understanding(s): <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● Statistics are used to measure the likelihood of an event. The most elementary form of this is a ratio. ● A fair event exists when every outcome has the same probability(rolling any number on a 6 sided dice).
<p>Content Objectives: <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Recall knowledge learned from ratios and proportions and how to apply such fractions to probability. ● Identify whether an event is considered 'fair' by probability. 	<p>Key Vocabulary</p> <ul style="list-style-type: none"> ● Ratio, likelihood, outcome, probability, events
Stage 2-Assessment Evidence	
<p>Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● Students are able to <i>express probability in terms of ratios: (# of desirable event/# of possible outcomes)</i> 	<p>Key Criteria to measure Performance Task or Key Evidence</p> <ul style="list-style-type: none"> ● Students are able to correctly express the probability of an outcome using ratios.
Stage 3- Learning Plan	

Do Now(7 mins):

Students will review two MCAS questions for Bellwork

- 19 A rectangular prism and its dimensions are shown below.



What is the volume, in cubic inches, of the rectangular prism?

- 18 Dana has 8 baseball cards, 10 football cards, 4 hockey cards, and 14 basketball cards. All the cards are the same size and shape. Dana will select one card at random. What is the probability that the card selected will be a hockey card?

Activity 1 (15-20 mins)

Students will finish the set of probability questions from end of class on Friday.

Probability of....

- 1) Rolling a 6 on a dice.
- 2) Guessing right answer on multiple choice question
- 3) Picking any Spades card
- 4) Picking any Ace
- 5) Picking a Jack of Clubs, then picking a jack of clubs again from same deck
- 6) Winning the lottery

Teacher will go over and discuss with entire class.

Activity 2(25 mins)

Students are shown the Rock/Paper/Scissors chart and will be asked to fill in with win/loss/tie to see the expected outcome for winning for both players.

		Player A		
		Rock	Paper	Scissors
Player B	Rock			
	Paper			
	Scissors			

Rock breaks scissors.
Paper covers rock.
Scissors cut paper.

Small icons of hands in Rock, Paper, and Scissors positions are placed above the corresponding columns in the table.

Students will be broken up into pairs to play the Rock/Paper/Scissors activity and fill out another chart like the one above recording their actual results.

Afterwards, the teacher will lead a discussion on the results. Is the game fair? Is any player unfavored/favored? What are possible strategies?

Application: Probability is a very useful concept in real life to gauge risk/reward in given situations, as well as finding out the likelihood of an event.

Skills Addressed:

- Problem Solving
- Interpersonal
- Logical/Mathematical

Student Grouping:

- Individual
- Whole Class
- Pairs

Instructional Delivery Methods:

- Teacher Modelling
- Discussion

Accommodations

- Keywords and concepts will be used repeatedly in examples.
- Brief review of prior topics utilized in this lesson during Do Now.

Homework/Extension Activities:

HW: p. 404(Book) #6-17

Materials and Equipment Needed:

- Writing utensils
- Projector
- Textbook/Journal

Appendix C: Student Sample Classwork/Homework

Student T

➤ Rates & Unit Rates

A rate is a ratio that compares two quantities with different kinds of units.

Example: $\frac{100 \text{ words}}{2 \text{ minutes}}$

When a rate is simplified so that it has a denominator of 1, it is called a **UNIT RATE**.

- To find a unit rate:
1. Write two quantities as a fraction.
 2. Divide both the numerator and the denominator by the denominator.
 3. This will create a denominator of 1 (a single unit means 1)
 4. Write unique units of measurement for both.

Example: $\frac{100 \text{ words}}{2 \text{ minutes}} = \frac{\div 2}{\div 2} = \frac{(50) \text{ words}}{1 \text{ minute}}$ or "**50** words per minute"

1) Alex can run 24 miles in 3 hours. What is his average speed in miles per hour?

$$\frac{24 \text{ mi}}{3 \text{ hrs}} = \frac{8 \text{ mi}}{1 \text{ hr}}$$

2) You buy 5 pounds for \$35. How much does one pound cost?

$$\frac{\$35}{5 \text{ lbs}} = \frac{\$7}{1 \text{ lb}}$$

3) The costs of different sizes of orange juice are shown in the table.

Which container costs the least per ounce?

Amount	Total Cost	Rate	Cost per ounce (Unit cost)
16 oz	\$1.28	$\frac{\$1.28}{16 \text{ oz}}$	\$0.08
32 oz	\$1.92	$\frac{\$1.92}{32 \text{ oz}}$	\$0.06
64 oz	\$2.56	$\frac{\$2.56}{64 \text{ oz}}$	\$0.04
96 oz	\$3.36	$\frac{\$3.36}{96 \text{ oz}}$	\$0.04

3.1 Enrichment and Extension

Matching

Simplify the expressions on the left by using the Distributive Property and combining like terms. Then, match it to an equal expression on the right by connecting the two with a line.

- | | |
|--|-----------------------|
| A 1. $6x + 2x$ | a. $8x$ |
| C 2. $14x - 12 - x - 3$ | b. $\frac{1}{2}x + 1$ |
| J 3. $-5x + 14 - x - 2$ | c. $13x - 15$ |
| G 4. $-3 - 5x - 3x + 11x + 3$ | d. $2x + 11$ |
| D 5. $-2(-5 - x) + x - x + 1$ | e. $2x$ |
| i 6. $\frac{1}{2}(12) + 4x - (x - 1)$ | f. $6x^2 + x - 27$ |
| F 7. $6(x^2 - 2) + 1 - 16 + x$ | g. $3x$ |
| h 8. $4\left(\frac{1}{2}x + 4\right) + 1 - 16 + x$ | h. $3x + 1$ |
| K 9. $5(x^2 + x)$ | i. $3x + 7$ |
| B 10. $x + \left(1 - \frac{1}{2}x\right)$ | j. $-6x + 12$ |
| E 11. $x^3 + x^2 + x + x - x^2 - x$ | k. $5x^2 + 5x$ |

1. $6x + 2x = 8x$

2. $14x - 12 - x - 3$

$13x - 15$

3. $-5x + 14 - x - 2$

$-5x + 14 + x - 2$

$-4x + 12$

4. $-3 - 5x - 3x + 11x + 3$

$-3 + -5x + -3x + 11x + 3$

$-8x + 11$

$2x$

5. $-2(-5 - x) + x - x + 1$

$10 + 2x + 0 + 1$

$10 + 1$

$11 + 2x$

Big Ideas Math Red

$$6. \frac{1}{2}x \frac{12}{1} + 4x - (x-1)$$

$$\frac{6 + 4x - (x-1)}{\cancel{3x+7}}$$

$$7. 6(x^2-2) + 1 + 16 + x$$

$$6(x^2+2) - 15 + x$$

$$6x^2 + -12 + -15 + x$$

$$\underline{6x^2 + 27 + x}$$

$$8. 4\left(\frac{1}{2}x + 4\right) + 1 - 16 + x$$

$$(2x + 16) + 1 - 16 + x$$

$$2x + 17 - 16 + x$$

$$3x + 1$$

$$11. x^3 + x^2 + x + x - x^2 - x^3$$

?

$$10. x + \left(1 + \frac{1}{2}x\right)$$

$$\frac{1}{2}x + 1$$

Student 'E' was one of my best students in my honors class. As seen here, he was very consistent in showing work for solving two-step equations. I was glad to see this, as he was originally one of the students that I needed to constantly remind to show work to avoid silly mistakes, given his habits to do mental math in his head.

$\begin{array}{r} \times 3.5 \\ 5 \overline{) 17.5} \\ \underline{-15} \\ 25 \\ \underline{-21} \\ 40 \\ \underline{-35} \\ 5 \end{array}$	<p>#6 15 6. $-v + 7 = 3$ $\frac{-v}{-1} = \frac{-4}{-1}$ $v = 4$</p> <p>7. $4b + 3 = -9$ $\frac{4b}{4} = \frac{-12}{4}$ $b = -3$</p> <p>8. $17 = 5k - 2$ $\frac{17}{5} = \frac{5k}{5} - \frac{2}{5}$ $3.8k$</p>	<p>P.112 13. $-4p + 9 = -5$ $\frac{-4p}{-4} = \frac{-14}{-4}$ $p = 3.5$</p> <p>14. $11 = -5x - 2$ $\frac{13}{-5} = \frac{-5x}{-5}$ $-2.6 = x$</p> <p>15. $4 + 2.2h = -3.7$ $\frac{2.2h}{2.2} = \frac{-7.7}{2.2}$ $h = -3.5$</p>	$\begin{array}{r} \times 3.5 \\ 4 \overline{) 17.5} \\ \underline{-14} \\ 35 \\ \underline{-30} \\ 5 \end{array}$ $\begin{array}{r} \times 2.0 \\ 5 \overline{) 10} \\ \underline{-10} \\ 0 \end{array}$
$\begin{array}{r} \times 3.5 \\ 5 \overline{) 17.5} \\ \underline{-15} \\ 25 \\ \underline{-21} \\ 40 \\ \underline{-35} \\ 5 \end{array}$	<p>9. $-6t - 7 = 17$ $\frac{-6t}{-6} = \frac{24}{-6}$ $t = -4$</p> <p>10. $8n + 16.2 = 1.6$ $\frac{8n}{8} = \frac{-14.6}{8}$ $n = 1.825$</p>		$\begin{array}{r} \times 3.5 \\ 22 \overline{) 77} \\ \underline{-66} \\ 110 \\ \underline{-110} \\ 0 \end{array}$
$\begin{array}{r} \times 4.112 \\ 5 \overline{) 20.56} \\ \underline{-20} \\ 56 \\ \underline{-56} \\ 0 \end{array}$	<p>11. $-5g + 2.3 = -18.8$ $\frac{-5g}{-5} = \frac{-21.1}{-5}$ $g = 4.112$</p> <p>12. $2 + 5 = -10$ $\frac{2}{2} = \frac{-12}{2}$ $t = -2.5$</p>		

Student 'O'

Write each ratio as a fraction in simplest form, using a colon, and using the word "to".

- 1) 3 sailboats to 6 motorboats

$$\frac{3}{6} \div \frac{3}{3} = \frac{1}{2}$$

- 3) 5 baseballs to 25 softballs

$$\frac{5}{25} \div \frac{5}{5} = \frac{1}{5}$$

- 5) 6 poodles out of 18 dogs

$$\frac{6}{18} \div \frac{6}{6} = \frac{1}{3}$$

- 7) 12 sheets of paper out of 28

$$\frac{12}{28} \div \frac{4}{4} = \frac{3}{7}$$

- 9) 16 elms out of 20 trees

$$\frac{16}{20} \div \frac{4}{4} = \frac{4}{5}$$

- 11) 5 ducks to 30 geese

$$\frac{5}{30} \div \frac{5}{5} = \frac{1}{6}$$

- 13) 6 sodas out of 16 drinks

$$\frac{6}{16} \div \frac{2}{2} = \frac{3}{8}$$

- 2) 4 tulips to 9 daffodils

$$\frac{4}{9}$$

- 4) 2 days out of 8 days

$$\frac{2}{8} \div \frac{4}{4} = \frac{1}{4}$$

- 6) 10 yellow eggs out of 12 colored eggs

$$\frac{10}{12} \div \frac{2}{2} = \frac{5}{6}$$

- 8) 18 hours out of 24 hours

$$\frac{18}{24} \div \frac{6}{6} = \frac{3}{4}$$

- 10) 15 trumpets to 9 trombones

$$\frac{9}{15} \div \frac{3}{3} = \frac{3}{5}$$

- 12) 14 lions to 10 tigers

$$\frac{10}{14} \div \frac{2}{2} = \frac{5}{7}$$

- 14) 20 blue jays out of 35 birds

$$\frac{35}{20} \div \frac{5}{5} = \frac{7}{4}$$

Write the ratio "21 wins to 9 losses" as a fraction in simplest form.

$$\frac{21}{9} \div \frac{3}{3} = \frac{7}{3}$$

- Two ratios that have the same value are **equivalent ratios**.

$$\begin{array}{r} 2.6 \\ 9 \overline{) 18} \\ \underline{06} \end{array}$$

Determine whether the ratios are equivalent.

$\frac{3}{4}$ and $\frac{12}{16}$
equivalent

$\frac{25}{35}$ and $\frac{10}{14}$
no equivalent

$\frac{12}{17}$ and $\frac{10}{15}$
no equivalent

Appendix D: Sample Quizzes/Tests

(1/31 Quiz on Chapter 5.1)

Name: _____

Date: _____

5.1 Quiz - Ratios, Rates, and Unit Rates

Understanding

1) Match each description to the keywords: **Ratio, rate, unit rate**

- a. \$4.50 per 1 pound _____
- b. 60 miles per 2 gallons _____
- c. 8 boys : 12 girls _____

Order Matters

2) Write the dollars(\$) per ounce(oz.) as a fraction(with the units): _____

Remember the unit on the **left** of 'per' goes on the _____, the unit on the **right** goes on _____

Show your work for the problems below

Simplify to a unit rate:

3) $\frac{144 \text{ m}}{12 \text{ sec}}$

4) $\frac{\$5.70}{3 \text{ pound}}$

Unit Cancelling and Complex Fraction

5) $25 \text{ ft} \times \frac{1 \text{ second}}{5 \text{ ft}} =$

6) $\frac{\frac{6}{8}}{\frac{3}{8}}$

Ratio Table

7) A communication satellite travels 28 **miles per 2 seconds**. Figure out the **unit rate**. Fill in the rest. Show your work!

Seconds	1	2	5	10
Miles		28		

What Should I Buy? Write the rate. Then divide, you should get an answer in dollars.
(Remember: You want to buy what is cheaper!)

8) \$4.50 per 10 piece nuggets vs. \$5 per 20 piece nuggets (way too unhealthy!)

Extra Credit(1 pt): Solve the inequality: $5x - 7 \leq 38$ (\leq means less than or equal to)

Sample Student Quiz 1 (page 1)

percent as a decimal.

Answer

Great job!

$23/25 = \frac{92}{100} = 92\%$

Date 4/2/18

Name

Ch. 6 Quiz - Blue

Write the percent as a decimal.

✓ 1. 73%

✓ 2. 32.3%

✓ 3. 121.6%

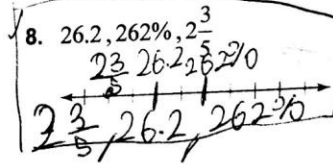
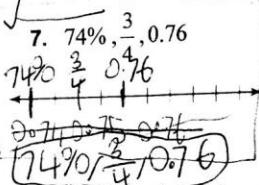
Write the decimal as a percent.

✓ 4. 0.65

✓ 5. 1.35

✓ 6. 0.003

Use a number line to order the numbers from least to greatest.



9. The table shows the scores for three students on a math test. Who earned the highest grade?

Ben = 0.86
Sarah = 0.84
Jim = 0.85

highest = ben

Student	Score
Jim	$\frac{17}{20}$
Sarah	84%
Ben	0.86

Write and solve a proportion to answer the question.

10. What number is 80% of 65?

$\frac{P}{65} = \frac{80}{100}$ $P = 52$

Just make sure you show your work!

11. 32 is what percent of 200?

$\frac{32}{200} = \frac{P}{100}$ $P = 16$

12. 125 is what percent of 200?

$\frac{125}{200} = \frac{P}{100}$ $P = 62.5$

13. 45 is 90% of what number?

$\frac{45}{W} = \frac{90}{100}$ $W = 50$

① $\frac{73}{100} = 0.73$

② $\frac{32.3}{100} = 0.323$

③ $\frac{121.6}{100} = 1.216$

4 $\frac{0.65}{100} = 65\%$

5 $\frac{1.35}{100} = 135\%$

6 $\frac{0.003}{100} = 0.3\%$

↑ Great job for #1-6!

14. You earned a 90% on a science test. You answered 18 questions correctly. How many questions were on the test?

0.90 = $\frac{18}{x}$ close... set up a proportion

$$\frac{90}{100} = \frac{18}{x}$$

$$90x = 1800$$

$$x = 20$$

79.90
x 18

70.20
16.20

16.20

Identify the percent of change as an increase or decrease. Then find the percent of change. Round to the nearest tenth of a percent, if necessary.

15. 15 books to 21 books

Just change everything into percents after!

-0.5

$$\frac{21-15}{15} = \frac{6}{15}$$

$$= 0.4$$

15 | 60
60
00

16. 60 cars to 24 cars

-0.5

$$\frac{24-60}{60} = \frac{-36}{60} = -0.6$$

60 | 360
360
00

Find the sale price:

17. Original price: \$50
Discount: 10%
Sale price after discount: _____

-1

$$\begin{array}{r} 50 \\ -10 \\ \hline 40 \end{array}$$

$\boxed{40}$

Find the final interest using the formula:

18. \$250 at 4% for 1 year
Hint: Interest = Principal x Rate x Time

= 10

$$250 \times 0.04 \times 1 = 10$$

~~Steps~~
~~Steps~~
You forgot a step!

Appendix E: Activities Created to Support Learner Diversity

Timed Quizlet Matching Activity

The screenshot shows a Quizlet matching activity. On the left, there is a sidebar with a 'MATCH' icon, a timer showing '35.6' seconds, and a 'BEST TIME' of '6.4' seconds. The main area contains a 4x3 grid of cards with the following values:

75%	87.5%	2/3
9.0909...%	12.5%	66.67%
3/4	1/11	1/8
25%	1/4	7/8

Jeopardy Review Game

The screenshot shows a Jeopardy Review Game interface. The title is '5.1 - Ratios, Rates, and Fractions'. The board has five columns: 'RATIOS AND RATES', 'UNIT RATE', 'SIMPLIFY/EQUIVALENT FRACTIONS', 'COMPLEX FRACTIONS', and 'GRAB BAG'. Each column has five rows of values: '\$100', '\$200', '\$300', '\$400', and '\$500'. Below the board are five contestant avatars: a dog, a zebra, a purple creature, a white dog, and a tiger. Each avatar has a score of '\$0' and a '0' on their board.

Sample Questions:

◀ BACK

SIMPLIFY

176/187

SKIP / SEE ANSWER

◀ ▶

\$0 \$0 \$0 \$0 \$0

LET'S SAY THERE'S A RATE THAT LOOKS LIKE .2 MILES/.5 GALLON, HOW DO YOU CONVERT THIS INTO A UNIT RATE?