SGO Example: Mathematics, Grade 6

Overview

This Student Growth Objective (SGO) was created by a 6th grade mathematics teacher to focus on Mathematical Practice 4 (MP4) "Model with mathematics" as articulated in the Common Core State Standards (CCSS). While this SGO does not focus on any particular content strand, the teacher's emphasis on this Mathematical Practice in his SGO is acceptable as his mSGP score will encompass student achievement on the broader grade-level content standards taught throughout the year. Several different sources of data are used as baselines for allocating the students to the different Preparedness Groups.

Name	School	Grade	Course/Subject	Number of Students	Interval of Instruction
		6	Mathematics	60	9/14/15 to 4/29/16

Standards, Rationale, and Assessment Method

Name the content standards covered, state the rationale for how these standards are critical for the next level of the subject, other academic disciplines, and/or life/college/career. Name and briefly describe the format of the assessment method.

RATIONALE

This SGO is not focused on a content standard, but rather a practice standard. It aligns with MP4 from the CCSS (*Model with mathematics*). Since this is a process standard, the assessments associated with this SGO do not follow the traditional format; instead, the assessments (diagnostic, formative, interim, and summative) used resemble performance tasks which assess student proficiency in the process of using mathematics, not their fluency with particular skills. Student achievement on this SGO will be tracked through the use of assessments which are aligned with the content being taught throughout the year, but the dimensions of the rubric measure student progress in attaining proficiency in the modeling standard. The teacher decided to use this SGO to deepen focus on the Modeling Mathematical Practice, continually returning to this Habit of Mind to address how mathematics has a lot to say about things that go on in the everyday lives of his students.

By improving their ability to model with mathematics, student engagement increases as well as interest in pursuing future studies requiring the use of mathematics. Traditionally, using mathematics to understand the world does not take place in a deliberate and meaningful way until late in a student's academic career. The emphasis on this practice as outlined in this SGO will increase student's faculty with applying the mathematics they are learning as well as developing their interest in future quantitative studies.

ASSESSMENT

A Performance-Based Assessment will be used to assess student performance on this SGO. A summative Modeling Task will be administered at the end of the year and will be scored on the same 25-point Modeling Rubric, through which students will have the opportunity to demonstrate proficiency. This rubric has three performance levels and five dimensions, as can be seen below. The teacher will have discretion to assign points in between each of the performance levels if a student's performance does not fit neatly in one of those levels.

A critical component of this SGO is a collection of well-designed assessment tasks which measure student understanding of modeling. It is especially important that a major focus be on the authenticity of the task; students must be able to see how and why these mathematics problems relate to the real-world and their experiences, and how mathematics can be used as a tool to model these situations. At the conclusion of the short- and long-term monitoring cycles implemented throughout the year, Modeling Tasks will be administered to permit progress monitoring by the teacher and to adjust instruction.

The teacher has laid out a thorough rationale for focusing on this Practice Standard instead of the traditional Content Standard SGO and outlines how this SGO will be assessed multiple times throughout the year. The teacher may want to add further commentary on how this SGO will facilitate the achievement of his students throughout High School, College, and Careers.

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Rubric Dimensions	Performance Levels		
	Meets expectations (5 pts)	**Approaching expectations (3 pts)**	**Not meeting expectations (1 pt)**
Essential Variables	Justifies the choice of essential variables in the context of the situation	Partially justifies the choice of essential variables in the context of the situation	Does not justify the choice of essential variables in the context of the situation
Formulate models	Provides estimate and justifies why it is reasonable **and** Presents data in an effective and organized manner **and** Creates appropriate representation which describes the variable relationship accurately **and** Formulates an appropriate model which represents the problem accurately	Provides estimate without justification **and** Presents data with limited effectiveness or organization **and** Creates appropriate representation which describes the variable relationship with minor errors **and** Formulates an appropriate model which represents the problem with minor errors	Does not provide estimate and justification **or** Does not present data or presents data with no organization **or** Does not create an appropriate representation which describes the variable relationship **or** Does not create an appropriate model which represents the problem
Perform operations	Executes mathematical procedures accurately	Executes mathematical procedures with minor computational errors	Executes mathematical procedures with major computational errors
Interpret the results	Interprets result in the context of the original situation **and** Always uses precise mathematical terminology and notation appropriately **and** Clearly communicates process and solution **and** Justifies all mathematical statements accurately	Attempts to interpret the result in context of the original situation **and** Mostly uses mathematical terminology and notation appropriately **and** Explains process and solution with limited clarity **and** Justifies some of the mathematical statements accurately	No contextual interpretation of the result **or** Little or no appropriate use of mathematical language and notation **or** Little or no coherent explanation of process and solution **or** Does not justify mathematical statements accurately
Validate conclusions	Identifies potential inaccuracies and/or sources of error **and** Justifies the reasonableness of the model in the context of the situation **and** Thoroughly discusses improvements to the model and acceptability of conclusion	Identifies potential inaccuracies and/or sources of error **and** Partially justifies the reasonableness of the model in the context of the situation **and** Attemps to discuss improvements to the model and acceptability of conclusion	Does not identify inaccuracies and sources of error **or** Does not justify the reasonableness of the model in the context of the situation **or** Does not discuss improvements to the model and acceptability of conclusion

*Based on NY Performance Standards Consortium, Mathematics Performance Assessment

STANDARDS

Standards for Mathematical Practice 4: Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether those results make sense, possibly improving the model if it has not served its purpose.

6.RP.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

6.NS.8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

6.EE.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE.7: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

6.EE.9: Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

6.SP.3: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

6.SP.5: Summarize numerical data sets in relation to their context, such as by:

> **6.SP.5a:** Reporting the number of observations.
>
> **6.SP.5b:** Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
>
> **6.SP.5c:** Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

ELA-LITERACY.WHST.6-8.1B:
Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

Next Generation Science Standards **– Eight Practices of Science and Engineering:**
Practice 2. Development and using models.
Practice 4. Analyzing and interpreting data.
Practice 5. Using mathematics and computational thinking.
Practice 7. Engaging in argument from evidence.
Practice 8. Obtaining, evaluating, and communicating information.

Although the focus of this SGO is on MP4, the teacher has identified related mathematics content which supports this Practice Standard as well. Additional cross-curricular standards have been identified in Literacy and Science as well.

Starting Points and Preparedness Groupings

State the type of information being used to determine starting points and summarize scores for each type by group. Modify the table as needed.

Preparedness Group	Information #1	Information #2	Information #3
	Modeling Diagnostic Task (Points Earned)	Grade 6 Quiz 1 (Percent Correct)	Markers of Future Success (Points Earned)
Low	<10	<70	0 – 1
Average	10 – 17	70 – 84	2
High	18 – 25	85 – 100	3

For students whose placement differs based on these data, the student will be placed in the Preparedness Group corresponding to the middle information score. For example, if a student scores in the Average Group for information #1 and #2, but the High Group for Information #3, the student will be placed in the Average Group. If, according to Information #1, #2, and #3, a student scores in the Low, Average, and High Group, respectively, then the student will be placed in the Average Group.

The Modeling Diagnostic Task, which will be administered within the first month of school, will assess the Modeling skills of each student and only include content from fifth grade. Since the Standards for Mathematical Practice span all grade-levels, this will provide an accurate picture of where each student is in their ability to relate the real-world and mathematics.

The Grade 6 Quiz 1 will be another source of information, since this assesses the student's skills in grade-level content. Finally, using Markers of Future Success is one way in which to quantify a student's academic habits which influence their growth potential.

Student Growth Objective

State simply what percentage of students in each preparedness group will meet what target in the space below, e.g. "75% of students in each group will meet the target score." Describe how the targets reflect ambitious and achievable scores for these students. Use the table to provide more detail for each group. Modify the table as needed.

Eighty percent of students in each Preparedness Group will meet their Target Score as described in the table below on the sum of their final two Modeling Exercises. Since each Modeling Exercise is scored on the 25 points Rubric, the sum of the final two will be out of 50 points.

Preparedness Group (e.g. 1,2,3)	Number of Students in Each Group	Target Score on SGO Assessment
Low	24	35/50
Average	28	40/50
High	8	45/50

Scoring Plan
State the projected scores for each group and what percentage/number of students will meet this target at each attainment level. Modify the table as needed.

Preparedness Group	Student Target Score	Teacher SGO Score Based on Percent of Students Achieving Target Score			
		Exceptional (4)	Full (3)	Partial (2)	Insufficient (1)
Low	35/50	≥ 90%	≥ 80%	≥ 70%	< 70%
Average	40/50	≥ 90%	≥ 80%	≥ 70%	< 70%
High	45/50	7/8	6/8	5/8	< 5/8

Here, the teacher has modified the scoring plan for the High Preparedness Group as there are only 8 students in that group for his class. Using a percent scheme would not make as much sense when there are so few students, since each student is such a high percentage of the total. In this case, using a fraction of the number of students is useful.

Approval of Student Growth Objective
Administrator approves scoring plan and assessment used to measure student learning.

Teacher _____ Signature_____ Date Submitted_____

Evaluator _____ Signature _____ Date Approved _____

Results of Student Growth Objective
Summarize results using weighted average as appropriate. Delete and add columns and rows as needed.

Preparedness Group	Students at Target Score	Teacher SGO Score	Weight (based on students per group)	Weighted Score	**Total Teacher SGO Score**
Low	**18/24 (75.0%)**	**2**	**0.40**	**0.80**	**2.3**
Average	**22/28 (78.6%)**	**2**	**0.47**	**0.94**	
High	**7/8**	**4**	**0.13**	**0.52**	

Notes
Describe any changes made to SGO after initial approval, e.g. because of changes in student population, other unforeseen circumstances, etc.

Review SGO at Annual Conference
Describe successes and challenges, lessons learned from SGO about teaching and student learning, and steps to improve SGOs for next year.

Teacher _____ Signature _____ Date _____

Evaluator _____ Signature _____ Date _____