SGO Example: CAD 10/11

Overview

The CAD team created this SGO to focus on the grade-level CAD content standards in order to prepare their students for continued success throughout the CAD class. This SGO is aligned to the selected Career and Technical Education and Common Core Science and Technical Subject Standards (CCSS) and uses several data points to determine each student's Preparedness Group (prior course work grades , a teacher-developed work habits rubric, attendance, and diagnostic assignment measuring prerequisite skills necessary for the course). The final assessment will be a performance task and notebook which is a technical manual accompanying the task.

Name	School	Grade	Course/Subject	Number of Students	Interval of Instruction
		10/11	CAD Design	62	October- April

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 focuses on the identified Career and Technical Education (CTE) and common core standards. The CTE standards include Science, Technology, Engineering, and Mathematics (STEM) standards, as well as those from both the both the Engineering and Technology (ST-ET) and Science and Mathematics (ST-SM) career pathways. The SGO contains a series of checkpoints in the form of three separate projects (explained below). Each project is a checkpoint at the end of a long monitoring cycle measuring student growth towards the final summative assessment, an original CAD drawing to be printed on a 3D printer. Accompanying this will be a notebook in the form of a technical manual documenting the student's ability to complete the task. The assessments are a practical way to measure growth on the selected standards. In the combined CAD 1 and 2 course students are given a series of increasingly complex problems. Each problem contains embedded instruction in the principals of design and builds upon previous standard mastery. For the performance assessment project students will be required to provide a reflection journal, and an engineering notebook which will turn into a technical manual. All of this is reflected in the rubric.

ASSESSMENT

Assessment Tool: Students will have three major projects during the course duration. The first two will help the teacher monitor student growth, adjusting instruction based on the data, while the final project will be the summative assessment. Project 1 will be on 2-D drawings and will have a rubric, project 2 will involve a modeled 3-D drawing using CAD software, and the final project will be an original CAD drawing that will be printed. Both of the assessments below will be averaged (70% for the project and 30% for the technical manual) to tabulate the SGO summative assessment grade.

1) Original CAD drawing to be printed and graded according to the Inventor Grading Rubric (see below). This will count as 70% of the overall growth score.

2) The engineering notebook. This notebook also serves as a technical manual accompanying the final project. This will count as 30% of the overall growth score.

STANDARDS

Standard 9.3 Career and Technical Education:

9.3.ST.1: Apply engineering skills in a project that requires project management, process control and quality assurance.

9.3.ST.2: Use technology to acquire, manipulate, analyze and report data.

9.3.ST.6: Demonstrate technical skills needed in a chosen STEM field.

9.3.ST-ET.1: Use STEM concepts and processes to solve problems involving design and/or production.

9.3.ST-ET.3: Apply processes and concepts for the use of technological tools in STEM.

9.3.ST-ET.4: Apply the elements of the design process.

9.3.ST-ET.5: Apply the knowledge learned in STEM to solve problems.

9.3.ST-SM.1: Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

Common Core Science and Technical Subjects Literacy:
CCSS.ELA-LITERACY.RST.9-10.8: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
CCSS.ELA-LITERACY.RST.11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

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	Information #4
	Prior Course Work: Algebra Physics Trigonometry Intro to CAD Engineering Courses	Work Habits: Rubric	Attendance (for the first six weeks of instruction)	Diagnostic Assignment: Out of 10 points Students create a product for a design brief and give an outline of the steps they would need to take.
Low	0 -1 out of 5	0-1	More than 3 days missed	0-3 out of 10
Middle	2-3 out of 5	2-3	2-3 days missed	4-7 out of 10
High	4-5 out of 5	4	1-0 days missed	8-10 out of 10

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.

At least 85% of students will achieve the target score at each level of proficiency

Preparedness Group (e.g. 1,2,3)	Number of Students in Each Group	Target Score on SGO Assessment
Low	12	75%
Middle	30	85%
High	20	95%

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	≥75	≥95%	85-94%	75-84%	≤74%
Middle	≥85	≥95%	85-94%	75-84%	≤74%
High	≥95	≥95%	85-94%	75-84%	≤74%

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**

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 _____

Technical Manual Rubric

Elements	Points	5	4	3	2	1	Total
Focus Questions	20	Focus questions are dated and answered correctly using complete sentences. All focus questions are complete.	Focus questions are dated and answered correctly using complete sentences. At least 90% of all focus questions are complete.	Focus questions are dated and answered but those completed contain some mistakes ***or*** are not in complete sentences. Less than 90% of questions complete.	Focus questions are dated and answered but those completed contain many mistakes ***and*** are not in complete sentences. Less than 80% of questions complete.	The notebook contains little to no evidence of focus questions.	
Integration of Ideas	20	Evaluated the hypotheses, data, analysis, and conclusions in the reviewed technical texts, verifying the data when possible and corroborated ***and*** challenged conclusions within those texts with other sources of information.	Evaluated the hypotheses, data, analysis, and conclusions in the reviewed technical texts, verifying the data when possible and corroborated ***or*** challenged conclusions within those texts with other sources of information.	Evaluated the hypotheses, data, analysis, and conclusions in the reviewed technical texts, verifying the data when possible.	Adequately assessed the extent to which the reasoning and evidence in a text supported an author's claim ***and*** displayed the ability to provide a recommendation for solving a technical problem.	Adequately assessed either the extent to which the reasoning and evidence in a text supported an author's claim ***or*** displayed the ability to provide a recommendation for solving a technical problem.	
Reflection	20	Reflections are dated, correct and use complete sentences. Entry made for all activities/ builds.	Reflections are dated, correct and use complete sentences. Entry made for 90% of activities/ builds.	Reflection are dated and answered but not completed correctly ***or*** in complete sentences. Entries made for less than 80% of activities.	Reflection are dated and answered but not correctly ***and*** are not in complete sentences. Entries made for less than 50% of activities.	The notebook contains little or no evidence of reflection.	
Sketches	20	Sketches are complete and annotated to show all important information. Heading information is complete and accurate.	One or two sketches are not complete and are missing important information, such as measurements. Some heading information is incomplete or inaccurate.	Sketches are missing more than 30% of the identification of the components. More than 30% of the heading information is not complete or is not accurate.	Sketches are missing more than 50% of the identification of the components. More than 30% of the information is not complete and is not accurate.	The notebook contains little or no evidence of sketches.	
Organization of Engineering Notebook	20	Engineering notebook shows a high level of organization; sections are clearly labeled; all activity sheets and related information are included.	Engineering notebook shows evidence of organization, but is missing section dividers; Up to 10% of activities are missing required information.	Notebook shows limited organization, such as missing sections. Up to 20% of sections are missing or incomplete.	Up to 30% of the notebook is missing or incomplete.	There is no evidence of an organized notebook. Over 30% of the notebook is missing or incomplete.	

Inventor Grading Rubric

	Industry Standard Work (8 points)	**Work Approaching the Standard (6 points)**	**Work Partially Meets the Standard (4 points)**	**Work Does Not Meet the Standard (2 points)**
Number/Quality of Parts	5+ individual parts in completed assembly.	5 or more individual parts, assembly nearly completed.	5 individual parts some complexity of design.	Fewer than 5 individual parts, simple design
Individual Parts Drawings	All parts completed to 100% accuracy. All details/features are present.	Most details/features of the parts are completed to full detail.	Some details/features of the parts are completed to full detail.	Details/features of the parts are not completed to full detail.
Object Assembly	Object is assembled with no errors or assembly conflicts. All parts are fully mated and in a fixed position.	Object is assembled with 1-3 errors/assembly conflicts. All individual parts are fully mated and in a fixed position (checked electronically).	Object is assembled with 4-7 errors/ assembly conflicts. 1-2 individual parts are not fully mated and in a fixed position (checked electronically).	Object is assembled with 8+ errors/ assembly conflicts. 3+ individual parts are not fully mated and in a fixed position (checked electronically).
Dimensions/ Measurement	All individual part drawings are properly dimensioned. Dimensions are clear and concise with no repeat information. Individual part could be manufactured from the information given.	All individual part drawings are dimensioned. Dimensions are clear and concise but there is repeat information given. Individual part still could be manufactured from the information given.	All individual part drawings are dimensioned. Dimensions are not clear and concise (difficult to read) and there is repeat information given. Individual part would be difficult to manufacturer.	All individual part drawings are dimensioned. Dimensions are not clear and concise and there is repeat information given. Individual part could not be manufactured with the information given.
Print Outs	All individual part drawings are properly formatted and printed on an ANSI template. Drawings include dimensions, appropriate views (front, top, side, orthographic).	Individual part drawings are properly formatted and printed on an ANSI template. Drawings include dimensions, but there is one view missing (front, top, side, orthographic).	Individual drawings are not properly formatted and printed on an ANSI template. Drawings include dimensions, but two or more views are missing (front, top, side, orthographic).	Individual part drawings are not properly formatted or printed on an ANSI template. Drawings do not include the appropriate views (front, top, side, orthographic).
Following Directions	Final project completed with all print-outs (individual parts, orthographic assembly, exploded assembly) turned in and files saved to the appropriate location.	Final project completed with one component (print-outs or file saved to appropriate location) missing.	Final project completed with two or more components (print-outs, file saved to appropriate location missing).	Final project not completed.