Center on
GREAT TEACHERS & LEADERS
at American Institutes for Research ■

Student Learning Objectives:
Considerations for Teachers of Career and Technical Education Courses

■ **Handouts**

OCTOBER 2014

PROFESSIONAL LEARNING MODULE

About This Booklet

This *Student Learning Objectives: Considerations for Teachers of Career and Technical Education Courses: Handouts* booklet is intended for use with the following additional resources:

- *Student Learning Objectives: Considerations for Teachers of Career and Technical Education Courses: Facilitator's Guide*

- Sample agenda

- Slide presentation

These online resources are available for download on the *Professional Learning Modules* webpage of the Center on Great Teachers and Leaders website. Please visit the webpage at http://www.gtlcenter.org/technical-assistance/professional-learning-modules/.

Adapting This Booklet

This booklet is designed so that facilitators can adopt it as written or modify the content to reflect state and local context, needs, and priorities. If modifications to content are made, the GTL Center requests that the following disclaimer be included in the revised materials:

This booklet was modified in whole or in part with permission from the Center on Great Teachers and Leaders.

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Contents

Handout 1: Student Learning Objective (SLO) Template

This template should be completed while referring to the SLO Checklist. When submitted, the accompanying baseline data and assessment should be attached for review.

Teacher Name: _____   Content Area and Course(s): _____

Grade Level(s): _____   Academic Year: _____

Please use the guidance provided in addition to this template to develop components of the SLO and populate each component in the following space.

Baseline and Trend Data

What information is being used to inform the creation of the SLO and establish the amount of growth that should take place?

Student Population

Which students will be included in this SLO? Include course, grade level, and number of students.

Interval of Instruction

What is the duration of the course that the SLO will cover? Include beginning and end dates.

Standards and Content

What content will the SLO target? To what related standards is the SLO aligned?

Assessment(s)

What assessment(s) will be used to measure student growth for this SLO?

Growth Target(s)

Considering all available data and content requirements, what growth target(s) can students be expected to reach?

Rationale for Growth Target(s)

What is your rationale for setting the above target(s) for student growth within the interval of instruction?

Handout 2: Student Learning Objective (SLO) Checklist

Baseline and Trend Data	Student Population	Interval of Instruction	Standards and Content	Assessments	Growth Target(s)	Rationale for Growth Target(s)	Instructional Strategies
❑ Identifies sources of information about students ❑ Draws upon trend data, if available	❑ Covers all students in the class (or in the case of a targeted SLO, covers all students in the subgroup) ❑ Describes the student population and considers any contextual factors that may impact student growth	❑ Matches the length of the course (e.g., quarter, semester, trimester, year)	❑ Specifies how the SLO will address applicable standards from the highest ranking of the following: (1) Common Core State Standards, (2) Academic content standards, (3) National standards put forth by education organizations	❑ Identifies assessments that have been reviewed by content experts to effectively measure course content and reliably measure student learning as intended	❑ Ensures all students in the course have a growth target ❑ Uses baseline or pretest data to determine appropriate growth	❑ Demonstrates teacher knowledge of students and content ❑ Explains why target is appropriate for the population ❑ Addresses observed student needs ❑ Uses data to identify student needs and determine appropriate growth targets	❑ Highlights the instructional methods that will best support the student achievement goals set forth in the SLO ❑ Discusses how the teacher will differentiate instruction in support of this SLO

Handout 3: Student Learning Objective Example 1—Agriculture Management and Economics

Teacher Name: Arnold Palmer

Grade/Course: Agriculture Management and Economics (11th and 12th grade)

Student Population: 25 students (nine 11th graders and 14 12th graders). These students are all CTE concentrators. I have three students enrolled in the course who are not CTE concentrators but are interested in business and finance. I have excluded these students from the SLO because they are taking the course "pass/fail" for credit and do not plan to pursue careers in this field. All the CTE concentrators are actively involved in FFA (Future Farmers of America) and plan to continue working in agriculture after secondary and postsecondary education.

Learning Content and Standards: The students will demonstrate the knowledge of economic principles while making real-world agriculture business decisions.

Unit 1 Standards: Agriculture Economics	Unit 2 Standards: Agriculture Business	Unit 3 Standards: Agriculture Operations
1. Determine the point of maximum profit.	1. Compare the different business structures for agricultural businesses.	1. Identify appropriate goal-setting activities that could be used for a farm business.
2. Determine the fixed and variable costs of production and use the fixed/variable concepts in making business decisions.	2. Identify the steps in buying land.	2. Determine the present use of resources for a farm business.
3. Determine when substitution is desirable and what is the most profitable level of substitution.	3. Explain the factors involved in starting an agricultural business.	3. Explain the principles of planning a cropping system and be able to revise the cropping system of the case farm.
4. Determine the opportunity cost of choosing various business alternatives.	4. Identify and describe key components of contracts.	4. Calculate machinery needs.
5. Determine the resulting change in price of commodities when shifts in supply and demand take place.	5. Explain the importance of business procedures.	5. Plan a profitable livestock system.
6. Determine the effects of the time value of money on business investments and decisions.	6. Explain the importance of agribusiness records.	6. Plan for the labor needs of a farm business.

Unit 1 Standards: Agriculture Economics	Unit 2 Standards: Agriculture Business	Unit 3 Standards: Agriculture Operations
	7. Describe how to manage inventory and determine selling price.	7. Determine the amount of capital needed for the farm business.
	8. Explain how to handle customer transactions.	8. Estimate farm business cash income and profitability.
	9. Prepare a sales ticket.	9. Revise a farm plan.
	10. Describe the proper procedures for handling customer credit in a business.	10. Explain the role of the employee.
	11. Explain factors that should be considered before securing a loan.	11. Explain the need for effective communication skills in an agricultural business.
	12. Complete a financial analysis of a business.	12. Identify skills needed for a successful career in agricultural sales.
	13. Explain business practices that will maximize after-tax income.	13. Describe the use of promotion in agriculture.
	14. Calculate the depreciation of an investment.	14. Explain the appropriate use of agricultural displays.
	15. Identify methods of reducing risk in a business.	
	16. Explain the types of insurance needs of an agricultural business.	
	17. Identify several cooperating agencies and services available.	

Time Interval: 12 weeks per unit exam (three unit exams total). Unit exam 1, Sept. 2–Nov. 21; unit exam 2, Dec. 1–Feb. 27; unit exam 3, Mar. 2– May 27.

Assessment: *Agriculture Economics Unit, Agriculture Business Unit, and Agriculture Operations Unit Pre- and Postassessments (three total sets of unit assessments)*

Baseline and Trend Data

Baseline Data

Students	Preassessment Score for Unit One
5 students	37–45/80 points
20 students	46–54/80 points

Trend Data

2013–14 Students	Average Preassessment Score	Average Postassessment Score
4 students	42 points	66 points
17 students	49 points	75 points

Proficiency is 65/80 points or better, and passing is 55/80 points or better on each unit exam.

Growth Target

Baseline	Target for Each Unit
0–45/80 points	25 points higher than baseline or score of 65
46–80/80 points	20 points higher than baseline or score of 70

Rationale: Based on last year's pre- and postassessments, these growth targets are both rigorous and attainable. These targets make it likely that all students will at least reach proficiency and are flexible enough to account for differences in individual student's performance throughout the year. The unit assessments require students to demonstrate knowledge and understanding of key concepts that they will use in projects and internships throughout the year, reflected in the course standards. These growth targets represent students' foundational knowledge in agriculture, which they will apply in practice in postsecondary education and employment.

Instructional Strategies: This course is structured around inquiry-based learning, cooperative learning, and student-led problem solving. Most of the class time will center on mini-lessons and activities based on real-world scenarios in which students will engage in peer learning and practice oral presentation skills. About once a week, students will also have time to work independently on projects related to their internship. Because students drive their own learning, I am able to provide individualized support and assistance to students as needed during this time and help students connect their learning in class to their learning in their internships. Throughout the year, I will adjust student grouping for the mini-lessons to differentiate instruction. I will use mini-quizzes and informal checks for understanding to monitor students' progress toward growth targets and identify learning challenges throughout the year.

Handout 4: Student Learning Objective Example 2—Computer Applications

Teacher	Marya Henderson
Course	Computer Applications Grade 9
Content Area	Technology
Course Interval	Spring Semester (January 8–June 12)

Baseline and Trend Data

Over the course of a week, I individually assessed student skills in Microsoft Word and Office by asking students to try to complete a task that required them to create several tables and graphs in Excel and transfer the content to Word. I explicitly told students that this was a preassessment to inform their personal learning plan so they would know what they would need to focus on for the semester. I gave students written instructions and asked to observe them as they tried to complete the task. Students were able to skip steps if they did not know how to do them. I used the rubrics to assess students' baseline understanding and knowledge.

Baseline					
Score Range	Line Chart	Pie Chart	Special Features	Changing Rows and Columns	Sorting Lists
0–2	20 students	19 students	12 students	4 students	4 students
3–5	4 students	5 students	12 students	17 students	17 students
6–8	0 students	0 students	0 students	3 students	3 students

Because this is my first year teaching this course and the first year it is being offered at this school, no trend data exist. I was able to access information on most students' grades for their eighth grade typing class and eighth grade English language arts (ELA) class. I was not able to access information for all students' grades.

Number of Students	Typing Grade	Number of Students	ELA Grade
2	A	3	A
7	B	2	B
11	C	11	C
0	D	4	D

There are also differences in some students' preparation for this course: Based on an informal survey from the first day of class, 16 students do not have regular access to computers at home, and nine students have not had regular access to computers in their prior classes or schools. Eleven students reported that they had used Microsoft Office tools in the past for schoolwork or other projects that required them to use features such as formatting and tables or formulas and graphs.

Student Population
This SLO includes all 24 students enrolled in the class (15 males and nine females). Eight of the students have IEPs, two students have a 504 plan, and four students are English language learners (intermediate or advanced-intermediate level).

Standards and Content

National Business Association Standard:

Communication Standard IV. Technological Communication: Use technology to enhance the effectiveness of communication.

Common Career Technical Core Career-Ready Practice:

11. Use technology to enhance productivity.

Common Core Literacy Standard W.9-10.6:

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Common Core Mathematics Standard: High School Functions: Building Functions

Build a function that models a relationship between two quantities. Build new functions from existing functions.

In this course, students will be expected to learn to successfully use several different types of common software. This SLO will focus on students' ability to use Microsoft Word and Microsoft Excel. I have communicated with the ninth grade ELA and Algebra teachers who will be working on these concepts.

Assessment

I will use six rubrics from a Shell Education book ("Microsoft Excel in Your Classroom"):

- Line Chart
- Pie Chart
- Formatting Cells
- Special Features
- Changing Rows and Columns
- Sorting Lists

Each of these rubrics gives students a score of 0–3 across four major skill areas. An "effective" score is 2 or higher.

Growth Targets and Rationale

Average Score Range on Preassessment Rubric	Target (Average Across All Rubrics)
0–2	6–8
3–5	8–9
6–8	10–11

These growth targets will require all students to show substantial growth within the course. Lower performing students will gain important skills and be able to execute all basic tasks independently. For higher performing students, the rubric used to measure student performance requires students to show full mastery of each skill and fully explain how their work meets the lesson objectives to earn the top score for each indicator. This will require higher performing students to not only execute tasks completely but also to communicate effectively about their process and connect their work to broader learning goals These outcomes correspond to the selected standards for all students.

Instructional Strategies
All students will receive a copy of their preassessment rubric, which they will use to build a learning plan for each lesson, documenting the skills they need to gain. I will collect copies of these learning plans and make suggestions to students about who may be working on similar concepts and may work well with them. I have also reached out to the ninth grade history and biology teachers to find out when they may be assigning homework or projects that could utilize these skills and will offer students study hall or after school time to use school computers and programs to practice these skills. The history, biology, ELA, and Algebra teachers have also made note of these concepts so that they can refer to them when giving assignments or reviewing standards.
Instruction is based on a "I do, we do, you do" model. Students are grouped based on ability for each skill or task and engage in peer learning before moving on to independent practice. All students will practice narrating and explaining their process to each other to develop communication skills and reinforce learning. I will monitor student progress and use mini-lessons to address individual and small-group learning needs throughout the year.
To ensure students are on-track to meet their growth targets, I will meet with individual students regularly (about once a month) to review their learning plans and their progress so far.

Handout 5: Reviewing Student Learning Objectives Activity

This activity allows participants to review sample student learning objectives (SLOs) that represent different grades and subjects from different states. After participants review the examples, participants engage in a small-group discussion and identify questions about each of the components of the SLOs. The activity concludes with an example of a low-quality SLO, example feedback from an SLO reviewer, and a revised SLO based on the feedback.

Sample SLO: Career and Technical Education

Advanced Culinary Arts: First Draft

Course: Advanced Culinary Arts	School: [redacted]
Grade: 11th and 12th	Teacher: [redacted]

Baseline and Trend Data
Baseline data is from a food lab completed in the first week of class: 10 students scored from 28–40 points 29 students scored from 41–60 points 22 students scored from 61–80 points 6 students scored from 81–89 points
Student Population
All 67 students enrolled in three sections of Advanced Culinary Arts.
Interval of Instruction
Second Semester: January 6–May 15
Standards and Content
Foundations of Restaurant Management & Culinary Arts, Level One: Standard 4.2; Foundations of Restaurant Management & Culinary Arts, Level Two: 3.1–3.4. CCSS: Reason quantitatively and use units to solve problems.
Assessments
Final lab/project, completed in early May
Growth Targets
10 students: 65 points 29 students: 75 points 22 students: 85 points 6 students: 95 points
Rationale for Growth Targets
These targets require all students to pass the class but also demonstrate growth.
Instructional Strategies
Instruction Strategies: Small-group instruction Modeling by successful students Manipulatives for practicing the relationships between fractions Collaborate with mathematics teacher who also teaches the same students. Warm-up and closure questions

Sample SLO: Career and Technical Education

Advanced Culinary Arts: Annotated

Course: Advanced Culinary Arts	School: [redacted]
Grade: 11th and 12th	Teacher: [redacted]

Baseline and Trend Data

Baseline data is from a food lab completed in the first week of class:

10 students scored from 28–40 points

29 students scored from 41–60 points

22 students scored from 61–80 points

6 students scored from 81–89 points

> Organizing students in tiered groups is appropriate here due to the wide range of student performance. This grouping makes sense.
> Please provide information about the lab. What kind of skills and activities does it include? How does the lab relate to the standards and content identified below? How were these scores calculated and what do they mean?
> Is there any trend data or additional data you can provide?

Student Population

All 67 students enrolled in three sections of Advanced Culinary Arts.

> Please provide a little more information about these students. How many are in each grade? Have they all taken the other courses in this pathway? Do they all plan to enter the culinary arts profession after graduation? Is there any information to consider in terms of student background, learning conditions, or home situations that may impact their growth or the instructional strategies you will use to ensure growth?

Interval of Instruction

Second Semester: January 6–May 15

Standards and Content

Foundations of Restaurant Management & Culinary Arts, Level One: Standard 4.2; Foundations of Restaurant Management & Culinary Arts, Level Two: 3.1–3.4. CCSS: Reason quantitatively and use units to solve problems.

> Please provide a little more information about these students. How many are in each grade? Have they all taken the other courses in this pathway? Do they all plan to enter the culinary arts profession after graduation? Is there any information to consider in terms of student background, learning conditions, or home situations that may impact their growth or the instructional strategies you will use to ensure growth?

Assessments

Final lab/project, completed in early May

> Please provide information about the lab. How does it relate to the beginning of year exam? What skills and activities does it include? How long will students have to complete this lab? How will the final score be calculated?

Growth Targets

10 students: 65 points

29 students: 75 points

22 students: 85 points

6 students: 95 points

> These tiered growth targets generally make sense given the baseline data.

Rationale for Growth Targets

These targets require all students to pass the class but also demonstrate growth.

> Please add more information about how these growth targets were growth students have made in the past?
> Also consider adding a piece on certification. Will any of your higher-performing students plan to take the NRAEF certification exam?

Instructional Strategies

Instruction Strategies:

Small group instruction

Modeling by successful students

Manipulatives for practicing the relationships between fractions

Collaborate with mathematics teacher who also teaches the same students

Warm-up and closure questions

> These instructional strategies sound like they will be successful. How do they relate to the growth targets? How do they relate to students' strengths and weaknesses?

Note: Annotations are indicated in blue textboxes and refer to the yellow highlighted information.

Sample SLO: Career and Technical Education

Advanced Culinary Arts: Final

Course: Advanced Culinary Arts	School: [redacted]
Grade: 11th and 12th	Teacher: [redacted]

Baseline and Trend Data

Baseline data is from a food lab completed in the first week of class. The lab is based on a hypothetical situation in which students try to create a pricing and inventory plan for one week of catered meals, using a set meal plan. The lab requires students to convert recipe yields, calculate total costs across all meals, and create an inventory plan based on sample market prices and delivery schedules, equipment and staff needed, and food safety codes. The goal of this lab is to assess students' relevant mathematics skills, planning strategies, and knowledge of culinary arts content from previous courses. The lab is graded on a 100 point scale: 40 percent of the score is based on planning strategies, 30 percent is based on mathematical accuracy, and 30 percent is based on accuracy in culinary content. The passing cut-off is 65 points.

Baseline Data:

Students	Baseline Data
10 students	28–40 points
29 students	41–60 points
22 students	61–80 points
6 students	81–89 points

Trend data from the past two years shows that all but one student passed the course and most students grew 10–30 points.

Trend Data—Advanced Culinary Arts Course Last Year

Students	Baseline Data	Final Lab Data
7 students	28–40 points	56–77 points
24 students	41–60 points	73–84 points
27 students	61–80 points	82–91 points
3 students	81–89 points	89–97 points

Trend Data—Advanced Culinary Arts Course Two Years Ago

Students	Baseline Data	Final Lab Data
15 students	41–60 points	74–85 points
33 students	61–80 points	78–91 points
11 students	81–89 points	93–98 points

Student Population

All 65 students enrolled in Advanced Culinary Arts Class are included in this SLO. All students plan to enter culinary school or the culinary arts industry after graduation, and all but two students have taken the prerequisite culinary arts courses in this district. More than 45 of these students have self-reported that they have struggled with mathematics in the past, and six students are at risk to not graduate on time based on their academic coursework.

Interval of Instruction
Second Semester: January 6–May 15

Standards and Content
SLO Focus Statement:

All of my students in Culinary/Advanced Culinary Sciences will demonstrate growth toward mastery in calculating the total cost and portion costs of standardized recipes, attending to precision in mathematics and with considerations to other costs and management structures.

Foundations of Restaurant Management & Culinary Arts, Level One Standards:

4.9: Using basic math calculations, attending to standardized recipe elements, and converting yields.

Foundations of Restaurant Management & Culinary Arts, Level Two Standards:

3.1: Creating and managing operating budgets

3.2: Controlling food costs, inventories, and efficiency

3.3: Sales, scheduling, and predicting operating budgets

3.4: Standardizing and monitoring production

CCSS High School: Number and Quantities: Quantity

A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Assessments

The final project will be completed through all of April and the beginning of May. Students will develop a three-course meal plan for 100 guests, including a budget for food, equipment, staff, and other costs based on sample models. The meal plan will include one dietary consideration and overall and per-course nutritional data. The operations plan will include the budget, storage, deliveries, food preparation schedule, and other considerations. The scoring method for this project is the same as the lab used to generate baseline data, with 100 points total: 40 percent of the score is based on planning strategies, 30 percent is based on mathematical accuracy, and 30 percent is based on accuracy in culinary content. The passing cut-off is 65 points.

Growth Targets

Students	**Baseline Data**	**Growth Target**
10 students	28–40 points	65 points or higher
29 students	41–60 points	75 points or higher
22 students	61–80 points	90 points or higher OR 85 points or higher plus passing score on the NRAEF certification exam
6 students	81–89 points	95 points or higher OR 90 points or higher plus passing score on the NRAEF certification exam

Rationale for Growth Targets

These growth targets require all students to both demonstrate growth and attain a passing score on the final project. Because students are required to apply mathematics skills independently within the context of a larger plan, students will not only be required to demonstrate understanding, but know when to use and apply concepts in a real-world context. The lowest performing students all struggle with basic

mathematics skills, but with effective supports and instruction, these students should all be able to successfully apply and use the relevant mathematics concepts in their final project. The higher performing students should all be able to pass the NRAEF certification exam at the end of the course and plan to take the exam. If any of these students choose not to take the exam, they will be required to meet a slightly higher growth target on the final project to ensure that they have strong evidence of their knowledge and skills for future employment or higher education.

Instructional Strategies

Reinforcing concepts by lower performing students learning from and alongside higher performing students:

Modeling and presentations by successful students

Self, peer, and group critiques of formative and summative performances

Small-group work with mixed groups of students (high-performers and low-performers working together)

Specific instructional strategies for lower performing and higher performing students:

Small group instruction to provide extra practice and advanced challenges

Warm-up and closure questions to review skills and practice integrating skills in real-life contexts

Use of manipulatives and online practice games for reinforcing basic mathematics and fractions concepts for lower-performing students

Strategies for ensuring Common Core State Standards are met:

- Collaborate with the mathematics teachers who teach the same students to identify strengths, weaknesses, and successful strategies.
- Collaborate with the mathematics teachers to access appropriate Common Core support resources and professional development opportunities.

Sources: National Restaurant Association Education Foundation

Sample SLO: Career and Technical Education

Architecture and Engineering: First Draft

Course: Architecture and Engineering	School: [redacted]
Grade: 11th–12th	Teacher: [redacted]
Baseline and Trend Data	
The overall class average baseline score on the problem-solving rubric was 13/20. The overall class average baseline score on the writing rubric was 10/20. These students are generally average to high performing in their other classes, especially mathematics and science courses.	
Student Population	
All 32 students in the course are included.	
Interval of Instruction	
August 19–May 19 (yearlong)	
Standards and Content	
Technology Standards: 8.2.12.B.1: Design and create a product that maximizes conservation and sustainability of a scarce resource, using the design process and entrepreneurial skills throughout the design process. 8.2.12.B.2: Design and create a prototype for solving a global problem, documenting how the proposed design features affect the feasibility of the prototype through the use of engineering, drawing, and other technical methods of illustration. 8.2.12.B.3: Analyze the full costs, benefits, trade-offs, and risks related to the use of technologies in a potential career path. 8.2.12.F.3: Select and utilize resources that have been modified by digital tools (e.g., CNC equipment, CAD software) in the creation of a technological product or system. Science Standards: 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories. CCSS: ELA for Science & Technical Subjects: Grade 11-12: Standard 7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	
Assessments	
The preassessment and postassessment are two rubrics: one that assesses problem solving, based on the science and technology standards included in this SLO, and one that assesses students' writing about their problem-solving processes, based on the Common Core State Standard included. I will use the same rubrics to monitor student performance on similar design challenges throughout the course to ensure students are on-target to meet growth targets and adjust instruction as needed. These rubrics are attached to this SLO.	

Growth Targets
All students will be expected to grow at least 50 percent more than their baseline score.

Rationale for Growth Targets
I set growth targets based on trend data and individual student scores.

Instructional Strategies
I will provide students with their baseline data scores and ask them to address these standards and concepts specifically in their subsequent projects. I will also encourage students to develop individual learning plans and continue to consult individual learning needs throughout the course.

Resources: NJ World Class Standards for Technology

Sample SLO: Career and Technical Education

Architecture and Engineering: Annotated

Course: Architecture and Engineering	School: [redacted]
Grade: 11th–12th	Teacher: [redacted]

Baseline and Trend Data

The overall class average baseline score on the problem-solving rubric was 13/20. The overall class average baseline score on the writing rubric was 10/20. These students are generally average to high performing in their other classes, especially mathematics and science courses.

Student Population

All 32 students in the course are included.

Interval of Instruction

August 19–May 19 (yearlong)

Standards and Content

Technology Standards:

8.2.12.B.1: Design and create a product that maximizes conservation and sustainability of a scarce resource, using the design process and entrepreneurial skills throughout the design process.

8.2.12.B.2: Design and create a prototype for solving a global problem, documenting how the proposed design features affect the feasibility of the prototype through the use of engineering, drawing, and other technical methods of illustration.

8.2.12.B.3: Analyze the full costs, benefits, trade-offs, and risks related to the use of technologies in a potential career path.

8.2.12.F.3: Select and utilize resources that have been modified by digital tools (e.g., CNC equipment, CAD software) in the creation of a technological product or system.

Science Standards:

5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

CCSS: ELA for Science & Technical Subjects: Grade 11-12: Standard 7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Assessments

The preassessment and postassessment are two rubrics: one that assesses problem solving, based on the science and technology standards included in this SLO, and one that assesses students' writing about their problem-solving processes, based on the Common Core State Standard included. I will use the same rubrics to monitor student performance on similar design challenges throughout the course to ensure students are on-target to meet growth targets and adjust instruction as needed. These rubrics are attached to this SLO.

Growth Targets

All students will be expected to grow at least 50 percent more than their baseline score.
Rationale for Growth Targets
I set growth targets based on trend data and individual student scores.
Instructional Strategies
I will provide students with their baseline data scores and ask them to address these standards and concepts specifically in their subsequent projects. I will also encourage students to develop individual learning plans and continue to consult individual learning needs throughout the course.

Resources: NJ World Class Standards for Technology

Note: Annotations are indicated in blue textboxes and refer to the yellow highlighted information.

Sample SLO: Career and Technical Education

Architecture and Engineering: Final

Course: Architecture and Engineering	School: [redacted]
Grade: 11th–12th	Teacher: [redacted]

Baseline and Trend Data

The overall class average baseline score on the problem-solving rubric was 13/20. The overall class average baseline score on the writing rubric was 10/20. These students are generally average to high performing in their other classes, especially mathematics and science courses.

Number of Students	Problem Solving Rubric Baseline	Writing Rubric Baseline
8	6–10 points/20 points	5–8 points/20 points
19	10–13 points/20 points	8–11 points/20 points
5	14–17 points/20 points	12–14 points/20 points

Two years of trend data are used for this rubric. Because the rubric assesses performance, students do not generally earn perfect scores, but most students end the year close to mastery.

Trend Data: One Year Ago				
Number of Students	Problem-Solving Rubric Baseline		Writing Rubric Baseline	
12	6–10 points/20 points	16–18 points	5–8 points/20 points	13–15 points
17	10–13 points/20 points	17–19 points	8–11 points/20 points	13–16 points
4	14–17 points/20 points	17–19 points	12–14 points/20 points	14–17 points

Trend Data: Two Years Ago				
Number of Students	Problem-Solving Rubric Baseline	Problem-Solving Rubric Final	Writing Rubric Baseline	Writing Rubric Final
7	6–10 points/20 points	15–17 points	5–8 points/20 points	12–14 points
16	10–13 points/20 points	17–18 points	8–11 points/20 points	13–16 points
6	14–17 points/20 points	18–19 points	12–14 points/20 points	15–17 points

Student Population

This course is a yearlong block period course in which students earn credit for three courses: two CTE course credits and one science course credit. All 32 students in the course are included.

Interval of Instruction

August 19–May 19 (yearlong)

Standards and Content
Technology Standards:
8.2.12.B.1: Design and create a product that maximizes conservation and sustainability of a scarce resource, using the design process and entrepreneurial skills throughout the design process.
8.2.12.B.2: Design and create a prototype for solving a global problem, documenting how the proposed design features affect the feasibility of the prototype through the use of engineering, drawing, and other technical methods of illustration.
8.2.12.B.3: Analyze the full costs, benefits, trade-offs, and risks related to the use of technologies in a potential career path.
8.2.12.F.3: Select and utilize resources that have been modified by digital tools (e.g., CNC equipment, CAD software) in the creation of a technological product or system.

Science Standards:
5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

CCSS: ELA for Science & Technical Subjects: Grade 11–12: Standard 7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. |
| **Assessments** |
| The preassessment and postassessment are two rubrics: one that assesses problem solving, based on the science and technology standards included in this SLO, and one that assesses students' writing about their problem-solving processes, based on the Common Core State Standard included. In the first six weeks of the course, I will assess students on two or three initial design challenges using the rubrics. I will use the same rubrics to assess student performance on two or three design challenges in the last six weeks of the course. Students are assessed on two or three initial design challenges early in the year and two or three later in the year. The pre- and postassessment data will be based on an average of the scores from the two or three design challenges. I will observe my students and assesses their problem-solving ability based on the rubric. During these observations, my department head will also observe a selection of students using the rubric to ensure general rating agreement. I will use the same rubrics to monitor student performance on similar design challenges throughout the course to ensure students are on-target to meet growth targets and adjust instruction as needed. I created these rubrics with the assistance of my department head and have used them in my class to assess student performance over the past two years. These rubrics are attached to this SLO. |

Growth Targets

Number of Students	Problem-Solving Rubric Baseline	Writing Rubric Baseline	Growth Target: Problem Solving	Growth Target: Writing
8	6–10 points/20 points	5–8 points/20 points	10 or more points higher than baseline	Eight points higher than baseline
19	10–13 points/20 points	8–11 points/20 points	Five or more points higher than baseline	Five or more points higher than baseline
5	14–17 points/20 points	12–14 points/20 points	Three or more points higher than baseline	Three or more points higher than baseline

Rationale for Growth Targets

I set growth targets based on trend data and individual student scores. These targets should all be attainable while requiring students to demonstrate significant growth. I expect all students to meet or exceed their growth targets.

Instructional Strategies

I will provide students with their baseline data scores and ask them to address these standards and concepts specifically in their subsequent projects. I will also encourage students to develop individual learning plans and continue to consult individual learning needs throughout the course.

Resources: NJ World Class Standards for Technology

Problem-Solving Rubric

	1	2	3	4	5
Design Model and Concept	Assignment criteria not satisfactorily met. The design concept is not correctly developed and not clearly connected to real-world needs. The work shows a limited understanding of design models or logics.	Some criteria for the assignment are met. The design concept is underdeveloped and is not connected clearly to real-world needs and conditions. The work shows a limited understanding of design models or logics.	Most of the criteria for the assignment are present. The design concept is based on real-world needs and conditions. The work is informed by or based on strong generative models and logic but could be improved.	All of the criteria for the assignment are present. The design concept includes some conservation and sustainability considerations and addresses real-world needs. The work is mostly based on strong generative models, use of digital tools, and logic.	All of the criteria for the assignment are present. The design concept includes relevant or innovative conservation and sustainability considerations and addresses real-world needs. The core of the work is based on strong generative models, use of digital tools, and logic.
	1	**2**	**3**	**4**	**5**
Design Techniques and Methods	Methods demonstrate limited understanding of major design techniques. The design is not cohesive and does not include quality methodology.	Methods demonstrate limited understanding of major design techniques. The design shows some aspects of quality methodology but is not cohesive.	Methods demonstrate some understanding of major design techniques. The design shows some quality methodology.	Methods demonstrate a solid understanding of design techniques. The design shows quality methodology.	Methods demonstrate a strong understanding of design techniques. The design shows innovation and high-quality methodology.
	1	**2**	**3**	**4**	**5**
Spatial, Physical, and Visual Development and Representation	Limited or faulty development and representation of model.	Product shows low-quality spatial, physical, and visual development and representation at most scales, with room for improvement.	Product shows acceptable spatial, physical, and visual development and representation at all scales, with room for improvement.	Product shows good spatial, physical, and visual development and representation at all scales.	Product shows exemplary spatial, physical, and visual development and representation at all scales.

	1	2	3	4	5
Entrepreneurial Model	The entrepreneurial plan is not based in data or designed with consideration to relationships.	Entrepreneurial plan for the design is based on some data and relationships but is incomplete.	Entrepreneurial plan for the design is based on some data and relationships and provides a complete but simple fiscal plan.	Entrepreneurial plan for the design is based on major relevant data and relationships and provides a complete but basic fiscal plan.	Entrepreneurial plan for the design is based a multitude of major relevant data and relationships and provides a complete fiscal plan.
Overall	___/20 points				

Common Core State Standards Writing Rubric

	1	2	3	4	5
Address Objective	Student writing does not address the design objective.	Student writing addresses the design objective in an incomplete manner.	Student writing minimally addresses the design objective.	Student writing addresses the design objective satisfactorily.	Student writing clearly and completely addresses the design objective.
	1	**2**	**3**	**4**	**5**
Clear Language and Structure	Student writing uses unclear language and structure that does not demonstrate understanding of the subject material.	Student writing uses language and structure that is mostly unclear and only partially demonstrates understanding of the subject material.	Student writing demonstrates understanding of the subject material using language and structure that is somewhat clear.	Student writing uses clear language and structure while demonstrating understanding of the subject material.	Student writing uses clear language and structure that is easy to read and follow while demonstrating a nuanced and complex understanding of the subject material.
	1	**2**	**3**	**4**	**5**
Use of Data and Detail	Student writing does not use data and detail.	Student writing uses data and detail inconsistently and sometimes without purpose.	Student writing uses data and detail with some purpose.	Student writing uses data and detail with purpose.	Student writing uses data and detail with purpose to provide insight, clarity, and evidence.
	1	**2**	**3**	**4**	**5**
Connection and Summary	Student writing does not include connections or summary statements.	Student writing makes some connections between ideas or evidence.	Student writing makes some connections between ideas and evidence and includes some summary statements.	Student writing makes connections between ideas and evidence and includes summary statements.	Student writing makes clear connections between ideas and evidence, and includes summary statements that organize the information.
Overall	___/20 points				

Handout 6: Student Learning Objective Writing Activity

Pretend it is fall 2014. You are a first-year teacher and need to write a student learning objective (SLO) for your high school digital arts and design class.

Information about your students:

- You instruct 44 students, divided into two sections. Eleven students are in 11th grade and 33 students are in 12th grade.

- The course is yearlong, and each class meets daily, which includes approximately two days per week of independent project work. The course is the fourth in the visual arts sequence, after introductory visual arts courses (ninth grade and 10th grade) and a multimedia applications course.

- The course aligns to the Common Career Technical Core standards for the Visual Arts Pathway.

- None of your students has been identified as gifted and talented. Students who have been identified as gifted take a separate honors course.

- Six students have individualized education programs (IEPs) or 504 plans. At the beginning of the year, you received a summary snapshot from the special educator who provides additional detail on these students:

IEP Disability Code or 504 Plan	Accommodations or Modifications	Testing Accommodations
4—Speech or Language	None	None
8—Other Health Impairment	Modified workload Graphic organizers Preferential seating	Extended time
9—Specific Learning Disability	Chunking	Extended time
504 plan—Attention deficit hyperactivity disorder (ADHD)	Preferential seating Frequent breaks	Extended time Study carrel
504 plan—ADHD	Frequent breaks Use of stress ball	Extended time Study carrel
504 plan—ADHD	Frequent breaks Chunking	Extended time Study carrel

Assessment information

Assessments available to you include the following:

- Commercial Adobe Photoshop and InDesign certifications

- Rubric for assessing student portfolio at the end of the year

- Four interim projects that require specific design skills and elements, evaluated using a rubric

You already have administered a survey to students to assess their knowledge of design programs and design principles. Seventy-four percent of students indicated that they had some experience with major design programs in the past, and 24 percent of students had already used these programs in basic or rudimentary ways to contribute to their portfolios. You have also already used the rubric to assess students' existing digital design portfolios. The rubric rates student performance between 0 and 5 in each domain, for a total possible score of 25. A passing score is 15 or higher, with proficiency being 18 or higher.

Portfolio Review Preassessment for 2014–15

Domain	Class average	Class median
Diversity of portfolio	8	9
Overall quality of portfolio	10	7
Cohesiveness of portfolio	7	5
Design principles met	11	10
Difficulty of digital design techniques used	4	4

This year is your first year teaching, and you do not have trend data available to you at this time. However, from talking to other teachers in the region you know the following information:

- Last year, on average, your students that took visual arts classes all moved from intermediate to intermediate-advanced skills.

- Students in a similar class in another district did not assess portfolios but it was reported that through in-class projects, students were able to use difficult design techniques effectively about 85 percent of the time and were able to meet all expectations for the overall quality of their work.

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