



Scientific Research & Design

PRE-TEST/POST-TEST TEKS BLUEPRINT

Pre-Test/Post-Test Development Overview

TEKS Addressed Selection Process

The Texas Essential Knowledge & Skills (TEKS) included in the course pre-test and post-test were selected for their direct relevance to the course content. This selection process was guided by the goal of assessing learners' understanding of specific topics and skills that are integral to the course. As a result, TEKS related to general employability skills or broader topics were often excluded. This focus ensures that the assessments accurately measure students' mastery of the subject matter, allowing educators to gain a clear insight into areas where students excel or may need additional support. By concentrating on content-specific TEKS, the tests provide a more precise evaluation of the students' knowledge and understanding of the core material.

Test Question Development Process

The questions created for the pre-test and post-test were designed using psychometric principles to ensure they are of high quality and fairness. This approach helps to accurately assess student understanding. These principles guide the development of questions to be reliable, valid, and free from bias, ensuring that they effectively measure the knowledge and skills the students are expected to acquire in the course.

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Knowledge & Skills Statement	Student Expectation	iCEV Lesson Title
(6) The student develops a proposal that centers around a scientific or engineering topic or problem within a specific Program of Study or area of interest. The student is expected to:	(A) establish a rationale and preliminary set of ideas for research question or questions using organizational tools, collaboration or research	Scientific Method: Introduction
(6) The student develops a proposal that centers around a scientific or engineering topic or problem within a specific Program of Study or area of interest. The student is expected to:	(B) perform a literature review and evaluate several examples related to the project	Scientific Research Strategies
(6) The student develops a proposal that centers around a scientific or engineering topic or problem within a specific Program of Study or area of interest. The student is expected to:	(D) distinguish between descriptive, comparative, or experimental research design methodologies	Experimental Design: Scientific Design
(6) The student develops a proposal that centers around a scientific or engineering topic or problem within a specific Program of Study or area of interest. The student is expected to:	(E) develop a research question or questions that is testable and measurable	Scientific Method: Introduction
(7) The student formulates hypotheses to guide experimentation and data collection independently or in a team that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(A) perform background research with respect to the selected investigative problem	Scientific Method: Introduction Scientific Research Strategies
(7) The student formulates hypotheses to guide experimentation and data collection independently or in a team that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(B) examine hypotheses generated to guide a research process by evaluating the merits and feasibility of the hypotheses	Scientific Method: Introduction
(7) The student formulates hypotheses to guide experimentation and data collection independently or in a team that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(C) identify the control, independent variable, and dependent variable within the research and justify the purpose of each.	Scientific Method: Introduction
(8) The student develops, implements, and collects data for their investigative designs that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(A) write the procedure of the experimental design including a schematic of the lab, materials, set up, ethical considerations and safety protocols;	Scientific Method: Test Design
(8) The student develops, implements, and collects data for their investigative designs that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(B) conduct the experiment with the independent and dependent variables;	Scientific Method: Test Design
(8) The student develops, implements, and collects data for their investigative designs that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(C) acquire data using appropriate equipment and technology, and	Scientific Method: Collecting Data Tools & Equipment in Scientific Research
(8) The student develops, implements, and collects data for their investigative designs that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(D) record observations as they occur within an investigation including, qualitative and quantitative observations, such as journals, photographic evidence, logs, and tables and charts	Scientific Method: Collecting Data
(9) The student organizes, and evaluates qualitative and quantitative data obtained through experimentation that centers around a scientific or engineering topic or problem with in a specific program of study or area of interest. The student is expected to:	(A) manipulate data by constructing charts, data tables, or graphs using technology to organize information collected in an experiment;	Scientific Method: Communicating Results
(9) The student organizes, and evaluates qualitative and quantitative data obtained through experimentation that centers around a scientific or engineering topic or problem with in a specific program of study or area of interest. The student is expected to:	(B) identify sources of random error and systematic error and differentiate between both types of error	Scientific Method: Analyzing Data

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(9) The student organizes, and evaluates qualitative and quantitative data obtained through experimentation that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(C) report error of a set of measured data in various formats, such as standard deviation and percent error	Scientific Method: Analyzing Data
(9) The student organizes, and evaluates qualitative and quantitative data obtained through experimentation that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(D) analyze data using statistical methods to recognize patterns, trends, and proportional relationships	Scientific Method: Analyzing Data
(10) The student knows how to synthesize valid conclusions from qualitative and quantitative data that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(A) justify conclusions that are supported by research data	Scientific Method: Drawing Conclusions
(10) The student knows how to synthesize valid conclusions from qualitative and quantitative data that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(B) consider and summarize alternative explanations for observations and results	Scientific Method: Drawing Conclusions
(10) The student knows how to synthesize valid conclusions from qualitative and quantitative data that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(C) identify limitations within the research process and provide recommendations for additional research	Scientific Method: Drawing Conclusions
(11) The student communicates conclusions clearly and concisely to an audience of professionals that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(A) develop a plan of action on how to present to a targeted audience	Scientific Method: Communicating Results
(11) The student communicates conclusions clearly and concisely to an audience of professionals that centers around a scientific or engineering topic or problem within a specific program of study or area of interest. The student is expected to:	(F) Communicate data analysis and experimental results of original findings of a research project clearly, to an audience of professionals	Scientific Method: Communicating Results