

# Developing a Continuum of Student Performance:

## A Paired Comparison Approach



### EdSteps Project Overview

EdSteps seeks to create an online resource to support the teaching and assessment of key skill areas using authentic student work. By creating a continuum of student work demonstrating competencies and abilities across all ages and content areas, EdSteps seeks to make available to the public the broadest possible spectrum of performance outcomes from early childhood to adult professional.

EdSteps is based on the simple premise that student work is powerful. Evaluation and analysis of authentic performance outcomes—work created in the classroom, at home, or in outside programs—is one of the best ways of measuring a student's progress and determining an individualized path to improvement.

The EdSteps project will create a continuum for judging student work ranging from novice to expert. A range of student work including written, graphic, audio- and video-based performance will be examined. A continuum will be developed in multiple skill and learning areas, including Writing, Global Competence, Problem Solving, Analyzing Information and Creativity.

The purpose of this document is to describe how we will create the EdSteps continuums in multiple content/skill areas.

### An Introduction to the Paired Comparison Approach

We will use a paired comparison approach to develop the EdSteps continuum. First, we will collect many thousands of pieces of actual student work in each EdSteps content/skill area, from students and teachers across the United States (and internationally). After we have collected the student work, teachers and students will be asked to evaluate pairs of student work; each piece of student work will be paired with a second piece of work. After reviewing the criteria for judging effectiveness and examples of student work illustrating the criteria, the reviewers will indicate whether the first or second piece of student work is more effective or whether the two pieces are equally effective. Finally, the results of the paired comparisons will

be statistically analyzed, to place all of the student work on a continuum from novice to expert.

Many reviewers (about 100) will compare each pair of student work and judge which piece of work is more effective. Simply put, the piece of work judged to be more effective most often is assumed to be higher on the continuum than a piece of work judged most effective less often. And, the difference in the number of times the piece of work is judged “more effective” helps determine how far apart the two pieces of student work are on the continuum.

Powerful statistical tools (Rasch Analysis) can be used create a continuum of student work from novice to expert. These tools takes into account the differences among the many pairs of student work examined and. that not all possible pairs will be reviewed.<sup>1</sup>

### Description of the Paired Comparison Methodology

As humans we often make comparisons between two “things” (e.g., stimuli, objects, student work) to decide which “thing” is preferable. It provides the basis for us to place these “things” in ordered categories and forms the basis of our more sophisticated judgments along a continuum or hierarchy. Whether comparing pairs of wines in a taste test or choosing between two different brands of cars, we are making paired comparisons.

The approach used to evaluate student work for EdSteps follows the same basic principle. Two pieces of student work can be judged to determine which one is more effective.

The paired comparison approach allows us to construct a meaningful continuum ranging from novice to expert and at the same time allows us to locate each piece of student work on that continuum. So, we will be able to determine where each piece of student work falls on the continuum and compare the qualities of work at different locations on the continuum.

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<sup>1</sup> A more complete description of the Rasch-based data analysis plan is included in the Developing the EdSteps Continuum Technical Report available from CCSSO.

With large numbers of student work samples to evaluate, judging all possible pairs quickly becomes impractical. However, with modern statistical tools, we can capture the benefits of paired comparisons without the need to examine all possible pairs. And, even though all the judges will rarely agree completely, the overall pattern of judgments yields a rank ordering of all of the student work in terms of effectiveness.

## Advantages of the Paired Comparison Approach

There are several advantages to using a paired comparison approach to create a continuum of student work.

1. Paired comparisons are made without making any assumptions, in advance, about the scale that might bias judges in their ratings.
2. Judging two pieces of student work requires a concrete, relative comparison and avoids abstract, absolute ratings.
3. Making paired comparisons relies on the most fundamental level of judgment: dichotomous comparison. This is arguably easier and more understandable to judges than making complex judgments on a labeled scale with several scale points.
4. The statistical approach (Rasch Analysis) used to analyze the paired comparisons allows the creation of a scale that is largely independent of the specific population studied, the specific student samples examined and the judges involved.
5. The creation of a continuum based on direct comparisons of student work allows actual student work to be located on the scale, providing more meaningful, concrete interpretations about the range of student performance and what constitutes novice and expert performance.

## Writing as an example

While the approach will be tailored to fit the specific needs of each of the content/skill areas, we can better understand it by examining how this will be applied to create the writing continuum. We will take the following steps to develop the scale for writing.

### Collect Writing Samples

The EdSteps project will collect samples of student writing in grades K-12 and post-secondary settings and from across the United States and internationally. Students and teachers will be able to submit writing samples through the EdSteps website as well as off-line. The EdSteps project will collect examples of student writing in a range of

content areas (e.g., Science), a range of purposes (e.g., persuasive), written for a range of audiences and at all grade levels.

### Create Pairs for Comparison

Once all the writing samples have been collected, we will select a subset of the collected writing samples reflecting the range of subject areas, purposes and grade levels. These selected writing samples will be paired together. Not all possible pairs will be created (or are needed) for rating.

### Collect Paired Judgments

Teachers, students and others will be asked to review the writing sample pairs, online, through the EdSteps website. Each judge will be asked to indicate for each pair of samples presented, which of the two samples of writing is most effective. Each judge will indicate whether the first sample presented is more effective, the second sample is more effective or if they are equally effective. About 100 judgments will be made for each pair of student writing samples.

### Analyze Paired Comparison Data /Create Continuum

The paired comparison judgments will be analyzed using a Rasch Analysis to place the student writing samples on a continuum from novice to expert. In order to provide meaning to the continuum, key points on the continuum will be identified by one or more pieces of work at that point; actual student work at each of these key points on the continuum will be used to “anchor” the scale, and educators will provide systematic judgments to establish levels of proficiency and expectations for students at various points in their academic career.