



Analyzing Student Misconceptions

Analyzing Student Responses

To fully understand what students have learned and map next steps to further that learning, data-literate educators systematically analyze student responses to identify patterns.

Key Method

Data-driven educators analyze patterns in student responses to identify misconceptions or alternative conceptions and, using those analyses, consider possible next steps for instruction.

Method Components

When analyzing work for student misconceptions, data-literate educators look for higher-level (NOT item- or task-specific) errors that can be generalized for individual students, groups of students, or the whole class. In so doing, educators do the following things:

They systematically catalogue misconceptions from item-level data, student work, and student performance.

- For example, educators implement systems (e.g., templates, data trackers, checklists, observation forms, etc.) that help them efficiently collect data on student misconceptions. These systems could include a spreadsheet-based data tracker that reports percentages of students selecting each option on every multiple-choice item on a test, or a grid with student names and a set of common errors students will likely make in a writing assignment, or a template for recording student misconceptions during a reading running record (Recording student errors while reading aloud).

Based on the catalogue of errors, they analyze captured misconceptions for trends, outliers, or other insights.

- For example, a mathematics educator might analyze a set of student work and determine that the vast majority of errors are a result of operational mistakes and that a subset of students appears to be struggling with conceptual understanding of the content.

Based on the analysis, the educator articulates plausible reasons for the misconceptions.

- For example, educators may look more closely at individual assessment items, deeply examine particular students' work, or interview students or have them think out loud. They may also reflect on the instruction and reconsider the learning experiences in light of the data.

Through this process, data-driven educators identify and plan interventions to improve student understanding.

Supporting Research

- Newman, A. 1997. "An Analysis of Sixth-grade Pupils' Errors on Written Mathematical Tasks." *Bulletin of the Victorian Institute of Educational Research* 39:31–43.
- Riccomini, Paul. 2005. "Identification and Remediation of Systematic Error Patterns in Subtraction." *Learning Disability Quarterly*, 28.3 (Summer): 233–242.

Resources

- Board of Studies: New South Wales. 2014. *Error analysis*, <http://bit.ly/1NssEmj>
- WestEd. 2015. *Reading Skills Error Analysis Worksheet*, <http://raisingthebar.wested.org/resource/reading-skills-error-analysis-sheet>

Submission Guidelines & Evaluation Criteria

To earn the micro-credential for Analyzing Student Misconceptions, you must submit an example of how you systematically catalogue misconceptions, your analysis of those mistakes, and reflections on the reasons for the misconceptions. You may also provide optional context.

Part 1. Overview questions

- (OPTIONAL) Please describe any important context that would help an external observer better appreciate the misconception analysis or particular teaching context (100-word limit).
 - Passing:** OPTIONAL: The educator provides information that will help the observer better understand the educator's context.

Part 2. Artifacts and analyses associated with error analysis

- Artifact:** Submit an example of a systematically catalogued set of misconceptions for a given assessment or task. If it is helpful to include an example of the actual assessment or task, please do so; however, it is most important to share the catalogued set of misconceptions in the actual system you use (e.g., spreadsheet, data tracker, etc.). Please redact or modify any evidence that contains full student names or other student-specific identifiers (e.g., addresses, birthdates, etc.) that could compromise a student's anonymity.
- Analysis:** Submit an analysis of the misconceptions captured in the submitted artifact. The analysis may be submitted in any format, but insights from the misconceptions should be clear.
- Articulation of reasons for misconceptions:** Submit an articulation of the reasons for the misconceptions in the form of a written reflection. Additional artifacts including, but not limited to, video of students talking aloud or being interviewed, samples of student work, or samples of instructional materials or video where students initially encountered the content may be used.

Your submission will be assessed according to the rubric below. You must earn a (3) Proficient or (4) Exemplary score in order to earn the micro-credential.

	Attempting (1)	Foundational (2)	Proficient (3)	Exemplary (4)
The educator systematically catalogues misconceptions.	The catalog of misconceptions is not systematic or it will likely be very difficult to use it efficiently to analyze the errors.	The catalog of misconceptions appears systematic, but it may be difficult to use it efficiently to analyze the errors.	The catalog of misconceptions appears systematic and will likely enable efficient analysis.	The catalog of misconceptions appears systematic and has features that allow for real-time analysis in tandem with cataloging the errors.
The educator analyzes the catalogued misconceptions.	The analysis does not highlight insights from the catalog of misconceptions, or it has serious flaws.	The analysis highlights insights from the catalog of misconceptions, but the analysis has minor flaws and/or doesn't highlight the most substantive insights.	The analysis correctly highlights substantive insights from the catalog of misconceptions.	The analysis not only correctly highlights substantive insights from the catalog of misconceptions, but also captures insights that are more nuanced, suggesting an even deeper analysis.

3. The educator articulates plausible reasons for the misconceptions.

Articulates, in written reflection, reasons for the insights highlighted in analysis, but the reasons do not seem plausible given the data and analysis.

Articulates, in written reflection, reasons for the insights highlighted in analysis, but the reasons may not seem as plausible given the data and analysis.

Articulates, in written reflection, plausible reasons for the insights highlighted in the analysis of misconceptions.

Not only articulates, in written reflection, plausible reasons for the insights highlighted in the analysis of misconceptions, but also leverages additional artifacts (e.g., video, student work, etc.) to strengthen the plausibility of the reasons