Quiz Question Analysis

Understanding how students perform on individual quiz questions can help you identify confusing questions, ineffective distractors, instructional gaps, and opportunities to improve future assessments.

> **Why use item analysis?**
>
> After a quiz has been taken by students, item analysis can help you:
>
> - Identify questions that were unexpectedly difficult or easy.
> - Determine whether answer choices (distractors) are functioning as intended.
> - Find questions that may be ambiguous or misleading.
> - Evaluate whether quiz items align with course outcomes and learning objectives.
> - Improve future versions of quizzes and exams.

Analysis Reports in Canvas

Both Classic Quizzes and New Quizzes provide tools that help instructors evaluate assessment quality and student performance after a quiz has been administered. These reports can identify questions that were too easy or difficult, detect ineffective distractors, and reveal areas where students may need additional instruction.

Reports Available in Classic Quizzes

Classic Quizzes provides two primary analysis tools:

- Student Analysis Report
  - The Student Analysis Report exports detailed student response data to a CSV file. The report includes student answers, scores, and response patterns across the assessment.
- Item Analysis Report
  - The Item Analysis report evaluates the effectiveness of quiz questions and provides statistics such as:
    - Difficulty Index

    - Point Biserial Correlation
    - Discrimination Index
    - Reliability (Cronbach's Alpha)

Reports Available in New Quizzes

New Quizzes expands reporting capabilities and provides three analysis reports.

- Quiz & Item Analysis
    - Provides both assessment-level and question-level statistics, including:
        - High, low, mean, and median scores
        - Standard deviation
        - Mean completion time
        - Cronbach's Alpha
        - Item Difficulty
        - Discrimination Index
        - Corrected Item-Total Correlation
        - Answer Frequency Summaries
- Outcomes Analysis
    - Displays mastery data for outcomes aligned to quiz questions, allowing instructors to identify strengths and weaknesses related to specific learning outcomes.
- Student Analysis
    - Provides detailed information about individual student responses, time spent, submission attempts, points earned, and overall performance.

Key Differences

Feature	Classic Quizzes	New Quizzes
Student Analysis	✓	✓
Item Analysis	✓	✓
Outcomes Analysis	✗	✓
Cronbach's Alpha	✓	✓
Discrimination Statistics	✓	✓
Answer Frequency Charts	Limited	Enhanced

Outcome Mastery Reporting	✗	✓

Important Limitations and Considerations

Classic Quizzes

- Statistics are generated only for quizzes with 100 or fewer unique questions or up to 1,000 quiz attempts.
- Item Analysis only supports Multiple Choice and True/False questions.
- For quizzes with multiple attempts, calculations use only the student's first attempt.
- Question groups and randomized question banks may produce multiple rows in Item Analysis reports.
- Editing a quiz after student submissions may affect reported statistics.

New Quizzes

- Reports require at least three quiz submissions before they can be generated.
- Outcomes linked through Item Banks do not appear in Outcomes Analysis unless the outcome has also been added to the course.
- Editing a quiz after students have submitted attempts can affect outcome reporting results.

Understanding Common Metrics

Before reviewing your reports, it is helpful to understand several common measures used in quiz analysis.

Difficulty Index
Also known as a p-value, this represents the percentage of students who answered a question correctly.

Values range between 0 and 1.

- Higher values indicate easier questions.
- Lower values indicate more difficult questions.
- Extremely high or low values may suggest that a question should be reviewed.

Canvas makes this calculation with a point-biserial correlation.

Point Biserial

A point biserial is a correlation coefficient that relates observed item responses and is especially used when one set of data is dichotomous, meaning it can take multiple values based on correct and incorrect responses. In addition to the point biserial of the correct answer, the same calculation is created for the distractors/incorrect answers (also known as a distractor efficiency). Ideally, all incorrect answers to the question should be equally appealing to students who miss it. Scores for this range from -1 to 1.

Discrimination Index

Quiz statistics for True/False and Multiple Choice quiz questions include an item discrimination index, which attempts to look at a spread of scores and reflect differences in student achievement. This metric provides a measure of how well a single question can tell the difference (or discriminate) between students who do well on an exam and those who do not. It divides students into three groups based on their score on the whole quiz and displays those groups based on who answered the question correctly. Student groups are generally divided into the top 27%, the middle 46%, and the bottom 27%. Ideally, students who did well on the exam should get the question right.

Generally:

- **0.25 or higher:** Good discrimination
- **0.24 or lower:** May warrant review

An ideal discrimination index shows students who scored higher on the quiz getting the quiz question right, students who scored lower on the quiz getting the quiz question wrong, and students in the middle range on either side. A discrimination index of zero shows all students getting the quiz question right or wrong.

Questions with poor discrimination may be unclear, miskeyed, or assessing something different from the rest of the quiz. This is especially true if students do well on the overall exam but not on questions with poor discrimination indices.

Reliability (Cronbach's Alpha)

Reliability estimates how consistently the quiz measures student learning. This is a measure of the test's internal consistency, meaning that if several questions are designed to measure the same information, the test-taker will answer them in a similar way. For example, if a test is given to measure the enjoyment of ice cream, students who like ice cream should agree with statements such as "I like ice cream" and "I've enjoyed eating ice cream in the past". Those students should also disagree with statements such as "I hate ice cream".

Higher reliability values generally indicate that the assessment is measuring a common set of concepts or skills. Canvas calculates this value using Cronbach's Alpha when sufficient data are available.

View Instructure Guide: Classic Quizzes Quiz Item Analysis

Accessing the Quiz Statistics

In Course Navigation, click the **Quizzes** link.

Open Quizzes

Classic Quizzes

For Classic Quizzes

Click the title of the quiz you want to open.

Open Quiz

Open Quiz Statistics

Click the **Quiz Statistics** link.

Open Quiz Statistics

Note: Quiz Statistics will not be available until at least one student has completed the quiz.

View Statistics

View Statistics

By default, the quiz summary shows statistics for all sections, including the quiz average score, high score, low score, standard deviation (how far the values are spread across the entire score range), and average time of quiz completion [1].

To view quiz statistics for a section, click the **Section Filter** drop-down menu [2]. To access additional survey results, generate a Student/Item Analysis report [3].

In the summary graph, the x-axis indicates the quiz score percentages [4], and the y-axis indicates the number of students who received each percentage [5].

If a student had multiple assignment attempts, you can view past attempts in SpeedGrader. Quiz stats will only display the kept score for the student (highest score or latest score). To

view the score setting for multiple attempts, edit your quiz and view the multiple attempts settings option. If necessary, you can give your students an extra attempt.

View Analysis Reports

View Analysis Reports
Download CSV files to view Student Analysis or Item Analysis for each quiz question to count all student attempts in the statistics. For more detailed information about item analysis limitations and calculations, please refer to the Quiz Item Analysis resource document.

When you generate an analysis report, Canvas shows the last time the report was generated. If there is an error with the report, you can retry the option or cancel the analysis completely.

The Student Analysis report includes a tabular representation of each student's answers and the grade awarded for each answer.

Notes:

- By default, the submitted time in the Student Analysis report is shown in UTC, not your set time zone.
- The Item Analysis report only displays statistics for Multiple Choice and True/False questions.
- If you have permission to read SIS data in the course, the sis_id column is included in the CSV download.

View Question Breakdown

View Question Breakdown
Each quiz question shows the total percentage of students who answered it correctly [1].

Each question includes a breakdown of each answer choice. Correct answer response(s) are shown in a green bar with a check mark [2]; incorrect responses are shown in a black bar [3]. Question types that do not have set answer choices, such as Fill-in-the-Blank questions, display entries other than the correct answer in a black striped bar [4]. The horizontal bars are scaled according to the answer response percentage [5].

Each response also displays the number of respondents who selected the answer [6]. To view the names of the students who selected an answer choice, click the **[xrespondents]** link.

View Manually Graded Questions

View Manually Graded Questions
Quiz statistics also show relative grade performance for manually graded essay and file upload quiz question types. Manually graded question types are shown in the same table format as other quiz types.

A manually graded quiz type is marked as correct if it contains a student score greater than or equal to the question points possible.

Grade breakdown responses are shown as the top 27% [1], middle 46% [2], and bottom 27% [3]. The statistics also show submissions that have not yet been graded [4]. However, if all scores are identical, a response category may show more than the percentage number of students (e.g., all students score 100%).

Manually graded questions also include access to SpeedGrader for quick reference [5].

View Discrimination Index

View Discrimination Index
True/False and Multiple Choice quiz questions include an item discrimination index, which provides a measure of how well a single question can tell the difference between students who do well on an exam and those who do not.

It divides students into three groups based on their score on the whole quiz: the top 27%, the middle 46%, and the bottom 27%. The number of correct answers from the bottom group is subtracted from the number of correct answers in the top group, then the total is divided by the size of the group.

Lower discrimination scores are scored +0.24 or lower; good scores are +0.25 or higher. An ideal discrimination index shows students who scored higher on the quiz getting the quiz question right, students who scored lower on the quiz getting the quiz question wrong, and students in the middle range on either side. A discrimination index of zero shows all students getting the quiz question right or wrong.

Ideally, students who did well on the exam should get the question right. If students do well on the overall exam but not on the question, the question itself may need to be revised.

View Instructure Guide: Once I publish a quiz, what kinds of quiz statistics are available?

New Quizzes

For New Quizzes

Find the quiz you want to open [1]. Click the **Options** icon [2], and then click the **Build** link [3].

Quizzes Index page with a quiz, its Options icon, and Build link highlighted

Open Reports

Click the **Reports** tab.

Build page with the Reports tab highlighted

Open Quiz and Item Analysis

To generate the improved Quiz and Item Analysis report for the quiz, click the **Generate Report** link [1].

To open the generated report, click the **View Report** link [2].

To download the Quiz and Item Analysis report as a CSV file, click the **Export CSV** button [3].

Reports tab with the Generate Report link, View Report link, and Export CSV button highlighted

View Quiz Analysis

Quiz Analysis report with the Expand icon highlighted
The Quiz and Item Analysis report includes two sections: Quiz Analysis and Item Analysis.

The Quiz Analysis includes statistics for overall quiz scores. To view all Quiz Analysis details, click the **Expand** icon.

Quiz Analysis details with the high score, low score, mean score, median score, and other statistic
The following statistics are available:

- **High Score** [1]: displays highest percentage score
- **Low Score** [2]: displays lowest percentage score
- **Mean Score** [3]: displays average percentage score
- **Median Score** [4]: displays median percentage score
- **Mean Elapsed Time** [5]: displays average time to complete the quiz
- **Standard Deviation** [6]: represents the amount of variation from the mean score in percentage
- **Cronbach's Alpha** [7]: is an internal consistency measure that estimates the reliability of a quiz
- **Score Distribution Chart** [8]: represents the distribution of earned scores for the quiz

For more information, visit the New Quizzes Quiz and Item Analysis.

View Item Analysis

Item Analysis report with the Expand icon highlighted

The Item Analysis includes statistics for items in a quiz and their correlation to the overall quiz score. To view Item Analysis details, click the **Expand** icon.

Item Analysis details with the item difficulty, earned points, discrimination index, and other statist

The following statistics are available:

- **Item Difficulty** [1]: measures the proportion of students who answered the question correctly
- **Mean Earned Points** [2]: displays average point score out of the maximum possible points
- **Median Earned Points** [3]: displays mean point score out of the maximum possible points
- **Discrimination Index** [4]: assesses the ability of an item to differentiate between the highest scoring and lowest scoring students
- **Corrected Item-Total Correlation Coefficient** [5]:measures the correlation between a given item and the total score
- **Answer Frequency Summary Chart** [6]: displays the number and percentage of students who selected each answer choice

Note: The Answer Frequency Summary charts display the total number of correct responses, incorrect responses, and no responses for the following question types: Categorization, Fill in the Blank, Formula, Hot Spot, Matching, Multiple Answer, Multiple Choice, Numeric-Answer, Ordering, and True or False.

Return to Reports

Quiz and Item Analysis report with the Back to Reports link highlighted
To return to the Reports page, click the **Back to Reports** link.

Open Outcomes Analysis

Reports tab with the View Report link highlighted
To open the Outcomes Analysis, click the **View Report** link.

View Outcomes Analysis

Outcomes Analysis report with a student's mastery results, an outcome name, and the Export CSV
The Outcomes Analysis includes each student who has completed a quiz [1] and their mastery results for each outcome [2].

To view more details for an outcome, click the name of the outcome [3].

To download the CSV file of the Outcomes Analysis report, click the **Export CSV** button [4].

Note: Outcomes may take up to 48 hours to display in New Quizzes after they have been added to an account.

View Outcome Detail

Outcome Detail page with the mastery count, description, average score, and other performance s

The Outcome Detail page contains performance information for a specific outcome, including number of students who reached mastery [1], description [2], average score [3], and score required to earn mastery [4].

You can also view the number of students who score within each criteria level [5] and how mastery is calculated [6].

Open Student Analysis

Reports tab with the Generate Report link and Export CSV button highlighted
To generate a Student Analysis report, click the **Generate Report** link [1], then click the **Export CSV** button [2].

View Student Analysis Report

Student Analysis Report CSV showing the report's column headers
The report includes:

- SISID (when permission is enabled)
- SectionSISID (when permission is enabled)
- Time Elapsed
- Submission Attempts
- Item Type
- Student Response
- Points Earned
- Number of Correct
- Number of Incorrect
- No Response
- Overall Score
- Status

Note: The Student Analysis Report CSV includes data on each student's individual attempt.

View Status Item Values

Student Analysis Report showing the Status column's item state values
The Status column includes the following item state values:

- Graded: The student answered the question, either correctly or incorrectly.
- Not Graded: The question is awaiting grading (applies only to Essay or File Upload questions).
- Not Attempted: The question was not included in the students quiz.
- No Answer: The student did not answer the question, but it was part of the quiz.
- Not Supported: The question type is not supported by the Student Analysis Report.
- N.A.: An error state indicating missing important data from the modal.

View Instructure Guide: How do I view reports for a quiz in New Quizzes?

Best Practices for Quiz Improvement

Quiz analytics should be used as a starting point for investigation rather than as the sole basis for changing assessment questions.

Compare analysis results across multiple semesters before making major changes.

Review questions with low discrimination values.

- Revise unclear wording.
- Remove implausible distractors.
- Add instructional support for concepts with consistently poor performance.

Align questions more closely with learning objectives.

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