

Test Scoring And Course Evaluation Service



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INTRODUCTION

Learning and Technology Services (LTS) offers test scoring services designed to accommodate multiple-choice, objective tests as well as course evaluation questionnaires. These services are provided by the LTS without charge. The only cost the user incurs is the cost of the answer forms. Normally, the scored test and accompanying analyses are ready within twenty-four hours after answer sheets are delivered to the Help Desk counter.

The basic steps in using the scoring and evaluation services are:

1. The requestor:
 - a. Obtains the answer forms to be used by the students in answering the test or questionnaire.
 - b. Creates the test or questionnaire.
 - c. Gives the test or questionnaire using the answer forms.
 - d. Records the correct answers on the “key” answer form, if the instrument is a test.
 - e. Takes the “key” and students’ answer forms to the Help Desk Counter of Learning and Technology Services in OL1106.
 - f. Fills out the computer center’s service request form.

2. The computer center:
 - a. Scores the tests or tabulates the questionnaires, and emails the requested reports.
 - b. Calls the requestor when the requested services are completed.

3. The requestor:
 - a. Picks up the completed materials at the Help Desk counter in OL1106.
 - b. Signs the request form.

It is advisable to keep the test/evaluation answer sheets for at least a year after they have been processed. Then if there are any questions about the validity of the results, the supporting documents (the answer sheets) will be available. Please shred answer sheets when you dispose of them.

Understanding the range of the computer center’s services will help you to use them to the greatest advantage. We suggest a complete examination of this manual before initiating a questionnaire or testing program. We have included descriptions of the services as well as samples of the forms and available reports.

Inquiries regarding scheduling of the computer center’s services as well as questions and comments about the services should be directed to the Scheduling staff in the Learning and Technology Services, Help Desk (Extension 36-5711).

SECTION 1: PREPARING A TEST OR QUESTIONNAIRE

OBTAINING THE ANSWER FORMS

Central Stores stocks two types of answer forms (see the samples following page 5):

1. The general purpose answer form contains space for answering 200 questions with 5 responses each plus 40 questions with 10 possible responses each. Order Central Stores Stock #32027 OPSCAN Answer Sheet is the Green sheet. This form uses the seven digit student identification number.
2. The offset answer form contains space for 50 questions with 5 responses each. Order Central Stores Stock #6932022 Offset OPSCAN.

Either form is suitable for any multiple-choice objective test or course evaluation questionnaire. The offset form is particularly useful for short tests or course evaluations. It allows for printing of both instructions and questions directly on the answer form by the offset process available through Duplicating Services.

The red general purpose answer form is being replaced with the green form. If you are still using the red answer sheet make sure your students enter their campus id and NOT their social security number.

PLANNING THE TEST OR COURSE EVALUATION

Tests and course evaluations which are to be scored by the computer center must be written in a multiple-choice or true/false format. Each question can have only one correct response.

Unless otherwise indicated, each question is assumed to have a point value of one. However, questions may be given any integral value up to and including five. For the purpose of assigning different point values to questions, a test may be divided into two or three groups of questions. A group must consist of consecutive questions, all of which have the same point value. Groups of questions may contain any number of questions and may begin and end wherever necessary, without leaving unused questions between groups. For example, a test may consist of two groups of questions: group 1 containing questions #1-20 with each question worth one point and group 2 containing questions #21-25 with each question worth four points.

For security or other reasons, a test may be given in two versions, resulting in two sets of correct answers to the test. When this is done, each version of the test will be treated throughout most of the test scoring process as a separate test.

USING THE ANSWER FORM

A #2 pencil must be used for making the answer forms. The optical mark reading machine will misread hard pencils and all types of pens. There should be no extraneous marks on the answer forms, because such marks may cause the test to be scored incorrectly. The general purpose answer form may not be used for written answers. The offset Optical form, however, can accommodate written answers in the non-response areas.

If taking a test, each student must enter their Campus ID in the box at the upper right-hand corner of the form. The ID number is used for identification throughout the test scoring process. ID numbers are not required on forms used for course evaluations, because the responses are not tabulated individually.

If a test, the students' names should be located in the upper left area of the form. Names should be entered last name first, as indicated on the form. If the student enters his Campus ID incorrectly, the software will try to use the Students name and PeopleSoft CampS course enrollment to locate the correct Campus ID. If the Campus ID can't be found, a substitute id of -----# a temporary ID will be substituted.

It is recommended the instructor reminds students to use a #2 pencil, erase all extra marks, and enter Campus ID correctly. The students should have entered the instructor, department, course, section, and date in the top boxes of the form to assure that the answer sheets for each section are kept together throughout the test scoring process.

If two versions of a test are given, then the answer sheets should be separated into two groups.

MAKING THE KEY

Before submitting a test for scoring, a "key" answer sheet must be made. If the test has two versions, i.e., two sets of answers, then two keys must be made. Each key answer sheet should be placed on top of the set of answer sheets which correspond to that key. (Evaluations and questionnaires do not require a key sheet since they have no "correct" answers.) To make a key:

1. Write your name, department, course, section, and test date in the indicated boxes.
2. Enter "KKEY" in positions 1-5 of the "LAST NAME" area.
3. Mark the correct answers on the answer form.

SECTION 2: REQUESTING THE SERVICES

DELIVERING THE ANSWER SHEETS TO THE COMPUTER CENTER

The Help Desk counter area of Learning and Technology Services is open from 7:30 a.m. to 10:00 p.m., Monday through Thursday. Friday hours are 7:30 a.m. to 5:00 p.m. You may deliver the completed answer forms to the Help Desk counter at your convenience during these hours.

COMPLETING A SERVICE REQUEST FORM

To request test or questionnaire services, one of the following forms must be completed and given to Scheduling with the answer sheets:

1. The “Test Scoring Services Request” form should be used to request test scoring services. (See the sample following page 11.)
2. The “Evaluation/Questionnaire Service” half-sheet form should be used to request evaluation or questionnaire services. (See Sample 4.)

In order to avoid delays due to misunderstood or incorrect information, it is important that the request form completely identifies the services you desire. If you have any questions concerning the request form, please ask the person at the Help Desk counter for clarification. The next section details the directions for completing the service request forms. (Section 3 of this manual describes the reports which may be requested.)

DIRECTIONS FOR THE TEST SCORING REQUEST FORM

The entries on the form should be filled out as follows. See Sample 3 shows the form. You can pick up this form at the LTS Help Desk or print your own at <http://www.uwec.edu/LTS/services/software/testScore.htm>.

I. STANDARD SCORING SERVICE:

1. NAME: The instructors name.
2. PHONE: The instructors phone number.
3. EMAIL NAME: Instructors email name.
4. COURSE(S): List Subject, Course number, and Class Section(s). If combining sections, you must list each course separately. Each course must use the same key and be taught by the same instructor.

5. TERM: Term the test was taken in.
6. TOTAL QUESTIONS: The number of responses which are marked on the key sheet. If a question does not have a response marked on the key sheet, then do not count that question in this total.
7. IF MULTIPLE SECTIONS CHECK ONE BELOW: Complete this section if there are multiple class sections being scored and the answer sheets are separate. Reports can be provided either: Separate (each class analyzed separate, Combined (all sections analyzed together as one test) or Separate and Combined.
8. REPORT (s): Check ALL reports wanted – reports explained in detail later in this document. With every request you will also receive a .CSV file of test results. For instructions on how to import scores: <http://www.uwec.edu/LTS/services/software/d2l-faculty/exportimportgrades.htm>. For D2L assistance, please contact Tiffany Lewis at lewistg@uwec.edu or call (715) 836-2700 .
9. POINT VALUE PER QUESTION (1, 2, 3, 4, or 5), IF ALL QUESTIONS EQUAL: If all questions on the test are to be given the same point value, enter that value in this space. (If not, see GROUP entry below.)
10. ADJUSTED SCORE: Use this entry only if you want to assign a maximum test score.
11. GROUPING POINT VALUES: Use this if you want to assign a score which is calculated based on your point value entries. You cannot have a number with decimals.
Example: group1=(20 questions with points = 1) group2=(30 questions with points = 2)

A test with 20 questions scored at 1 point each and 30 questions scored at 2 points each would have a maximum score of 80 points. A student whose test score is 60 points has a percent score of 75%.

If that same test were assigned an “adjusted score” of 120 points, the student who had 60 point (75%) in the previous paragraph would be given a score of 90 points while retaining the same percent score (75%).

Test Scoring Request Form

Instructor		Subject	Course #	Section	Year Term Code
Name:					
Email:		Phone:			If multiple sections, select one below
Special Instructions					<input type="checkbox"/> Separate Reports
					<input type="checkbox"/> Combined Reports
					<input type="checkbox"/> Combined & Separate
Select ALL Report(s) Wanted		Report Information			
<p>Report 1 - Standard Test Scores</p> <input type="checkbox"/> Name order <input type="checkbox"/> Campus ID order <input type="checkbox"/> Score order		<p>Separate Reports: Each section must be physically separated with a paper clip, binder clip, rubber band, etc. and you MUST include all section numbers.</p> <p>Combined Reports: If running ONLY this report, you do not to physically separate the sections, but you MUST include all section numbers.</p> <p>Combined & Separate Reports: Each section must be physically separated with a paper clip, binder clip, rubber band, etc. and you MUST include all section numbers.</p>			
<p>Report 2 - Student Answers</p> <input type="checkbox"/> Name order <input type="checkbox"/> Campus ID order		<p>Report 1 is the report most instructors will request. It contains the students' test scores by points, percentage, and standard score (standard score expresses a score's distance above or below the mean of the group).</p>			
<p>Report 3 - Frequency and Percentages</p> <input type="checkbox"/> Question order only		<p>Report 2 is a bird's eye view of how each student answered the test questions. An "E" is added when the answer is wrong.</p>			
<p>Report 4-Item Analysis</p> <input type="checkbox"/> Graphic Format <input type="checkbox"/> Numeric Format		<p>Report 3 is used to analyze each test question for quality. The frequency, percentage of each question is listed. Use this to find poor questions or verify main ideas were understood.</p>			
<p>Report 5 - Score Distribution</p> <input type="checkbox"/> Question order only		<p>Report 4 is used to analyze test question by difficulty and discrimination. This report shows the percent of responses for the upper group of students ("+27%" column) and the lower group of students ("-27%" column).</p> <p>Report 5 shows distribution of scores, includes the frequency of each score with percentile rank and corresponding standard score. Composite statistics are also given including mean, standard deviation, and Kuder-Richardson Reliability.</p>			
IMPORTANT SCORING INFORMATION					
Enter # of Questions		The correct Number of Questions is essential. Do NOT leave blank.			
Enter Point Value Per Question		Point Value to be assigned to each question. If left blank the point value defaults to 1. Only 1 through 5 valid.			
Enter (1,2,3,4, or 5) :					
Adjusted Score:		Adjusted Score is used if you want to assign a maximum test score different from the score which is calculated based on your point value entries.			
Group Number of Questions	Group1	Group2	Group3	Number of questions in GROUP is used when questions on the test do NOT have an equal point value. Enter the number of questions in each group and assign points below group. If a test has 40 questions, you might have 20 in (group1) and 20 in (group2) for a total of 40 questions.	
Group Point Value (1, 2, 3, 4, or 5)				Point Value to be assigned to each group of questions listed above. So, if Group1 had 20 questions you could assign a point value of 1 and group2 had 20 questions you could assign a point value of 2. Only 1, 2, 3, 4, or 5 valid.	
For Office Use Only		<p>Date Received:</p> <p>Signature:</p> <p>Print Name:</p>			

DIRECTIONS FOR THE COURSE EVALUATION REQUEST FORM

Use the “Course Evaluation Request” form to request an evaluation. Sample 4 shows this half-sheet form. You can pick up this form at the LTS Help Desk or print your own at <http://www.uwec.edu/LTS/services/software/testScore.htm>. If this is not an evaluation for a course, please leave the course information empty and list the person being evaluated in the box labeled instructor information. Evaluation without a course are retained in the CampS database.

The following entries on the Course Evaluation form are needed:

- 1) NAME: The name of the ADA or department head who should receive the evaluation.
- 2) EMAIL NAME: The email of the ADA or department head who should receive reports.
- 3) PHONE: The phone of the ADA or department head if questions.
- 4) INSTRUCTOR INFORMATION (NAME): The name of the instructor being evaluated.
- 5) INSTRUCTOR INFORMATION (EMAIL): The email name of the instructor being evaluated.
- 6) COURSE(S): List Subject, Course number, and Class Section(s). If combining sections, you must list each course separately. If combining more than one course section, each evaluation should have been given using the same standard questions and key.

NO COURSE – When not evaluating an Instructor, leave the course section blank and be sure to put the evaluation identifier in the “Instructor Information” area.
- 7) TERM: Term the Course Evaluation was given.
- 8) TOTAL QUESTIONS: The number of responses on the evaluation(s). *If a question does not have a response marked on the key sheet, then do not count that question in this total.
- 9) COMBINING SECTIONS: If combining sections, select the type of report you would like. Either separate reports for each class, combining reports for all classes, or select both if you would like both separate and combined reports.

Type of EVALUATION (check only 1 per request):

- 10) Evaluation for Single Course: Scans a SINGLE evaluation, loads data into the CampS database and emails a report and .txt file. The .txt file can be ignored or imported into other software products such as Qualtrics or Excel for further analysis of data.

11) Evaluation for Combined Courses: Scans multiple course sections, loads evaluation data into the CampS Database and emails reports (combined and/or separate reports) and .txt file. The .txt file can be ignored or imported into other software products such as Qualtrics or Excel for further analysis of data. ****IMPORTANT** – all combined data must use standard evaluation questions and keys.

12) Load/Scan ONLY: **This option is not going to be for everyone.** This option is used when all you want is the raw evaluation data. You might do this if you do your reporting and analysis using another software product like Qualtrics. This option allows you to forgo all the small individual reports and .txt files because you just want one large txt file with all your data. The txt file is created using the “previously reported or loaded” options (see step 12 below). ****IMPORTANT** – combine evaluations must use standard questions and keys.

13) New - Produce evaluation from previously loaded/reported evaluation(s)The reports listed here ONLY apply to course evaluations you have already had scanned. You can also, reprint an old evaluation. Options are: single, combine sections, instructor, subject, or college. For example, an instructor could ask to see an evaluation containing all his courses for an entire semester or the MATH department could request an evaluation for all MATH courses that have the subject “MATH” for an entire semester. ****IMPORTANT** – combined evaluations must use standard questions and keys.

		<h2>Course Evaluation Request</h2>			LTS Help Desk 715-836-5711 helpdesk@uwec.edu	
Report Emailed To		Subject	Course Nbr	Section		
Name:	Email:				Term:	
	Phone:				# Questions:	
Instructor Information					If combining by sections, check reports wanted:	
Name:	Email:				<input type="checkbox"/> Separate Reports <input type="checkbox"/> Combined Reports	
Type of Evaluation (check only 1)						
<p>(ALL COMBINED evaluations must have been given using the same questions and key)</p> <input type="checkbox"/> Evaluation for a Single Course as listed above (evaluations attached). <input type="checkbox"/> Evaluation for Combined Course Sections as listed above (evaluations attached). <input type="checkbox"/> Scan/Load - NO REPORT. Combining EVALs so I can Import one (txt) file into other software (evaluation attached). Produce an evaluation from PREVIOUSLY REPORTED OR LOADED evaluation <input type="checkbox"/> Single or Combined using courses listed above. <input type="checkbox"/> Combine by Instructor using instructors name listed above. <input type="checkbox"/> Combine By Subject and Term _____ Example "Acct" <input type="checkbox"/> Combine By College and Term _____ Example "Business"						
For Office Use Only				Date Received: _____ Signature: _____ Print Name: _____		

Sample 4

PERFORMING THE REQUESTED SERVICES

An optical mark reading machine scans the marks on the test or questionnaire answer sheets and the resulting information is used to produce the reports described in Section 3. Help Desk counter will call you when your request is completed.

RECEIVING THE RESULTS OF THE REQUEST

You will get your test result via emailed as soon as they are scanned; typically within 24 hours. Generally you can pick up your test materials 2 or 3 hours after you get the email. The Help Desk will only call after your test material has been at the Help Desk for more than a week.

When you pick up your materials, you will be asked to sign the request form as an indication that your request has been completed satisfactorily.

It is advisable to keep the answer sheets for at least a year after they have been processed. This will make it possible to answer any questions about the test/evaluation.

The Help Desk counter is open anytime between 7:30 a.m. and 10:00 p.m., Monday through Thursday, or 7:30 a.m. to 5:00 p.m. on Friday.

SECTION 3: REPORTS AND OUTPUT

TEST SCORING - D2L IMPORT FILE

This file is a tab delimited .csv file of test results which comes with every request. Use this file to import your test scores into D2L. Instructions are located at <http://www.uwec.edu/LTS/services/software/d2l-faculty/exportimportgrades.htm>. Contact Tiffany Lewis at lewistg@uwec.edu or (715) 836-2700 for D2L assistance.

TEST SCORING - REPORT 1 – STUDENT SCORES

Student Scores prints the student scores, percentage score, and standard score (see report 5 for explanation of standard score). An Adjusted Column will appear on the right if the adjusted score option was used. This report can be requested in student name, score, or Campus ID order.

UW-Eau Claire Test Scoring and Reporting Spr 2014 Apr 09, 2014 1:40 PM

Student Scores Sorted by Name (report 1) Acct 420 081
Number of Questions: 7 Max Score: 28

Campus ID	Name		Score	Percent	Standard
9999282	Pam Olson		20	71.43%	54.88
9999381	Tom Tans	D	24	85.71%	59.96
9999852	Tucker Hibbard	L	16	57.14%	49.80
9999309	Wendy Erica	L	20	71.43%	54.88
9999521	Wise Mat	T	16	57.14%	49.80
9999282	Tanner Rob		20	71.43%	54.88
9999381	Soft Smith	D	24	85.71%	59.96
9999852	Trish Ashley	L	16	57.14%	49.80
9999309	Long Erica	L	20	71.43%	54.88
9999521	James Theo	T	16	57.14%	49.80

Number of Students 10

TEST SCORING - REPORT 2 – STUDENT’S ANSWERS

This report shows each answer given on the test. An answer will be followed by an “E” if it is incorrect, “O” if the instructor omitted the question or a blank if it is answered correctly. The response position will be blank if the student did not mark a response and will be “?” if the student marked multiple responses. This report can be request by name or campus id order (see Sample 6).

UW-Eau Claire Test Scoring and Reporting Spr 2014 Apr 09, 2014 1:40 PM

Student Answers Sorted by Name (report 2) Combined

Number of Questions: 7 Max Score: 28

AGUABCDE ID: -----3 AGUILARM Score: 20
1:A 2:A 3:D 4:EE 5:A 6:B 7:EE

ARKABCDE ID: -----5 ARKOLAJR Score: 16
1:EE 2:A 3:AE 4:BE 5:A 6:B 7:B

ADBCDEFG ID: 4257690 Adams Eric W Score: 28
1:A 2:A 3:D 4:C 5:A 6:B 7:B

BEGLABCD ID: -----6 BEGLEYMJ Score: 28
1:A 2:A 3:D 4:C 5:A 6:B 7:B

TEST SCORING - REPORT 3 – ITEM ANALYSIS

This report is divided into 2 sections. The first section shows the number of students who gave each of the possible responses to each question by frequency and the second half shows the number of responses by percent. The possible responses are A-E for questions 1 through 200, and A-J for questions 201 through 240. The “NON” column indicates the number of students who responded erroneously such as marking two responses to one question. The “Err” column shows when more than 1 response was given (see Sample 7).

UW-Eau Claire Test Scoring and Reporting

Spr 2014

Mar 07, 2014 1:31 PM

Item Frequency and Percent (report 3)

CJ 322 001

Number of Questions: 25 Max Score: 75

-----Frequency-----								
No.	A	B	C	D	E	Non	Err	Key
1	1	0	23	8	0	0	0	C
2	29	0	0	3	0	0	0	A
3	1	0	31	0	0	0	0	C
4	0	32	0	0	0	0	0	B
5	2	2	27	1	0	0	0	C
6	4	18	8	2	0	0	0	B
7	0	0	32	0	0	0	0	C
8	7	25	0	0	0	0	0	B
9	0	0	32	0	0	0	0	C
10	6	1	25	0	0	0	0	C
11	11	5	14	2	0	0	0	C
12	10	20	1	1	0	0	0	B
13	0	0	15	17	0	0	0	D
14	3	2	27	0	0	0	0	C
15	1	0	26	5	0	0	0	C
16	7	6	6	13	0	0	0	A
17	18	1	2	10	0	1	0	A
18	2	1	29	0	0	0	0	C
19	0	0	31	1	0	0	0	C
20	7	11	2	12	0	0	0	E
21	6	22	4	0	0	0	0	B
22	1	31	0	0	0	0	0	B
23	29	3	0	0	0	0	0	A
24	26	6	0	0	0	0	0	A
25	26	6	0	0	0	0	0	A

No.	-----Percent-----							Key
	A	B	C	D	E	Non	Err	
1	3	0	72	25	0	0	0	C
2	91	0	0	9	0	0	0	A
3	3	0	97	0	0	0	0	C
4	0	100	0	0	0	0	0	B
5	6	6	84	3	0	0	0	C
6	13	56	25	6	0	0	0	B
7	0	0	100	0	0	0	0	C
8	22	78	0	0	0	0	0	B
9	0	0	100	0	0	0	0	C
10	19	3	78	0	0	0	0	C
11	34	16	44	6	0	0	0	C
12	31	63	3	3	0	0	0	B
13	0	0	47	53	0	0	0	D
14	9	6	84	0	0	0	0	C
15	3	0	81	16	0	0	0	C
16	22	19	19	41	0	0	0	A
17	56	3	6	31	0	3	0	A
18	6	3	91	0	0	0	0	C
19	0	0	97	3	0	0	0	C
20	22	34	6	38	0	0	0	E
21	19	69	13	0	0	0	0	B
22	3	97	0	0	0	0	0	B
23	91	9	0	0	0	0	0	A
24	81	19	0	0	0	0	0	A
25	81	19	0	0	0	0	0	A

Number of Students 32

Sample 7

TEST SCORING - REPORT 4 – ITEM ANALYSIS – STATISTICS

This report is designed to compare the responses of the top 27 percent of the students with the responses of the lower 27 percent. REPORT 4 provides the following information and can be printed in numeric or graph formats (refer to Sample 8):

No.: This is the question number.

KEY: This shows which response is the correct one.

PERCENTAGE RESPONSE: This section of the report shows that percent of the upper group of students (“+27%” column) and the percent of the lower group of students (“-27%” column) who gave each possible response. The possible responses are A through E (A through J for question 201 through 240), OMITTED, and ERROR.

DIFF: This difficulty index indicates the proportion of all students who responded correctly to the question. A difficulty index of 65, for example, indicates that 65 percent of the students answered the question correctly. The higher the difficulty index, the easier the question.

A test covering related subject matter should contain questions with a fairly wide range of difficulty values. However, questions with indexes at or below the chance level (25 or lower for a question with four alternatives; 20 or lower for a question with five alternatives) are undesirable. Equally undesirable are extremely easy questions with difficulties approaching 100, as they merely add a constant to the scores.

Test reliability and validity will be maximized if the difficulty index for most of the questions is above the midpoint between chance level and 100. A test consisting of questions with five alternatives should contain many questions with difficulties in the 60 to 85 range and the remaining should be scattered between 25 and 100. Tests consisting of questions with two alternatives (true-false) should have difficulties between 50 and 100 with concentration in the 75 to 90 range.

DISC: This index of discrimination is the difference between the percent of high achieving students (top 27 percent) who answered the question correctly and the percent of low achieving students (lower 27 percent) who answered the question correctly. A negative entry in the DISC column indicated a higher percent of the lower group answered the question correctly. Generally, the higher a positive discrimination, the more reliable the test question. (See page 23 for further explanation.)

MAX DISC: This gives the maximum possible discrimination for a question. (See page 23 for further explanation.)

DISC EFF: Discriminating efficiency is the discrimination divided by the maximum discrimination.

MEAN ITEM DIFFICULTY: This appears at the end of the report and is the mean of the entries in the DIFF column.

MEAN ITEM DISCRIMINATION: This appears at the end of the report and is the mean of the entries in the DISC column.

A useful rule of thumb for interpreting the index of discrimination (DISC) is to compare it with the maximum possible discrimination for a question. The maximum possible discrimination is a function of question difficulty. When half, or less, of the combined upper and lower groups answered the question correctly, the maximum possible discrimination is the sum of the percentages of the upper and lower groups who answered the question correctly.

Example:

If 30 percent of the upper group and 10 percent of the lower group answered the question correctly, the maximum possible discrimination is 40 (30 plus 10). This maximum possible discrimination would occur when 40 percent of the upper group and none of the lower group answered the question correctly. Note that the actual discrimination of the example is 20. In this example, the discriminating efficiency (DISC EFF) of the question, which is the ratio of the actual discrimination to the maximum possible discrimination, is 50 percent. (See the "Question A" column in TABLE 1.)

When more than half of the combined upper and lower groups answer a question correctly, the maximum possible discrimination is the sum of the percentages of the upper and lower groups who answered the question incorrectly.

Example:

If 96 percent of the upper group and 84 percent of the lower group answered the question correctly, the maximum possible discrimination is 4 (100 minus 96) + 16 (100 minus 84) or 20. Since the index of discrimination for the question is 96 minus 84 (or equivalently, 16 minus 4) or 12, the discriminating efficiency of the question is 12/20 or 60 percent. (See the "Question B" column in TABLE 1.)

It is important to recognize that a question which half of the students answer correctly has the highest possible discriminating potential. Consider a question which 80 percent of the upper group and 20 percent of the lower group answer correctly. According to the rule of thumb for questions answered by half or less of the students, the maximum discriminating ability of the question is 60 and the discriminating efficiency is 60 percent. (See the "Question C" column in TABLE 1.) As the difficulty of a question varies so that more than half or less than half of the combined upper and lower groups answer the question correctly, the maximum discriminating ability will decrease from 100. The lower limit of the maximum discriminating ability is zero when all or none of the combined upper and lower groups answer a question correctly.

TABLE 1

	<u>Question A</u>	<u>Question B</u>	<u>Question C</u>
Percent Correct, Upper Group	30%	95%	80%
Percent Correct, Lower Group	10%	84%	20%
Index of Difficulty	20	90	50
Index of Discrimination	20	12	60
Maximum Discrimination	40	20	100
Discriminating Efficiency	50%	60%	60%

The techniques discussed above enable one to determine the upper limit of the index of discrimination. In the most practical situations determining a lower limit for the index of discrimination is not a problem, since the most discriminating questions are selected from the available question pool. The practical rule is that the higher the discrimination the better. One of the following techniques may be used to determine a lower limit below which the index of discrimination is not significantly different from zero:

1. The most tedious method would be to determine the statistical significance of the difference between two proportions which is the difference between the proportion of the upper group who answered the question correctly and the proportion of the lower group who answered the question correctly.
2. A second method would be to use a specially prepared table such as the one in Appendix A of Julian Stanley's *Measurement in Today's Schools* (fourth edition), Prentice Hall, 1964. (This book is available in the UWEC Library.) Table A-5 (pages 353-355) indicates the level at which a question can be considered sufficiently discriminating in terms of numbers of persons. The number of persons must be converted to a proportion before relating it to the index of discrimination given in REPORT 4. Use of this table is convenient and gives values appropriate for 2, 3, 4, or 5-response questions.
3. A third method of determining the statistical significance of the index of discrimination would be to compute its standard error. This might be accomplished by doing an item analysis on two samples of a large group. The reliability of the index of discrimination may be determined by correlating the pairs of values from the two item analyses. The rule may then be applied that the index of discrimination must be more than twice as large as the standard error in order for the index to be statistically different from zero at the two and a half percent level of significance.

Note that for small class sizes, say less than 50, there are only 27 percent, (13.5 cases) in the extreme groups, and these procedures are almost meaningless.

Item Analysis (report 4) Numeric MATH 322 001
 Number of Questions: 25 Max Score: 75

No.	y	Percentage Response															Dif	Dis	Dis	Eff
		K	A	B	C	D	E	Omitted	Error											
1	C	0	11	0	0	78	67	22	22	0	0	0	0	0	0	72	11	56	20	
2	A	100	78	0	0	0	0	0	22	0	0	0	0	0	0	91	22	22	100	
3	C	0	11	0	0	100	89	0	0	0	0	0	0	0	0	97	11	11	100	
4	B	0	0	100	100	0	0	0	0	0	0	0	0	0	0	100	0	0	und	
5	C	0	11	0	22	100	56	0	11	0	0	0	0	0	0	84	44	44	100	
6	B	0	33	78	22	22	33	0	11	0	0	0	0	0	0	56	56	100	56	
7	C	0	0	0	0	100	100	0	0	0	0	0	0	0	0	100	0	0	und	
8	B	22	33	78	67	0	0	0	0	0	0	0	0	0	0	78	11	56	20	
9	C	0	0	0	0	100	100	0	0	0	0	0	0	0	0	100	0	0	und	
10	C	0	11	0	11	100	78	0	0	0	0	0	0	0	0	78	22	22	100	
11	C	22	33	0	44	67	11	11	11	0	0	0	0	0	0	44	56	78	71	
12	B	0	44	100	56	0	0	0	0	0	0	0	0	0	0	63	44	44	100	
13	D	0	0	0	0	22	56	78	44	0	0	0	0	0	0	53	33	78	43	
14	C	11	11	0	11	89	78	0	0	0	0	0	0	0	0	84	11	33	33	
15	C	0	11	0	0	89	67	11	22	0	0	0	0	0	0	81	22	44	50	
16	A	22	11	11	33	33	11	33	44	0	0	0	0	0	0	22	11	33	33	
17	A	78	33	0	11	0	11	22	44	0	0	0	0	0	0	56	44	89	50	
18	C	0	0	0	0	100	100	0	0	0	0	0	0	0	0	91	0	0	und	
19	C	0	0	0	0	100	100	0	0	0	0	0	0	0	0	97	0	0	und	
20	E	11	33	44	44	22	0	22	22	0	0	0	0	0	0	0	0	0	und	
21	B	0	22	100	56	0	22	0	0	0	0	0	0	0	0	69	44	44	100	
22	B	0	11	100	89	0	0	0	0	0	0	0	0	0	0	97	11	11	100	
23	A	100	78	0	22	0	0	0	0	0	0	0	0	0	0	91	22	22	100	
24	A	100	56	0	44	0	0	0	0	0	0	0	0	0	0	81	44	44	100	
25	A	89	89	11	11	0	0	0	0	0	0	0	0	0	0	81	0	22	0	

Mean Item Difficulty (Dif) 75
 Mean Item Discrimination (Dis) 21

Number of Students 32
 This item analysis is not as significant as when there are at least 50 students.

Sample 8

Item Analysis Graphic (report 4) MATH 322 001
 Number of Questions: 25 Max Score: 75

No.:	1	Key:	C	Dif:	72	Dis:	11	A	B	C	D	E	Non	Err
+27%			*					0	0	78	22	0	0	0
All			*					3	0	72	25	0	0	0
-27%			*					11	0	67	22	0	0	0
	0	25	50	75	100					W				W

No.:	2	Key:	A	Dif:	91	Dis:	22	A	B	C	D	E	Non	Err
+27%				*				100	0	0	0	0	0	0
All				*				91	0	0	9	0	0	0
-27%				*				78	0	0	22	0	0	0
	0	25	50	75	100					W	W			W

No.:	3	Key:	C	Dif:	97	Dis:	11	A	B	C	D	E	Non	Err
+27%				*				0	0	100	0	0	0	0
All				*				3	0	97	0	0	0	0
-27%				*				11	0	89	0	0	0	0
	0	25	50	75	100					W		W		W

TEST SCORING - REPORT 5 – SCORE DISTRIBUTIONS

This report shows the distribution of the raw scores from the highest and lowest possible score received on the test. REPORT 5 provides the following information (see Sample 9):

SCORE: This is a score received on the test.

FREQUENCY: This shows the number of people who received a particular score.

CUMULATIVE FREQUENCY: This shows the number of people who received the corresponding raw score or less.

C.F. TO MIDPOINT: This is the cumulative frequency to midpoint, which is found by adding one-half the frequency of the raw score to the cumulative frequency of the next lower raw score.

PERCENTILE RANK: The percentile rank for a raw score is the percentage of scores which lie below it.

STANDARD SCORE: This is a normalized standard score or “T” score and expresses the relative position of a score in terms of standard deviation units. The standard score has a mean of 50 and standard deviation of 10. Standard score expresses a score’s distance above or below the mean for the group.

MEAN SCORE: This appears at the end of the report. It is the sum of all the raw scores divided by the number of people taking the test.

STANDARD DEVIATION: This appears at the end of the report and is a measure of the variation of the scores. The higher the standard deviation, the greater the variation of scores. In a normal distribution, approximately 68 percent of the scores are within one standard deviation from the mean and approximately 95 percent are within two standard deviations from the mean. A histogram of the test scores (such as the one available from the cumulative test scoring service) provides some insight into the possible normalcy of the distribution.

VARIANCE: The formula for variance for grouped data and the Kuder-Richardson formula #20 are on pages 116 and 311, respectively, in *Statistical Inference* by Helen M. Walker and Joseph Lev; Holt, Rinehart and Winston, Inc., 1953. (This book is available in the UWEC library.)

$$\text{variance} = s_x^2 = \frac{\sum_{j=1}^m n f_j x_j^2 - (\sum_{j=1}^m f_j x_j)^2}{n(n-1)}$$

$$\text{Kuder - Rich. #20} = \frac{m}{m-1} \left(1 - \frac{\sum_{i=1}^m n P_i Q_i}{(n-1)s_x^2} \right)$$

N = Number of students taking the test

M = Number of question in the test

f_j = Number of students with the j^{th} raw score

x_j = The j^{th} raw score

P_i = Proportion of students answering the i^{th} question correctly

$Q_i = 1 - P_i$ = Proportion of students not answering the i^{th} question correctly

s_x^2 = Variance of the test scores of the N students if each score is the number of questions answered correctly by the student.

KUDER-RICHARDSON RELIABILITY #20: This appears at the end of the report. The Kuder-Richardson internal consistency formula number 20 has been used to compute the reliability estimate provided in this analysis. A reliability coefficient of this type gives an indication of the extent to which individuals taking the test again will receive the same scores. Values of the Kuder-Richardson reliability estimate range between 0.000 and +1.000. a value close to +1.000 indicates that the test exhibits a high degree of reliability. Estimates should be interpreted cautiously if large numbers of students are unable to complete the test within the allotted time.

For a typical 50 minute classroom examination covering related subject matter, a reliability coefficient of at least .75 is desirable. Reliability can be improved through question revision

based upon the question analysis data computed by this program. Lengthening the test (when this is practical) will also increase reliability, particularly in the case of a short examination.

UW-Eau Claire Test Scoring and Reporting Spr 2014 Mar 07, 2014 1:31 PM

Score Distribution (report 5) ACCT| 322 001
 Number of Questions: 25 Max Score: 75

Score	Frequency	Cumulative Frequency	C.F. to Midpoint	Percentile Rank	Standard Score
67	0	32	32.0	100	66.23
66	4	32	30.0	93	64.75
63	5	28	25.5	79	60.34
60	3	23	21.5	67	55.93
57	2	20	19.0	59	51.52
54	7	18	14.5	45	47.10
51	9	11	6.5	20	42.69
42	1	2	1.5	4	29.45
39	1	1	0.5	1	25.04

The Standard Score has a mean of 50 and standard deviation of 10.

Number of Students 32
 Mean 55.97
 Variance 46.22
 Standard Deviation 6.799
 Kuder-Richardson Reliability 0.967

Variance and Kuder-Richardson Reliability are not as significant, because not all questions are worth one point.

Sample 9

COURSE EVALUATION - ITEM ANALYSIS

The RTF report you receive shows the number of students who gave each of the possible responses to each question by frequency and percent. The possible responses are A-E for questions 1 through 200, and A-J for questions 201 through 240. The AVE column gives the average answer given. The “NON” column indicates the number of students who didn’t respond. The “MUL” column shows how many student put down multiple answers for one questions. Non and Mul answers are not included in the frequency or Percentage results.

UW-Eau Claire Course Evaluation Fall 2013 (2141) 05/12/2014 1:57PM

Ques #	A		B		C		D		E		Ave	Non	Mul
	Frq	Prc	Frq	Prc	Frq	Prc	Frq	Prc	Frq	Prc			
1	2075	54	1473	38	199	5	59	2	20	1	4.4	94	1
2	1350	35	1632	43	608	16	191	5	39	1	4.1	101	0
3	970	25	1388	36	1072	28	327	9	59	2	3.8	103	2
4	1218	32	1350	35	912	24	270	7	68	2	3.9	103	0
5	968	25	975	26	1196	31	537	14	140	4	3.5	104	1
6	1835	47	1228	32	559	14	190	5	85	2	4.2	24	0
7	2075	53	1324	34	308	8	142	4	47	1	4.3	23	2
8	2076	53	1384	36	330	8	77	2	27	1	4.4	27	0
9	2457	63	1183	30	207	5	41	1	10	0	4.5	21	2
10	2208	57	1403	36	227	6	42	1	18	0	4.5	23	0
11	2203	57	1308	34	256	7	100	3	32	1	4.4	22	0
12	2008	52	1181	30	483	12	159	4	58	1	4.3	32	0
13	2774	71	934	24	139	4	27	1	14	0	4.7	33	0

The averages were obtained by giving A the value 5, B - 4, etc.

Student Count: 3921

COURSE EVALUATION – CSV FILE

The .CSV file is sent with each course evaluation. It contains all the same data as in the Course Evaluation .RTF report in a comma delimited format. .

You can use this file to manipulate your data as needed.