Introduction to Research Methods

The suggestions below assume you will be conducting research like that expected for the Educational Specialist degree, i.e., the goal is not to produce groundbreaking findings, instead the goal is to introduce you to the research experience.

1. Study Design and Topic Selection

1.1 Participants

Best to design a study in which participants are easily accessed and readily available (e.g., your classes or colleagues' classes, local or district administration, peers and colleagues).

1.2 Study Design

Make your study simple

- administer questionnaires (e.g., two scales, one to measure mathematics self-efficacy and a second to measure mathematics anxiety),
- easy experiment such as comparing achievement between one class that uses a new computer program and a comparable class that does not, or
- interview administrators or colleagues on a topic of interest (e.g., thoughts about consolidation or implementation of a new district policy)

and brief

- 30 minutes to administer questionnaires in a classroom,
- experiment that lasts no more than two weeks, or
- interview 4 to 6 colleagues with interviews lasting 20 to 40 minutes each, or maybe conduct a focus group.

1.3 Few Variables

Your study should have a limited number of variables, maybe two to five, for example:

- relation between mathematics self-efficacy and anxiety (two variables),
- is there a difference in reading performance and reading motivation by sex (three variables), or
- is job satisfaction predicted by level of work autonomy, workplace climate, management support, or family-work time management (five variables).

1.4 Institutional Review Board (IRB)

Your proposed study must be approved by the Georgia Southern IRB, and this has proved to a tedious process for some specialist and doctoral students. Things to consider when developing a study that will be approved by IRB:

- simple study
- noncontroversial
- safe for participants
- common educational activities (e.g. comparing different reading programs, assessing student knowledge)
- short time frame (e.g. one or two weeks or instruction, 30 minutes to administer questionnaires)
- authority figure – if you have a position of authority (e.g., you are principal), then have someone else administer questionnaires or training session, or whatever you plan to do – concern here from IRB perspective is that participants feel free not to participate

- opt out experience and planning for those who decide not to participate in study (e.g., what will non-participating students do during study activities, how to employees freely opt out of participation)
- study detail is clear, precise, complete, and easy to understand (e.g., provide example lesson plans, clearly explain what experimental and control students will do during entire timeframe of study, explain measures used and provide evidence for validity and reliability, etc.)

1.5 Topic Selection

Pick a study topic that is:

- convenient and easy for you;
- allows you to use existing resources (e.g., your class, school-wide data, colleagues);
- may be of relevance (e.g., compare student outcomes between new and old policies); and/or
- replicate all or part of a published study.

2. Literature Search and Review

2.1 Benefits of Literature Search

As one who conducts a literature search and review, one benefits in the following ways:

- generation of research ideas by seeing gaps or weaknesses in the field,
- historical overview of area of interest,
- learn about methods used to conduct studies, and
- interpretation of unexpected outcomes.

For many, learning about methods used to conduct prior studies proves to be very helpful.

Example Method Problem

- Topic: Reading interest among young kindergarten students
- Problem:
    - How would one measure reading interest among those who have trouble reading (e.g., kindergarten students)?
    - Would kindergarten students be able to process and answer questionnaire items like those found for adults? Would the questionnaire item provided below be too complex for kindergarten students?

	Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
I enjoy reading books provided by my teacher.	1	2	3	4	5

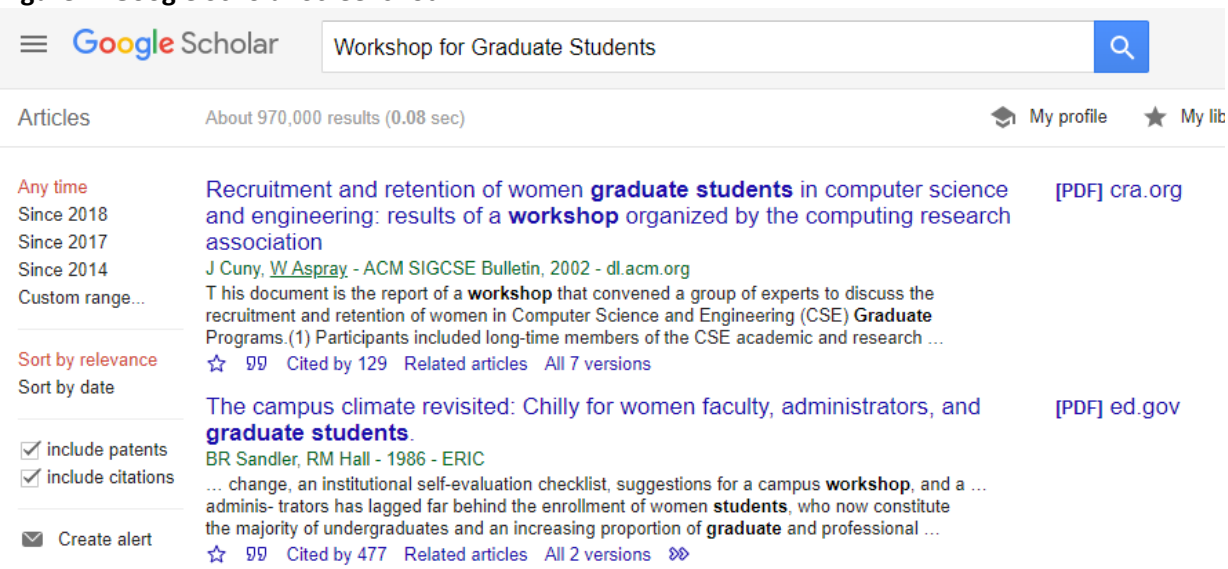
2.2 Google Scholar to Find Academic Works

https://scholar.google.com

Excellent features of Google Scholar:

- Like Google, search is very thorough, includes many publications, large database
- Helpful options:
  - 99 – provides citation in various formats (this is very nice!)
  - Cited by – shows works that have cited the linked source
  - Related articles – shows similar studies or works
  - Versions – provides different links to same study, some have full text
  - PDF link – sometimes full text available for free
  - Time search ranges – can limit specific dates for search (e.g., last 4 years)
  - Create alert – Google will send email when new items are located on this topic
- Author pages (with scholarship, citation counts)
- Authors can add work if missing

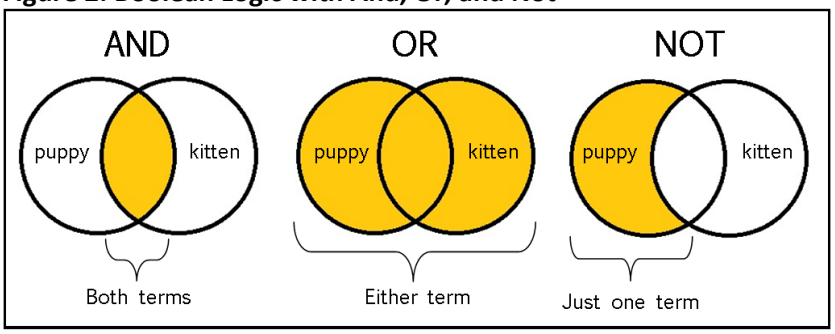
Figure 1: Google Scholar Screenshot



2.3 Google Scholar, Boolean Logic, and Search Symbols

Many search engines use AND, OR, and NOT to define searches, as illustrated below in Figure 2.

Figure 2: Boolean Logic with And, Or, and Not



Source: https://sites.google.com/a/onalaskaschools.com/tech/boolean-search-tools

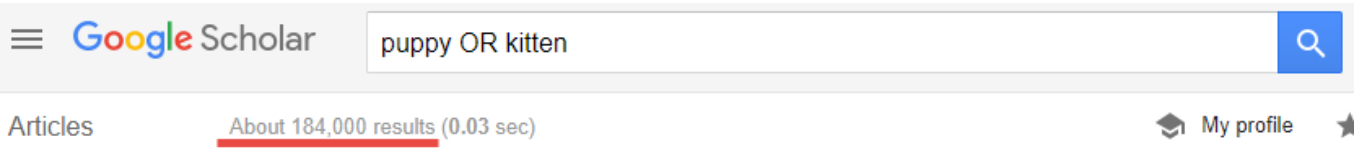
Google Scholar and Google work a bit differently

- **AND** = not needed, Google assumes if multiple words, AND is implied
- **NOT** = does not work in Google, instead, use negative sign, -
- **-** = same as NOT, excludes word, **kitten -puppy**
- **OR** = functions as expected, but must use capitalize OR, **kitten OR puppy**
- **" "** = exact match, **"Bryan W Griffin"**
- ***** = wildcard, **"Bryan * Griffin"**
- **Site:** = search sites, **site:.edu "Bryan W Griffin"**

Figure 3: Example Search Results of Puppy Kitten

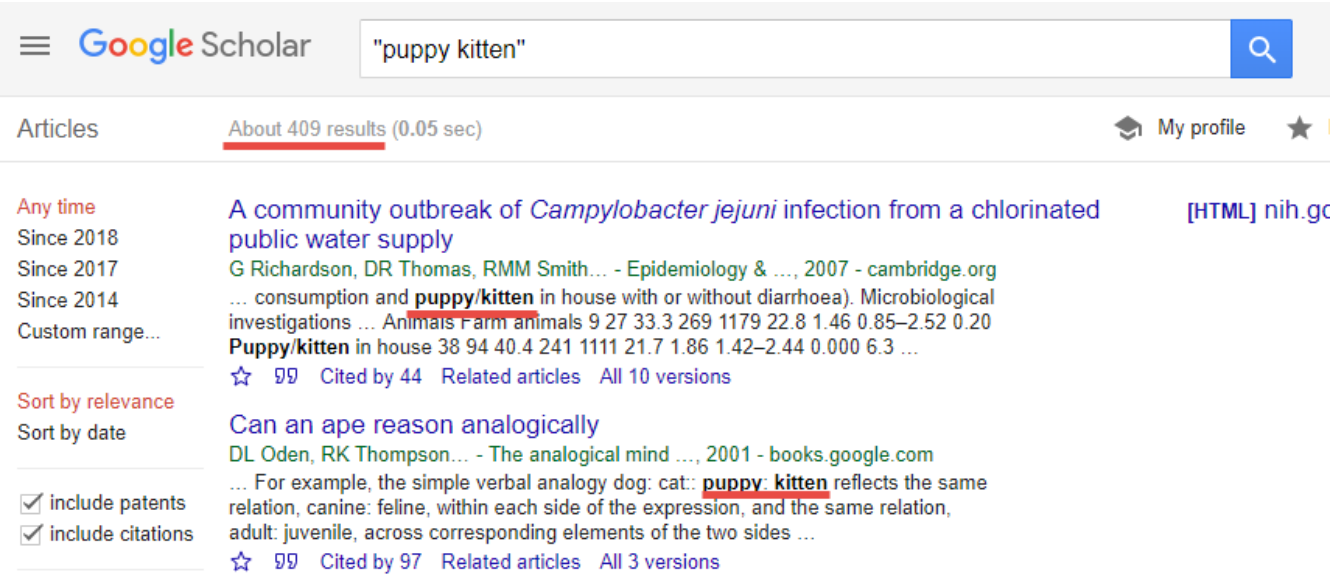
Search A = 13,300

Search B = 184,000



Search C = 103,000

Search D = 409



2.4 Using Google Scholar to Find Questionnaires/Scales

(a) Example Method Problem

- Topic: Reading interest among young kindergarten students
- Problem:
  - How would one measure reading interest among those who have trouble reading (e.g., kindergarten students)?
  - Would kindergarten students be able to process and answer questionnaire items like those found for adults? Would the questionnaire item provided below be too complex for kindergarten students?

	Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
I enjoy reading books provided by my teacher.	1	2	3	4	5

(b) Goals of Search

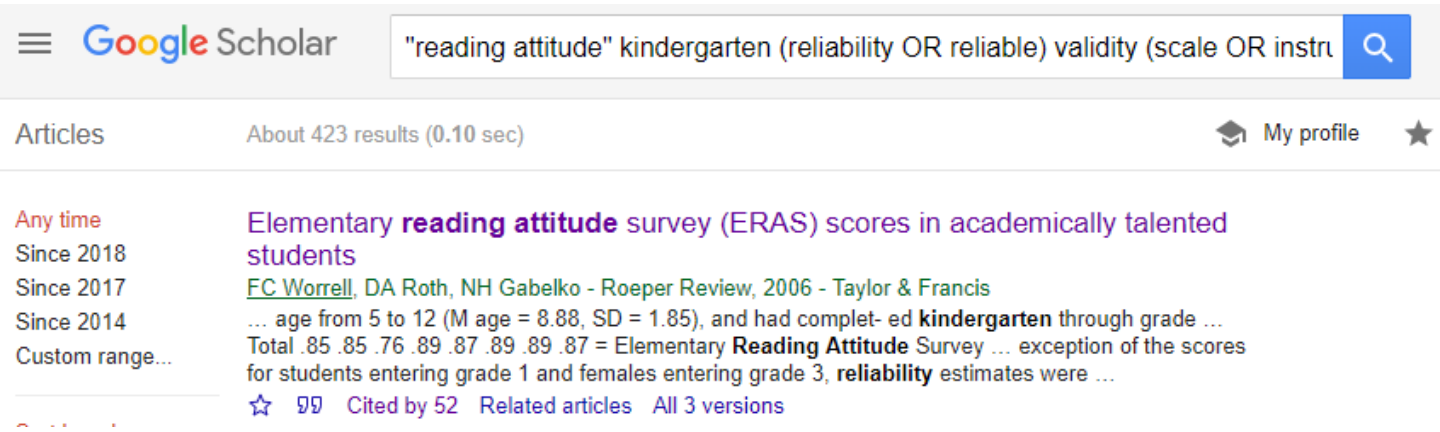
- Locate scale to measure reading attitudes
- young students – kindergarten, first grade, etc.
- scale produces reliable scores
- scale produces valid scores

(c) Search Terms

"reading attitude" kindergarten (reliability OR reliable) validity (scale OR instrument) alpha

- **"reading attitude"** – in quotations to clearly set term sought
- **kindergarten** – limits to studies of young children
- **(reliability OR reliable)** – limits search to studies with mention of reliability
- **validity** – limits search to studies with mention of validity
- **(scale OR instrument)** – limits search to studies that mention scale
- **alpha** – limit search to studies with mention of Cronbach's alpha, a measure of reliability

Figure 4: Search Results: "reading attitude" kindergarten (reliability OR reliable) validity (scale OR instrument) alpha

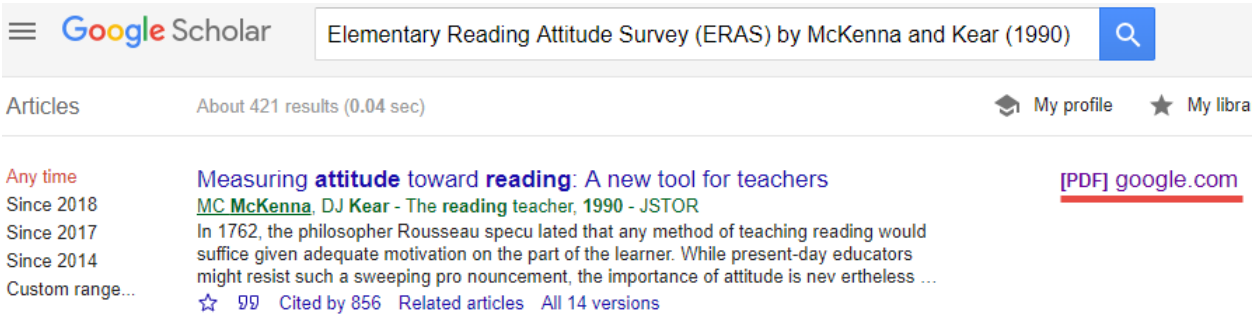


(d) Locating the Cited Scale

The citation found above referred to the scale named

Elementary Reading Attitude Survey (ERAS) by McKenna and Kear (1990)

Figure 5: Search Results: Elementary Reading Attitude Survey (ERAS) by McKenna and Kear (1990)



2.5 Writing the Literature Review

Example Study – purpose and questions used to guide this example study.

Purpose statement explains to readers the overall goal of this study:

> The purpose of this study is to learn whether cyber-bullying experiences among middle school students is related to student academic performance and academic-self-efficacy.

Research questions pinpoint what one hopes to learn from conducting this study:

1. Do middle school students experience cyber-bullying, and what is the extent of that experience?
2. Is there a relation between cyber-bullying experience and academic performance for middle school students, and what is the nature of that relation?
3. Is there a relation between cyber-bullying experience and academic self-efficacy for middle school students, and what is the nature of that relation?

Answering each research question should provide a global answer to the purpose of the study.

Three variables of interest

(a) Cyber-bullying – independent variable
(b) Academic Performance – dependent variable
(c) Academic Self-efficacy – dependent variable

Review Format

I recommend writing a review that is variable centered. This makes it easier to stay focused on the topic paragraph by paragraph.

Section A: Cyber-bullying - What is it and what does it do?

Find literature that explains cyber-bullying, more specifically:

- Define and describe cyber-bullying
- Explain how cyber-bullying is similar and dissimilar to traditional bullying
- Does cyber-bullying have negative consequences - cite studies and describe their findings linking cyber-bullying to negative outcomes not related to academics, e.g., mental health, social connections

Section B: Cyber-bullying and Academic Performance - Is there a negative outcome?

Find literature that addresses the possible link between cyber-bullying and academic performance:

- Cite studies that explore possible link between cyber-bullying and academic performance
- Include studies that show all possible outcomes, positive, negative, no effect
- Examine and explain how studies were conducted - settings, samples, measures, etc.

Section C: Cyber-bullying and Academic Self-efficacy - Is there a negative outcome?

Find literature that addresses the possible link between cyber-bullying and academic self-efficacy:

- Explain and describe academic self-efficacy.
- Seek studies that explore possible link between cyber-bullying and academic self-efficacy
- If any are found, then include studies that show all possible outcomes, positive, negative, no effect
- Examine and explain how studies conducted - settings, samples, measures, etc.
- If no studies found, report that

3. Method (not Methodology)

3.1 Participants

This section contains information on:

- study setting,
- how participants were sampled,
- sample size sought,
- sample size obtained,
- response rate,
- participant demographics, etc.

There is no such thing as a “sample population” so don’t use this word combination.

Table 1 below is an example showing participant demographics.

3.2 Materials, Measurement, Variables

Explain how variables were measured including

- questionnaire/instrument/scale selection or development,
- item creation or selection,
- item analysis procedures,
- item scaling (e.g., 1 = “not true of me” to 7 = “very true of me”),
- Items to be reverse scored, etc.

Table 1: Undergraduate Sample Demographics

Variable	n	%
Sex		
Female	162	82.7
Male	34	17.3
Race		
African American or Black	35	17.9
Asian	3	1.5
Multi-racial	6	3.0
White	152	77.6
Age		
18	1	0.5
19	46	23.5
20	76	38.8
21	46	23.5
22	10	5.1
23	7	3.6
24	3	1.5
25+	7	3.6

Discuss evidence for reliability of scores such as

- Cronbach's α, split-half, KR-20, KR-21
- test-retest
- parallel forms
- rater/score agreement (Cohen's kappa, Krippendorff's alpha, etc.),

and evidence for validity of scores, for example,

- logical validity: content validity rationale – theory, research, item & sampling validity, expert review
- empirical validity: construct, predictive, concurrent, structural analysis (factor).

You may have to open and review a number of documents to find a scale that works. Look for:

- Brief scale - few items the better for obtaining participant completion of questionnaires
- Scale with evidence of both validity and reliability
- Fits your sample - wording and instructions are suitable for reading and experience level of sample

3.3 Procedure

In this section provide a detailed, step-by-step description of the method/procedures used to collect your data. Enough detail should be offered here, and in other sections of the Method, to enable one to replicate your study without having to guess or contact you for clarification.

IRB will require thorough detail before your study will be approved.

3.4 Analysis

If you are at the proposal stage for your study, include an Analysis section. If you have collected and analyzed your data, remove the Analysis section and include only a Results section.

Analysis section should list each research question or hypothesis, and explain after each which data will be used, and how the data will be analyzed, to address that question.

Example: Cyber-bullying Analysis Plans

1. Do middle school students experience cyber-bullying, and what is the extent of that experience?

   Data from each item of the cyber-bullying scale will be presented in frequencies. These individual item statistics will help reveal which type of experiences respondents reported. Next, responses will be combined to form composite cyber-bullying victim and bully measures. From these two measures, the percentage of students who report being a victim or bully will be reported.

2. Is there a relation between cyber-bullying experience and academic performance for middle school students, and what is the nature of that relation?

   Student course mean grade will be calculated from available test scores and other graded activities, and Pearson correlation will be calculated to assess the relation between student grade and both victim and bully measures of cyber-bullying. In addition, scatterplots will be developed to show graphically these relationships.

3. Is there a relation between cyber-bullying experience and academic self-efficacy for middle school students, and what is the nature of that relation?

   The analysis presented for Question 2 above will be replicated for the self-efficacy measure.

3.5 IRB

You will have to submit an IRB application for study approval. Details of IRB are presented in another Workshop session, so have a look at those materials for information.

4. Results

As noted above, if you are developing a proposal for your study, include an Analysis plan. If you have collected data, remove the Analysis plan and present Results of your analysis.

4.1 Data Examination, Variable Scoring, and Descriptive Statistics

Before presenting results that address your research questions or hypotheses, first discuss

- your process of data examination,
- variable scoring and creation, and then
- present descriptive statistics.

Some of this information is secondary to your study and, if reported, may be better suited for placement in an appendix rather than in the Results section.

Data Examination. Explain to readers the

- process of reviewing your data for errors or outliers (extreme cases),
- identifying missing information, and
- and any corrective steps taken to address errors and missing information.

Frequencies. Calculating tables of frequencies can be an excellent first step to identifying problematic data.

Example 1: Frequencies. Questionnaire Item: In general, my parents ignore what I have to say:

1 = Not at all
2 = Somewhat
3 = A Moderate Amount
4 = Quite a Bit
5 = Very Much

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	12	4.8	5.0	5.0
	2.0	28	11.2	11.7	16.7
	3.0	36	14.5	15.1	31.8
	4.0	73	29.3	30.5	62.3
	5.0	89	35.7	37.2	99.6
	6.0	1	.4	.4	100.0
	Total	239	96.0	100.0	
Missing	System	10	4.0		
Total		249	100.0		

The problem identified by the frequency table above is the presence of a score “6” which should not be possible since the variable score range is only 1 to 5. This appears to be a data entry error.

Example 2: Frequencies. Questionnaire Item: What is your race/ethnicity?

1 = American Indian, Alaska Native
2 = Asian
3 = Black or African American
4 = Hawaiian/Pacific Islander
5 = Hispanic/Latino
6 = White
7 = Mixed/Multi-racial

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	3.2	3.2	3.2
	"Dark Skin"	1	.4	.4	3.6
	1	1	.4	.4	4.0
	2	3	1.2	1.2	5.2
	2,3,4	1	.4	.4	5.6
	3	60	24.1	24.1	29.7
	4	1	.4	.4	30.1
	6	169	67.9	67.9	98.0
	7	3	1.2	1.2	99.2
	7 (6+2)	1	.4	.4	99.6
	blank	1	.4	.4	100.0
	Total	249	100.0	100.0	

With this example we see that some participants did not select one number or even wrote a description. How do we handle these types of data in the analysis?

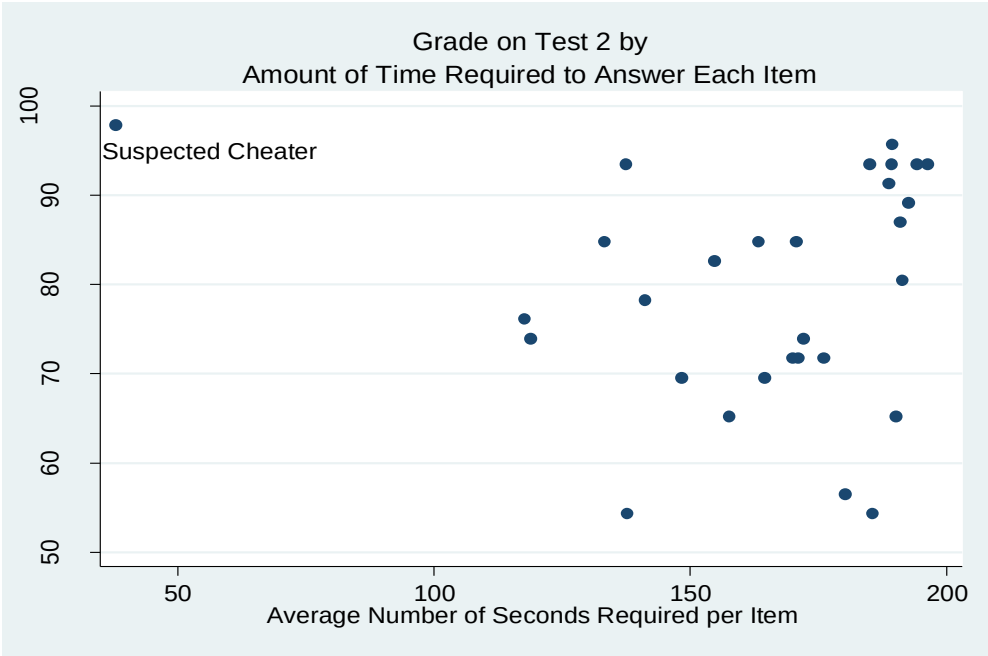
Scatterplots. These can be excellent ways to determine problematic data or outliers.

Example Scatterplot. What is the relation between Test 2 scores and the average time required to answer each item on Test 2?

Pearson r = -0.025

Very weak, slightly negative relation; the more time one takes to answer each question, the lower will be test scores.

How does this relation appear if plotted via a scatterplot?

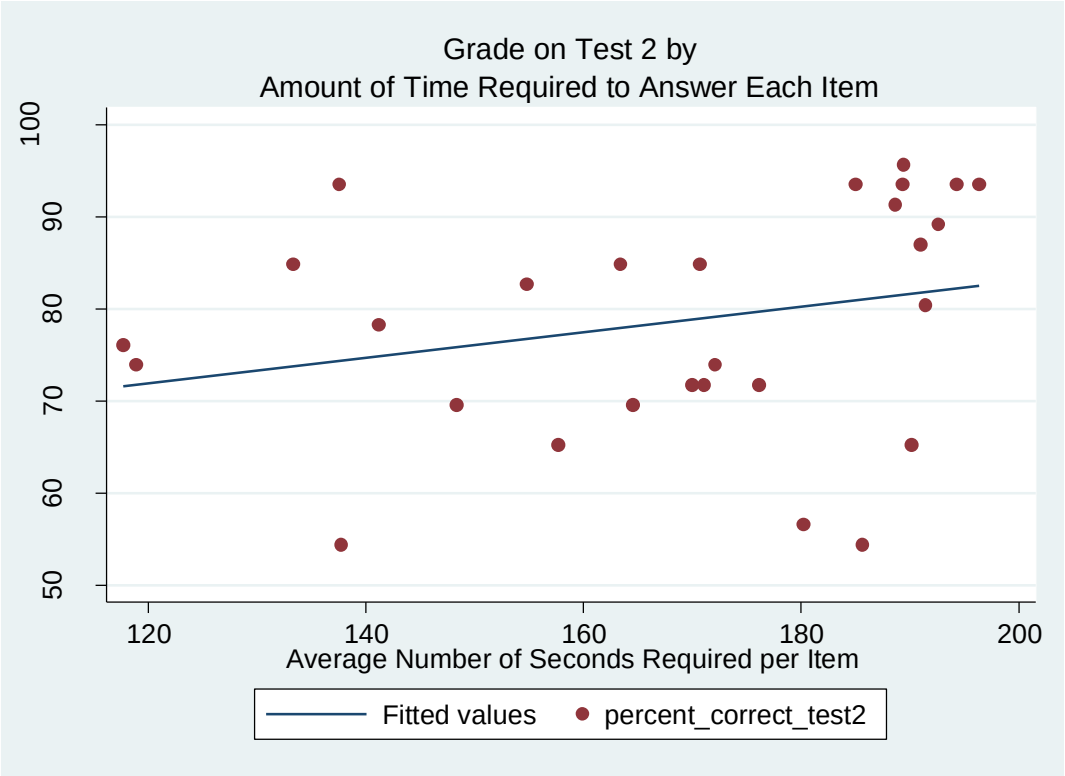


This scatterplot does not show much of a relationship, but it does show a clear outlier – an observation that differs greatly from all other observations.

What happens if the suspected cheater, the outlier, is removed from the analysis?

Pearson r = 0.26

Positive weak to moderate relation: the more time on test items, the higher are test scores. A new scatterplot with the cheater's score removed appears below.



Variable Scoring and Creation. Explain in the Results section the following:

- the process of scoring variables (e.g. use of raw data from responses or convert to scale scores),
- identification of special scoring procedures (e.g., items that must be reverse scored),
    - Formula: Reversed Score = (minimum score) + (maximum score) – actual score
- how missing data or problematic data were addressed,
- calculation of composite variables (e.g., summation of raw scores after reverse scoring, mean of items after reverse scoring, etc.),
- coding of categorical variables (e.g., dummy or contrast coding for regression), and
- any special coding needed beyond that described above (e.g., normalized gain scores).

Example 1. This example explains how a scaled variable (ranging from 1 to 5) with a non-scaled response (option 6) was recoded for statistical analysis.

"To assess instructor reputation, students answered this question: "Before taking this course, what did you hear about this instructor?" Reponses ranged from (1 "very bad" to 5 "very good", and 6 "didn't know about the instructor"). For statistical modeling purposes, responses were recoded into one of three categories: negative reputation (score of 1, 2,

or 3; about 18.5% of respondents), positive reputation (score of 4 or 5; about 24.8% of respondents), and no reputation (score of 6; about 56.7% of respondents)."

Example 2. This example shows how one explains reverse scoring and formation of a composite variable.

"Perceived autonomy support was measured by student responses to three statements, "The instructor was willing to negotiate course requirements with students," "Students had very few choices in course requirements or activities that would affect their grade," and "The instructor made changes to course requirements or activities as a result of student comments or concerns." The response scale for each item ranged from 1 ("strongly disagree") to 5 ("Strongly agree"). The second item has reverse polarity from the other two items and was therefore reverse scored. The composite measure of perceived autonomy support was then formed by taking the mean response of the three items."

Descriptive Statistics. Present basic descriptive statistics for each variable included in analyses presented in this section. These may include the following.

- Categorical, Nominal, Qualitative Variables:
  - category counts/frequencies
  - category percentages
  - contingency (cross-classification) tables (e.g., 2x2 table of sex by test outcome [pass vs fail])
- Quantitative, Ordinal, Interval, Ratio Variables:
  - Central Tendency (mean, median, mode)
  - Variability (standard deviation, range, variance)
  - Maximum and minimum scores, maximum and minimum possible scores
  - Correlations among IV and DVs
  - Means on DVs across categories of IVs

Often such descriptive information is presented with analyses performed to answer research questions, so a separate presentation of descriptive statistics is not needed in this section.

Example 1. Table showing descriptive information for two categorical variables.

Questionnaire Item				
	Yes		No	
Do you have daily contact with parents?	n	%	n	%
	107	54.6	89	45.4
Is staying in contact with parents the reason for you having the following accounts?	n	%	n	%
Facebook	58	29.6	138	70.4
Email	47	25.3	139	74.7
Instagram	27	13. 8	169	86.2
Snapchat	18	9.2	177	90.8
Google+	3	1.6	186	98.4
Pinterest	3	1.5	192	98.5
Twitter	2	1.0	192	99
YouTube	1	0.5	191	99.5
My Space	1	0.5	185	99.5
LinkedIn	0	0.0	189	100
Tumblr	0	0.0	193	100
Yik Yak	0	0.0	191	100

Example 2. Table showing descriptive information for both qualitative and quantitative variables.

Participate Demographic Information	
Sex	
Female	N = 1324 (44.3%)
Male	N = 1669 (55.6%)
Age	
Female	Mean = 70.14 years (range = 3.0 to 105.0 years)
Male	Mean = 66.80 years (range = 2.2 to 105.0 years)

Source: Suiter, D., & Leder, S. (2007). Clinical Utility of the 3-ounce Water Swallow Test. Dysphagia, 23, 244-250.

4.2 Statistical Findings

Order of presentation:

(a) List the research question/hypothesis of interest (take them in order),
(b) explain which analysis was conducted to address that question/hypothesis,
(c) present results of the analysis, then
(d) move to next research question/hypothesis.

In short, organize results by research questions and hypotheses.

Presentation of Common Statistical Analyses.

- Statistical analyses results should include both tabular and written presentations
- Example tables for commonly employed statistical procedures are provided below
- Inferential statements: tells reader whether you rejected or failed to reject the null hypothesis
    - Significant: means only that the null hypothesis, Ho, was rejected
    - Significant: does NOT mean something important was found
        - The correlation between X and Y was statistically significant; this means a relation between X and Y was found
        - The correlation was not statistically significant; this means a relation between X and Y was not found
- Interpretational statements: tell readers, in simple language, what the statistics mean
    - Statistic: Pearson r = -.45 between academic self-efficacy and test anxiety in mathematics
    - Interpretation: Students who were more confident in their mathematical skills tended to have lower levels of anxiety when taking a mathematics test

Correlations. Correlations, specifically Pearson's r, may be used to assess whether a linear relationship exists between two quantitative variables. A categorical variable with only two categories may also be included as part of a correlational study, although care must be exercised for interpretations. Pearson's r may range from -1.00 to 1.00, with these two extremes representing perfect and very strong relationships, and a value of 0.00 representing no linear relationship.

Table of Correlations. Table 1 below provides an example correlation matrix of results. The data represent Ed.D. students reported levels of anxiety and efficacy toward doctoral study, their graduate GPA, and sex.

Table 1. Correlations and Descriptive Statistics for Anxiety and Efficacy Toward Doctoral Study, Graduate GPA, and Sex of Student

	1	2	3	4
1. Doctoral Anxiety	---			
2. Doctoral Efficacy	-.43*	---		
3. Graduate GPA	-.24*	.31*	---	
4. Sex	-.11	.19*	-.02	---
M	3.20	4.12	3.92	0.40
SD	1.12	1.31	0.24	0.51
Scale Min/Max Values	1 to 5	1 to 5	0 to 4	0, 1

Note. Sex coded Male = 1, Female = 0; n = 235.
* $p < .05$.

Written Results. For inferential statistical tests, one should provide discussion of inferential findings (was null hypothesis rejected; are results statistically significant), and follow this with interpretation of results. The focus of this study was to determine whether anxiety and efficacy toward doctoral study are related, and whether any sex differences for doctoral students are present for anxiety and efficacy.

Pearson's correlations were calculated and results revealed that efficacy toward doctoral study was negatively and statistically related, at the .05 level of significance, to students' reported level of anxiety toward doctoral study, and positively related with students' sex. There was not a statistically significant relationship between student sex and doctoral study anxiety. These results indicated that students' who held higher levels of anxiety about doctoral study also tended to demonstrate lower levels of efficacy toward doctoral work. The positive correlation between sex and efficacy must be interpreted within the context of the coding scheme adopted for the variable sex where 1 = males and 0 = females. Since the correlation was positive, this means that males hold higher average efficacy scores than do females. Lastly, there was no evidence in this sample that anxiety toward doctoral study differs between males and females; both sexes appeared to display similar levels of anxiety when thinking about doctoral work.

Independent Samples t-test. Researchers use t-tests to determine whether sample groups appear to differ on some continuous (quantitative) outcome.

Table of t-test Results. Table 2 below shows mean differences on SAT verbal and mathematics subscales, and for GPA, by sex.

Table 2: Results of t-tests and Descriptive Statistics for SAT Verbal, SAT Math, and GPA by Sex

Outcome	Group						95% CI for Mean Difference		
	Male			Female					
	M	SD	n	M	SD	n		t	df
SAT-Verbal	463.81	98.89	45	532.21	101.23	44	-110.56, -26.24	-3.22*	87
SAT-Math	515.43	99.56	44	483.31	98.97	44	-9.95, 74.20	1.52	86
College GPA	2.71	1.32	45	3.16	1.16	44	-0.97, 0.07	-1.71	87

* $p < .05$.

***Written Results*.** As before, both inferential and interpretational components are needed to discuss results.

Results of the two-group t-test show a statistically significant difference, at the .05 level, in SAT verbal scores between females and males. There were no statistical differences, however, in SAT mathematics scores or grade point averages between the sexes. Descriptive statistics in Table 2 show that females scored higher on the SAT verbal subscale than did males. While this sample of students did demonstrate some mean differences between the sexes on the SAT mathematics subscale and college GPA, these differences can be attributed to sampling error and probably do not reflect true population differences between the sexes.

Chi-square (χ^2) Tests. Chi-square tests are used with qualitative (categorical) variables, and may be interpreted as a test of association (relationship) or difference.

Table of χ^2 Results. Table 3 below shows dropout status (in counts and percentages) by sex.

Table 3: Results of Chi-square Test and Descriptive Statistics for Dropout Status by Sex

Dropout Status	Sex	
	Female	Male
In School	70 (70%)	40 (40%)
Out of School	30 (30%)	60 (60%)

Note. Numbers in parentheses indicate column percentages.
$\chi^2 = 18.18$*, df = 1,
* $p < .01$

***Written Results*.** Again, include both inferential and interpretation information.

There was a statistical difference, at the .05 level of significance, in dropout status between females and males. Males were more likely to drop out (60%) than females (30%).

Analysis of Variance (ANOVA). ANOVA is used to compare a quantitative (continuous) outcome across two or more groups.

Table of ANOVA Results. Table 4 and 5 below show differences in teacher job satisfaction (scaled from 1 = low to 5 = high) across three levels of schools within a district.

Table 4: ANOVA Results and Descriptive Statistics for Teacher Satisfaction by School Type

School Type	Mean	SD	n
Elementary	4.33	0.72	15
Middle	3.11	1.23	18
High	2.53	1.45	15

Source	SS	df	MS	F
Group	25.47	2	12.73	9.12*
Error	62.84	45		

Note. R^2 = .28, adj. R^2 = .26.
* p < .05

Table 5: Multiple Comparisons and Mean Differences in Teacher Satisfaction by School Type

Comparison	Mean Difference	s.e.	95% CI
Elementary vs. Middle	1.22*	0.41	0.19, 2.25
Elementary vs. High	1.80*	0.43	0.73, 2.87
Middle vs. High	-0.58	0.41	-1.61, 0.45

* p < .05, where p-values are adjusted using the Bonferroni method.

Written Results. Inferential and interpretation results.

All statistical tests were conducted at the .05 level of significance. Results of the analysis of variance, presented in Table 4, show that there were statistically significant mean differences in levels of reported satisfaction among teachers sampled from elementary, middle, and high schools. Table 5 displays all pairwise comparisons of teacher satisfaction among the three schools. These comparisons indicate that mean levels of satisfaction for elementary teachers were different from those reported by either middle or high school teachers, and there is no statistical evidence in this sample to suggest satisfaction levels differ between middle and high school teachers. Elementary school teachers sampled reported higher levels of satisfaction with their jobs than did either middle or high school teachers. There does not appear to be a difference in mean job satisfaction between middle and high school teachers.

4.3 Summary

Sometimes it is helpful to provide a briefly summary of findings. Address the study's overall question, if one is present. If a specific analysis does not address the overall question, then explain how totality of findings address that question.

5. Conclusion and Discussion

Many options exist for this section, so best to follow guidance of whoever is directing your studyr. Below are a few ideas to consider.

Restate study purpose and research questions/hypotheses or an abbreviated version of these.

Explain how findings in the Results section address study purpose and research questions.

Use simple language so most readers can understand your findings. No need to repeat technical information presented in the Results, instead, explain with general interpretations (e.g., the findings show that the more confidence one has, the less anxiety one experiences) unless there are particular findings/statistics that are important to restate (e.g. highly unusual or unexpected results).

Discuss findings

- Are findings consistent or inconsistent with your hypotheses? Explain how.
- For research questions, what was learned – what was answered?
- Are findings consistent or inconsistent with theory? Explain how; compare and contrast.
- Are findings consistent or inconsistent with prior research? Explain how; compare and contrast.
- Anything new learned?
- Anything unusual with your study?

When discussing findings, consider threats to validity of result interpretations

- Example: In a study comparing motivation and achievement of female and male students when offering words of encouragement, male students may have viewed these words as phony and without merit and therefore lost some interest in the instructional module that was part of a study.
- Example: Learned after the study the instructional treatment was not implemented fully by teachers in all classes.
- Example: Found that respondents consistently failed to answer a few key items on a questionnaire and therefore compromised measurement of some of the key constructs.

If you do find serious threats to the validity of your study, explain how these may have impacted study results and cautiously offer interpretation of results with these limitations in mind.

- Example: In a study comparing motivation and achievement of female and male students when offering words of encouragement, male students may have viewed these words as phony and without merit and therefore lost some interest in the instructional module that was part of a study. Therefore, the differences observed in motivation means between males and females may have resulted from the treatment, or may have resulted from male student reactions to perceptions of insincerity by the instructor.

Evaluate and interpret the results, but be objective – look carefully at results to determine if they are consistent or inconsistent with your expectations. This is one of the more common mistakes I see in studies.

If results are counter to what you expected, attempt to explain why this may be the case (i.e., anything unusual about your study, unusual about the sample of participants or settings, etc.).

Discuss theoretical and practical significance of your findings.

Any recommendations for practice in the field of your study?

Building on your study, make recommendations how the study could be improved for future research (e.g., address threats to internal or external validity, improve upon design or measures, include relevant confounding variables, consider other settings or groups to target for study).