FERRIS STATE UNIVERSITY

General Education Assessment
Report 16(1) — July 2016

Meta-Analysis of Student Achievement on Natural Science FLO SCI1 in a 200-Level Biology Course

Dr. Clifton Franklund[1]

Abstract
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Keywords
Meta-Analysis — Forest plot — Natural Sciences — Scientific concepts

[1] *General Education Coordinator, Ferris State University*

Contents

Introduction

PUT THE INTRODUCTION TEXT HERE.

Methods

Collection of assessment data

Student performance on the first lecture exam in a 200-level Biology course was analyzed. Individual student scores were collected using the new General Education Natural Sciences ”scores” data workbook for thirteen semesters. Student scores were automatically converted to a rubric score by the workbook using the equivalencies shown in Table 1.

These files all contain personally identifiable information (PII) and are, therefore, subject to FERPA regulations. For this reason, they are not directly shared. Instead, they are stored in a data folder in TracDat: Core Competency: Natural Sciences ⇒ Assessment ⇒ Proof of Concept.

Table 1. Conversion of percentages to rubric scores

Percent correct	Rubric	Interpretation
0.0 to 49.9%	0	Unsatisfactory
50.0 to 59.9%	1	Beginning
60.0 to 69.9%	2	Developing
70.0 to 84.9%	3	Proficient
85.0 to 100.0%	4	Advanced

De-identification of student data

Copies of the 13 data files were downloaded from TracDat. An R aggregator script was used to read the data from these data sheets and contatenate it into one dataset. Student names were removed and each student’s entry was given a unique eight-digit identifier - the Record.Key. These keys may be used for longitudinal studies in the future. The algorithm used is kept in an encrypted site and shared with **noone**. The de-identified dataset contains 973 student entries and is stored as a comma-delimited textfile (BIOL200Data.csv).

Data provenance

Location of public website files Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis

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Session information The following information pertains to the session used to generate this report.

- R version 3.3.0 (2016-05-03), `x86_64-apple-darwin13.4.0`
- Base packages: base, datasets, graphics, grDevices, grid, methods, stats, utils
- Other packages: car 2.1-2, dplyr 0.5.0, forestplot 1.5.1, Formula 1.2-1, gdata 2.17.0, ggplot2 2.1.0, Hmisc 3.17-4, knitr 1.13, lattice 0.20-33, magrittr 1.5, mice 2.25, moments 0.14, papeR 1.0-1, Rcpp 0.12.6, survival 2.39-5, weights 0.85, xtable 1.8-2
- Loaded via a namespace (and not attached): acepack 1.3-3.3, assertthat 0.1, chron 2.3-47, cluster 2.0.4, colorspace 1.2-6, data.table 1.9.6, DBI 0.4-1, evaluate 0.9, foreign 0.8-66, formatR 1.4, gmodels 2.16.2, gridExtra 2.2.1, gtable 0.2.0, gtools 3.5.0, latticeExtra 0.6-28, lme4 1.1-12, MASS 7.3-45, Matrix 1.2-6, MatrixModels 0.4-1, mgcv 1.8-13, minqa 1.2.4, munsell 0.4.3, nlme 3.1-128, nloptr 1.0.4, nnet 7.3-12, parallel 3.3.0, pbkrtest 0.4-6, plyr 1.8.4, quantreg 5.26, R6 2.1.2, RColorBrewer 1.1-2, rpart 4.1-10, scales 0.4.0, SparseM 1.7, splines 3.3.0, stringi 1.1.1, stringr 1.0.0, tibble 1.1, tools 3.3.0

Results

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Structure of the report files

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Summary statistics

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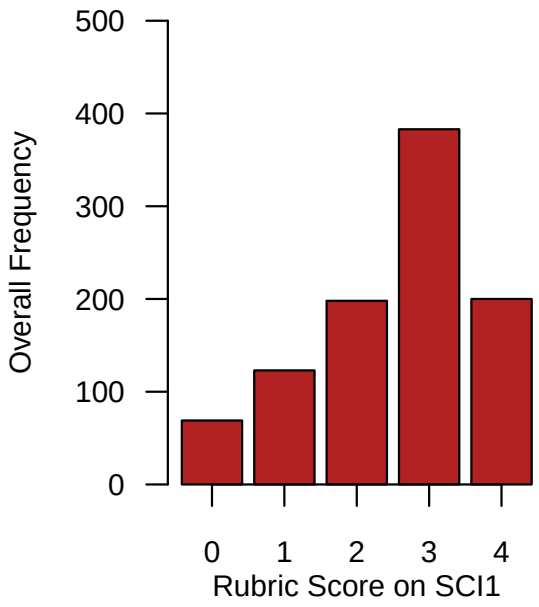

Figure 1. A histogram of the distribution of individual rubric score frequencies over all twelve semesters.

The overall overall average rubric score for all 13 semesters was 2.54. The distribution of the rubrics scores is shown below.

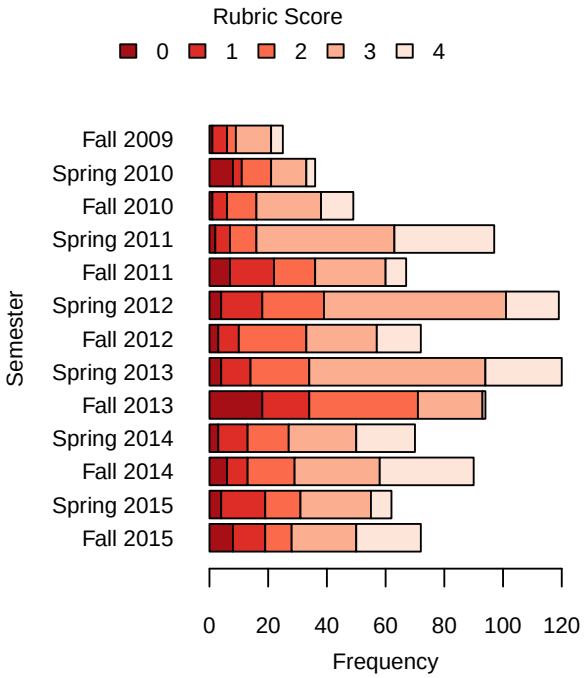

Figure 2. A barplot showing the distribution of rubric scores broken down by semester.

Table 2. One-way ANOVA analysis of scores by semester

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Semester	12	142.74	11.89	9.85	0.0000
Residuals	960	1159.22	1.21		

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Meta-analysis

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$$\cos^3\theta = \frac{1}{4}\cos\theta + \frac{3}{4}\cos 3\theta \tag{1}$$

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3. Third item in a list

Reference to Figure 4.

Discussion

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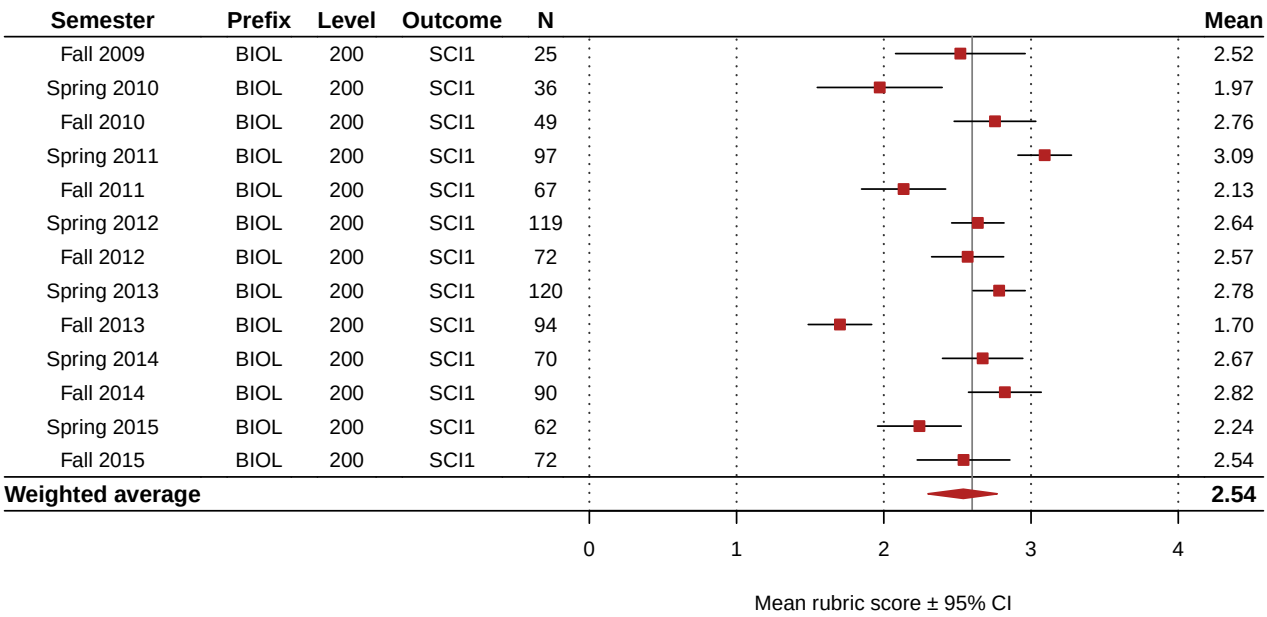

Figure 3. A forest plot of the average scores for each semester with a weighted mean estimate for the entire period investigated. Error bars indicate the 95% confidence intervals.

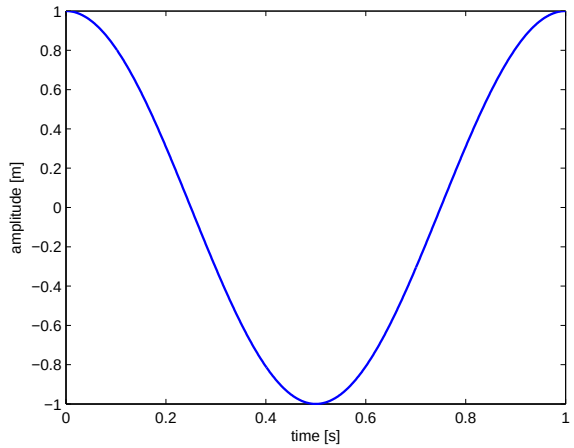

Figure 4. In-text Picture

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Table 3. Table of Grades

Name		
First name	Last Name	Grade
John	Doe	7.5
Richard	Miles	2

Faculty feedback

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Word Definition

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- No modifications
- Modify the assignment
- Modify instruction
- Modify the learning outcome
- Modify the competency

Acknowledgments

So long and thanks for all the fish (Figueredo and Wolf, 2009).

References

Figueredo, A. J. and P. S. A. Wolf (2009). “Assortative pairing and life history strategy - a cross-cultural study.” In: *Human Nature* 20, pp. 317–330.