FERRIS STATE UNIVERSITY

General Education Report*

Quantitative Literacy Outcome QNT3, Fall 2017

Dr. Clifton Franklund
General Education Coordinator

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Contents

Abstract

"Assessment is not a spreadsheet; it's a conversation." — Irmeli Halinen

This report is a proof-of-concept for the proposed General Education assessment strategy at Ferris State University. Course-level student assessment data was gathered using TracDat and de-identified using a custom script. The clean and tidy data set was used to generate this report in both PDF and HTML formats with the bookdown package for the R statistical programming language. A total of 21 semesters of student performance on a lecture exam were used to evaluate student competency on Ferris Learning Outcome (FLO) SCI1. A meta-analysis of these data demonstrated that performance was essentially at the criterion of success. There was substantial variation in enrollment and course performance over the time span examined The utility of reports like these to analyze, distribute, and act up General Education assessment data will be investigated using faculty focus groups in the fall of 2016.

Introduction

This report is an actual analysis of real course-level assessment data from a 200-level Biology course. However, its primary purpose is to serve as a proof-of-concept for the new General Education assessment process at Ferris State University. Assessment is perhaps best viewed as a scholarly activity that is focused upon programmatic improvement. Such scholarly work should be built upon, and contribute to, the relevant professional literature (?). To emphasize that reality, this report is formatted in the form of a journal article. This report, and ones like it, will be authored, published, and cited in future work to support the development and improvement of the General Education program at Ferris.

Methods

Collection of assessment data

Student performance on the first lecture exam in a 200-level Biology course was analyzed. The content assessed in all exams was biological diversity. However, the number and format of the questions used varied by semester. Individual student scores were collected using the new General Education Natural Sciences "scores" data workbook for 21 semesters. Student scores were automatically converted to a rubric score by the workbook using the equivalencies shown in Table ??.

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Table 1: Conversion of percentages to rubric scores

Percent Correct	Rubric	Interpretation
0.0 to 49.0%	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

These workbook files contain personally identifiable information (PII) and are, therefore, subject to FERPA regulations. For this reason, they are not directly shared. Instead, they are permanently housed within the Proof_of_Concept folder under Core Competency: Natural Sciences in TracDat.

De-identification of student data

Copies of the 21 data files were downloaded from TracDat. An R aggregator script was used to read the data from these data sheets and concatenate it into one data set in a destructive process – the downloaded copies were deleted in the process. Student names and identification numbers were redacted 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 no one. The de-identified data set contains 748 student entries and is formatted as a comma-delimited text file (mathData.csv).

Data provenance

Data provenance refers to a system that permits tracking of the origin, movement, modification, and utilization of data sets (?). The provenance of General Education data will be explicitly declared to facilitate the reproducibility and extensibility of these studies.

Location of public website files

All files related to this report can be found online at the Open Science Framework (?). This site contains all of the files needed to reproduce this report from the de-identified data set. The site's url is https://osf.io/t6u8m/.

Session information

This report was written using RStudio (?) and the R statistical programming language (?). These products are free to download for PC, Macintosh, and Linux operating systems. The following information pertains to the session parameters used to generate this report. If you have trouble reproducing this report, it may be due to different session parameters. You may contact Dr. Franklund if you need assistance.

R version 3.5.1 (2018-07-02)

Platform: x86_64-apple-darwin15.6.0 (64-bit)

locale: en_US.UTF-8||en_US.UTF-8||en_US.UTF-8||C||en_US.UTF-8||en_US.UTF-8

attached base packages: grid, stats, graphics, grDevices, utils, datasets, methods and base

other attached packages: forestplot(v.1.7.2), checkmate(v.1.8.5), magrittr(v.1.5), weights(v.1.0), mice(v.3.3.0), gdata(v.2.18.0), Hmisc(v.4.1-1), Formula(v.1.2-3), survival(v.2.42-6), lattice(v.0.20-35), moments(v.0.14), modeest(v.2.1), pander(v.0.6.2), forcats(v.0.3.0), stringr(v.1.3.1), dplyr(v.0.7.6), purrr(v.0.2.5), readr(v.1.1.1), tidyr(v.0.8.1), tibble(v.1.4.2), ggplot2(v.3.0.0) and tidyverse(v.1.2.1)

loaded via a namespace (and not attached): httr(v.1.3.1), jsonlite(v.1.5), splines(v.3.5.1), modelr(v.0.1.2), gtools(v.3.8.1), assertthat(v.0.2.0), latticeExtra(v.0.6-28), cellranger(v.1.1.0), yaml(v.2.2.0), pillar(v.1.3.0), backports(v.1.1.2), glue(v.1.3.0), digest(v.0.6.17), RColorBrewer(v.1.1-2), minqa(v.1.2.4), rvest(v.0.3.2), colorspace(v.1.3-2), htmltools(v.0.3.6), Matrix(v.1.2-14), plyr(v.1.8.4), pkgconfig(v.2.0.2), broom(v.0.5.0), haven(v.1.1.2), bookdown(v.0.7), scales(v.1.0.0), lme4(v.1.1-18-1), htmlTable(v.1.12), withr(v.2.1.2), pan(v.1.6), nnet(v.7.3-12), lazyeval(v.0.2.1), cli(v.1.0.0), crayon(v.1.3.4), readxl(v.1.1.0), mitml(v.0.3-6), evaluate(v.0.11), nlme(v.3.1-137), MASS(v.7.3-50), xml2(v.1.2.0), foreign(v.0.8-71), tools(v.3.5.1), data.table(v.1.11.8), hms(v.0.4.2), munsell(v.0.5.0), cluster(v.2.0.7-1), bindrcpp(v.0.2.2), compiler(v.3.5.1), rlang(v.0.2.2), nloptr(v.1.2.1), rstudioapi(v.0.7), htmlwidgets(v.1.3), base64enc(v.0.1-3), rmarkdown(v.1.10), gtable(v.0.2.0), R6(v.2.2.2), gridExtra(v.2.3), lubridate(v.1.7.4), knitr(v.1.20), bindr(v.0.1.1), jomo(v.2.6-4), rprojroot(v.1.3-2), stringi(v.1.2.4), parallel(v.3.5.1), Rcpp(v.0.12.18), rpart(v.4.1-13), acepack(v.1.4.1), tidyselect(v.0.2.4) and xfun(v.0.3)

Processing instructions

This project produced a computationally reproducible assessment report (this document). Anyone wishing to recreate this report from the source document will need to install the following on their computer:

1. An installation of the R programming language
2. An installation of the RStudio IDE
3. An installation of LaTeX

The necessary source files include the de-identified data set (BIOL200Data.csv), Rmarkdown code files (index.Rmd, 01-Introduction.Rmd, 02-Methods.Rmd, 03-Results.Rmd, 04-Discussion.Rmd, and 05-References.Rmd), bibtex reference file (references.bib), and custom art file in the /art folder.

To process the files, you must first open the project in RStudio. Click on the "Build Book" button in the Build menu. Bookdown allows you to build this project as git_book (html site), pdf_book (via LaTeX), or epub_book (compatible with iBooks and other e-book readers).

Citation of this work

Results

This document itself is the primary result of the project. It will be shared with members of the General Education Committee, Academic Senate, and the Department of Mathematics at Ferris State University. Their comments and suggestions will be included in the Discussion.