# Introduction

## Rationale

Technological advancement has led to the emergence of big data (Gould & Çetinkaya-Rundel, 2014) making data inevitable in our daily life. In addition, powerful computers are now easily available . These developments gave way to the emergence of data science as a field. As a result, the practice of statistics has dramatically changed and has distanced away from statistics education (Finzer, 2013; Wood, Mocko, Everson, Horton, & Velleman, 2018; Zeiffler, Garfield, & Fry, 2018). In this regard, Gould (2010), Horton et al. (2015), Horton (2015) and Hardin et al. (2015) pointed out the importance of data management skills and its integration in introductory and second courses in statistics. Nonetheless, some measures are already in place to lessen the gap between statistical practice and statistics education. In 2005, Franklin et al. (2007) put forth the Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report recommending a framework for statistics education both in the k to 12 and college level. In 2016, the GAISE College Report ASA Revision Committee (2016) revisited the effectiveness of the framework and still found it effective. The framework is now the standard in statistics education in the United States and in many countries that adopted it (Zeiffler et al., 2018).

In the GAISE report, one noteworthy recommendation is the “use of technology to explore concepts and analyze data.” Studies have shown that the use of technology can really improve statistics education; equipping learners with relevant data skills and effective powerful tools in this era where data is very much abundant (Chance, Ben-Zvi, Garfield, & Medina, 2007; Chance & Rossman, 2006; Çetinkaya-Rundel & Rundel, 2017; Doi, Potter, Wong, Alcaraz, & Chi, 2016; Harraway, 2012; Stander & Dalla Valle, 2017). Nonetheless, there is no single statistical computing tool that fits all statistical tasks (McNamara, 2018). However, introductory statistics students should be taught a common statistical package such as SAS, SPSS, or R (R Core Team, 2018), enthusing them to continuously learn statistics technology since statistical tools are diverse and eventually evolve through time (Gould et al., 2018).

In our country, leading universities are aware of this issue and have already integrated the use of technology in their curriculum for statistics education. The University of the Philippines for example uses a number of software in its introductory statistics courses and statistics courses (eg. R with RStudio, Python, SAS, SPSS, Stata, MS Excel, QGIS, ArcGIS, Gephi, yEd Graph Editor, and more). Most of the software used are opensource.

In the province, some universities have acquired SPSS to teach statistics courses. On the other hand, some still uses calculators to do and teach statistical computing. Unfortunately, both setup do not lessen the gap between statistics education and statistical practice. In reality, most institutions to which graduates from these universities get employed cannot afford SPSS. One can choose MS Excel as an alternative, however its functions are limited (Biehler, Ben-Zvi, Bakker, & Makar, 2013).

Reproduciblequite

The gap between statistical practice and statistics education.

barriers in using technology (price)

R and RStudio

Efforts in the Philippines

## Statement of the Problem

1. What are the profile variables of the respondents?
2. What are the technology readiness index scores, calculator test scores, and the RStudio test scores of the respondents?
3. What are the technology readiness index scores, the calculator test scores, and the RStudio test scores of the respondents when grouped according to the profile variables?
4. Is there significant difference in the technology readiness index scores, the calculator test scores, and the RStudio test scores of the respondents when grouped according to the profile variables?
5. Is there a significant relationship between the technology readiness index scores and the RStudio test scores of the respondents?
6. Is there significant difference between the calculator test scores and RStudio test scores of the respondents

## Statement of the Hypothesis

## Significance of the Study

## Research Framework

## Scope

## Definition of Terms

# Review of Related Literature and Studies

The choice of which software to use in teaching statistics can be quite a challenge given a lot of things to consider. It can be a problem similar to bridging the gap between the practice of statistics and statistics education. Tools for learning statistics can be used easily by starters opposite to when using tools for doing statistics (Gould et al., 2018). However,

# Methodology

## Research Design

## Research Environment

## Respondents

## Research Instruments

## Data Gathering Procedure

## Data Analysis

# Results and Discussion

## Profile Variables of the Respondents

### Gender

**Table 1:** Frequency Distribution Gender

|  |  |  |
| --- | --- | --- |
| Gender | Freq | Percentage |
| Female | 5 | 62.5 |
| Male | 3 | 37.5 |
| **Total** | 8 | 100 |

### Have Previous Programming Experience

**Table 2:** Frequency Distribution of Have Previous Programming Experience

|  |  |  |
| --- | --- | --- |
| Prog | Freq | Percentage |
| No | 4 | 50 |
| Yes | 4 | 50 |
| **Total** | 8 | 100 |

### Statistical Computing Tool Preference: Calculator or RStudio

**Table 3:** Frequency Distribution of Respondents’ Statistical Computing Tool Preference

|  |  |
| --- | --- |
| RStudio | Freq |
| Calculator | 0.5 |
| RStudio | 0.5 |

### Age

**Table 3:** Frequency Distribution of Respondents’ Age

|  |  |
| --- | --- |
| Age | Freq |
| 21 | 4 |
| 22 | 2 |
| 24 | 1 |
| 39 | 1 |

Another Table

|  |  |  |
| --- | --- | --- |
| V1 | Tweedledee | Tweedledum |
| Age | 14 | 14 |
| Height | 3’2" | 3’2" |
| Politics | Conservative | Conservative |
| Religion | “New Age” | Syrian Orthodox |

# Reference

Biehler, R., Ben-Zvi, D., Bakker, A., & Makar, K. (2013). Technology for Enhancing Statistical Reasoning at the School Level. In M. A. Clements, A. J. Bishop, C. Keitel, J. Kilpatrick, & F. K. S. Leung (Eds.), *Third International Handbook of Mathematics Education* (pp. 643–690). New York: Springer.

Chance, B., Ben-Zvi, D., Garfield, J., & Medina, E. (2007). The Role of Technology in Improving Student Learning of Statistics. *Technology Innovations in Statistics Education*, *1*(1). Retrieved from <https://escholarship.org/uc/item/8sd2t4rr>

Chance, B., & Rossman, A. (2006). Using Simulation to Teach and Learn Statistics. In A. Rossman & B. Chance (Eds.), *Proceedings of the Seventh International Conference on Teaching Statistics*. Voorburg, The Netherlands: International Statistical Institute.

Çetinkaya-Rundel, M., & Rundel, C. (2017). Infrastructure and Tools for Teaching Computing Throughout the Statistical Curriculum. *The American Statistician*. <https://doi.org/10.1080/00031305.2017.1397549>

Doi, J., Potter, G., Wong, J., Alcaraz, I., & Chi, P. (2016). Web Application Teaching Tools for Statistics Using R and Shiny. *Technology Innovations in Statistics Education*, *9*(1). Retrieved from <https://escholarship.org/uc/item/00d4q8cp>

Finzer, W. (2013). The Data Science Education Dilemma. *Technology Innovations in Statistics Education*, *7*(2). Retrieved from <https://escholarship.org/uc/item/7gv0q9dc>

Franklin, C., Kader, G., Mewborn, D. S., Moreno, J., Peck, R., Perry, M., & Scheaffer, R. (2007). *Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report: A Pre-K-12 Curriculum Framework*. Alexandria, VA: American Statistical Association.

GAISE College Report ASA Revision Committee. (2016). Guidelines for Assessment and Instruction in Statistics Education College Report 2016. Retrieved from <http://www.amstat.org/education/gaise>

Gould, R. (2010). Statistics and the Modern Student. *International Statistical Review*, *72*(2), 297–315. <https://doi.org/10.1111/j.1751-5823.2010.00117.x>

Gould, R., & Çetinkaya-Rundel, M. (2014). Teaching Statistical Thinking in the Data Deluge. In T. Wassong, D. Frischemeier, P. Fischer, R. Hochmuth, & P. Bender (Eds.), *Mit Werkzeugen Mathematik und Stochastik lernen – Using Tools for Learning Mathematics and Statistics* (pp. 377–391). Wiesbaden: Springer Spektrum.

Gould, R., Wild, C. J., Baglin, J., McNamara, A., Ridgway, J., & McConway, K. (2018). Revolutions in Teaching and Learning Statistics: A Collection of Reflections. In D. Ben-Zvi, K. Makar, & J. Garfield (Eds.), *International Handbook of Research in Statistics Education* (pp. 457–472). Cham: Springer.

Hardin, J., Hoerl, R., Horton, N. J., Nolan, D., B. Baumer, Hall-Holt, O., … Ward, M. (2015). Data Science in Statistics Curricula: Preparing Students to “Think with Data”. *The American Statistician*. <https://doi.org/10.1080/00031305.2015.1077729>

Harraway, J. A. (2012). Learning Statistics Using Motivational Videos, Real Data and Free Software. *Technology Innovations in Statistics Education*, *6*(1). Retrieved from <https://escholarship.org/uc/item/1fn7k2x3>

Horton, N. J. (2015). Challenges and Opportunities for Statistics and Statistical Education: Looking Back, Looking Forward. *The American Statistician*, *69*(2), 138–145. <https://doi.org/10.1080/00031305.2015.1032435>

Horton, N. J., Baumer, B. S., & Wickham, H. (2015). Taking a Chance in the Classroom: Setting the Stage for Data Science: Integration of Data Management Skills in Introductory and Second Courses in Statistics. *CHANCE*, *28*(2), 40–50. <https://doi.org/10.1080/09332480.2015.1042739>

McNamara, A. (2018). Key Attributes of a Modern Statistical Computing Tool. *The American Statistician*. <https://doi.org/10.1080/00031305.2018.1482784>

R Core Team. (2018). *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <https://www.R-project.org/>

Stander, J., & Dalla Valle, L. (2017). On Enthusing Students About Big Data and Social Media Visualization and Analysis Using R, RStudio, and RMarkdown. *Journal of Statistics Education*, *25*(2), 60–67. <https://doi.org/10.1080/10691898.2017.1322474>

Wood, B. L., Mocko, M., Everson, M., Horton, N. J., & Velleman, P. (2018). Updated Guidelines, Updated Curriculum: The GAISE College Report and Introductory Statistics for the Modern Student. *CHANCE*, *31*(2), 53–59. <https://doi.org/10.1080/09332480.2018.1467642>

Zeiffler, A., Garfield, J., & Fry, E. (2018). What is Statistics Education? In D. Ben-Zvi, K. Makar, & J. Garfield (Eds.), *International Handbook of Research in Statistics Education* (pp. 37–70). Cham: Springer.