



Statistics Students' Perception of Including a Course Project on Their Attitudes Toward Statistics

Mishaal Farooq, Sarah Mansoor

Computational Sciences, University of Toronto Mississauga, Computational Sciences, University of Toronto Mississauga

Abstract

The word statistics has preconceived notions in education, from high school to university students. These preconceived notions about statistics can sometimes steer students away from taking statistics courses. In this qualitative research study, we used thematic analysis to interpret students' anonymous survey responses from STA258: Statistics with Applied Probability about their perception of including a statistics course project, working with peers in small groups and using a free statistical software R to code and to analyze a realistic data. Three main themes emerged from our analysis of the qualitative data: 1) Students appreciated having had a hands-on learning experience opportunity in a statistics course, working with realistic data, and applying the skills they learned in the course in their statistical course project. 2) Students found that the inclusion of a course project enabled them to gain more practical and technical skills in terms of how to conduct statistical analyses using R. 3) Students described that the course project fostered the development of their statistical communication skills. Students practiced course contents on an ongoing basis so that they could use appropriate statistical terms and vocabularies to communicate and interpret statistical results in effective ways, in writing and orally.

Introduction

Introductory statistics courses make a major impression on students' views and opinions on the subject (Songsore & White, 2018). There have been questions and research on how relevant students believe introductory statistics is and how these courses can be used in other projects (Songsore & White, 2018). In this study, we aim to understand students' perceptions of group collaboration within a statistics introductory course, STA258. The course included 160 students, all of whom answered a set of questions after the completion of their group project. Using thematic analysis of the qualitative data collected from an end-of-course survey, the responses were analyzed. The following questions were asked:

Q1: How did the course project enable you to use and apply statistical concepts and techniques covered in this course?

Q2: How did the course project develop your communication skills in statistics?

Q3: How did the course project facilitate the usefulness, relevance, and worth of statistics in your personal and academic life?

This poster will look at the methods used to analyze the students' responses, the results and themes that emerged from the analysis, and the future work of this research project.

Methods

Thematic analysis:

- Is a method for identifying patterns within data (Braun & Clarke, 2006)
- Offers an accessible and theoretically flexible approach to analyzing qualitative data (Braun & Clarke, 2006)
- Provides core skills that are useful in conducting qualitative analysis (Braun & Clarke, 2006)

Themes in this type of analysis capture important information about the data in relation to the research questions and allow the researchers to present a level of patterned response of meaning within the data (Braun & Clarke, 2006). Some themes may be more recurring than other themes, however, more instances of the theme do not necessarily mean the theme is more important (Braun & Clarke, 2006). Researchers need to make clear and unbiased judgements to determine what themes are relevant and contribute to the research questions. It is important as researchers to analyze recursively rather than linearly. An analysis is not a linear process that goes from one step to the next but recursive where there are movements that go back and forth as needed throughout the steps and this process develops over time in thematic analysis.

Themes

Q1	Q2	Q3
Understanding the meaning behind statistical concepts	Selecting appropriate tools to communicate results effectively	Develop statistical thinking to analyze, interpret, and transfer skills to future data analysis
Visualizing concepts and data effectively using R	Communicate in ways others can understand statistics	Simulated work experience through statistician level experience, workflow, and peer edits
Statistics can be applied to other disciplines (social statistics)	Terms/words used to convey statistics/interpret within the context of data in an understanding way	Communication with data for interpretation and drawing conclusions

Future Work

Through this research and analysis, we have thoroughly understood the use of thematic analysis for qualitative work. The common themes among STA258 students are now understood, along with their attitude toward statistics while completing a group project. The main themes which emerged from the analysis can be summarized as the following: Students appreciated having had a hands-on learning experience opportunity in a statistics course, working with realistic data, and applying the skills they learned in the course in their statistical course project. As well, students felt more enabled to gain more practical and technical skills in terms of how to conduct statistical analyses using R. Students also mentioned that the project fostered the development of their overall statistical communication skills.

With this information and understanding, for the future, we would like to create a more tailored end-of-course survey for future STA258 students. The questions would relate more to the themes that have emerged, and in a sense get a more detailed understanding of the students' perceptions and attitudes. As well, with our findings, we aim to create a course project in STA258 that now considers the feedback that students have provided. We will change some aspects of the project that students seemed to like or dislike. Overall, through this study, detailed information was understood about current and future STA258 students.

References

Bree, R., & Gallagher, G. (2016). Using Microsoft Excel to code and thematically analyze qualitative data: a simple, cost-effective approach.

Bond, M. E., Perkins, S. N., & Ramirez, C. (2012). Students' perceptions of statistics: An exploration of attitudes, conceptualizations, and content knowledge of statistics. *Statistics Education Research Journal*, 11(2), 6-25. <https://doi.org/10.52041/serj.v11i2.325>

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp0630a>

Maguire, M., & Delahunt, B. (2017). Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars.

Schau, C., & Emmiaglu, E. (2012). Do introductory statistics courses in the United States improve students' attitudes? *Statistics Education Research Journal*, 11(2), 86-94. <https://doi.org/10.52041/serj.v11i2.331>

Songsore, E., & White, B. J. (2018). Students' perceptions of the future relevance of statistics after completing an online introductory statistics course. *Statistics Education Research Journal*, 17(2), 120-140. <https://doi.org/10.52041/serj.v17i2.162>

Acknowledgements

STA258 students in Fall 2021 for participating in this study by completing an anonymous graded survey.

Prof. Asal Aslemand

Prof. Luai Al Labadi

Prof. Omidali (Omid) Aghababaei Jazi