Winter 10-27-2020

EXPERIENTIAL STATISTICS - A CASE STUDY IN FAVOR OF USING PROJECT-BASED LEARNING TO ADVANCE PRELIMINARY STATISTICS CONTENT KNOWLEDGE IN THE ALGEBRA I AND GEOMETRY CLASSROOM

Trey Earle

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A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Educational Leadership, Research & Counseling

by
Trey Michael Earle
B.A., Northwestern (LA) State University, 1999
B.S., Louisiana State University, 2013
MAppStat, Louisiana State University, 2016
December 2020

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my family, namely my fiancée, Brandi, my son, Austin, and my parents, Steve Earle and Pamela Culp, each for their unwavering encouragement and support during my "late in life" foray (again) into higher education. My cup truly runneth over with each one of them.

I would also like to thank Professor Eugene Kennedy for taking me on as his student. Your knowledge of statistics is amazing, especially as it relates to education. I find myself more and more wanting to follow in your exact footsteps at whatever university will have me.

I want to thank Professor Angela Webb for introducing me to the power of project-based, inquiry-based, and problem-based learning, and Professor Susan K. MacGregor, for showing me the power of mixed methods research. Dr. Webb showed me the relevance and worthiness of each type and how each can yield great results. Dr. MacGregor taught me the power and rich information that can be taken from deep, qualitative data analysis. Both professors have made this purely "quantitative guy" much more well-rounded in research.

I would also like to thank Professor Kevin McCarter for his support over the last three years. He encouraged the Experimental Statistics Department at LSU to consider me to teach my own course in Advanced Statistical Methods, which gave me the opportunity to lead a more advanced statistics course. I thank him for his expertise and support.

Finally, I want to thank Professor Frank Neubrander, whom I met in the summer of 2004 in my early days as a beginning teacher. After asking me to be a part of the GK-12 project at LSU and sending me to become AP Calculus "certified," I instantly became indebted to him. I consider him to be a very important part of my life, a man who has shaped me into the educator I am today.

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ABSTRACT

Preparing secondary students for college entrance requirements and the expectations of the job market, a market which is actively seeking the employees who are most qualified to take on jobs that require data analysis skills, is becoming increasingly important. Federal, state, and local education administrators and personnel must rewrite many of the general education curricula to incorporate data organization, collection, manipulation, application, and analysis in order to better prepare students for the expectations of college entrance and an ever-changing employment market. From a purely pedagogical standpoint, while traditional educational structure has been commonplace for decades in the United States, projects used as assessment tools are a more progressive way to gauge content understanding and course achievement, especially in mathematics. Algebra I and Geometry students at a lone high school were randomly assigned to participating teachers' classes that were assigned to one of two main treatment groups, one that used projects, the other traditional instruments, as formative assessments, in order to gauge two main goals - the growth in achievement before and after a curricular unit involving statistics and the change in attitudes towards statistics before and after the statistics unit. Using several parametric (paired t testing and MANOVA) and an additional non-parametric statistical analyses on a variety of demographic and class variables and coupled with an interview of participating teachers, the results revealed that projects, from the perspective of both participating students and teachers, often are much more effective in increasing achievement and attitudes towards the science of statistics, especially in the secondary educational years. The results of this study would be useful in rewriting mathematics curriculum to incorporate more focused attention to the science of statistics.

KEYWORDS: project-based learning, statistics education, secondary school mathematics

INTRODUCTION

For some time now, the job market in the United States and around the world has been changing. Decades ago, secondary school graduates who sought employment required only a certain set of job skills, many of a clerical nature, in addition to a basic knowledge of reading, writing and arithmetic. In those days, if a secondary school student had additional trade and vocational skills and he or she had no imminent plans to attend a post-secondary institution, the student would be much more marketable than any average secondary school graduate. Nevertheless, these secondary school graduates certainly could find employment after graduation. For example, in 1973, 72% of all U.S. jobs were held by people who had a high school diploma or less, while in 2020, it is expected that nearly two-thirds (65%) of all jobs will require some form of postsecondary education (Foorahar, 2014). The required skill sets for being employed have changed, though. Today, specific skill sets geared towards the ability to analyze big data are of paramount importance, regardless of primary job discipline.

In fall 2016 LinkedIn™ published a list of the ten most important job skills that employers around the globe are actively seeking in current job applicants. All ten positions were closely related to careers that are heavily weighted towards data manipulation, data mining, and statistical analysis. The top three positions in order on the list were cloud and distributed computing, statistical analysis and data mining, and web architecture and development framework, respectively (Smith, 2016).

The curriculum in most state STEM programs do not include standards and benchmarks for data manipulation, mining and analysis. In the 1950's a course in statistics was rarely taught in the high school classroom, but during this decade the efforts in making statistics a part of the school

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