# A Methodology for Appropriate Testing When Data is Heterogeneous Using EXCEL

**R. Yearout[1], J. Lee[2], K. Nguyen[1], S. Reiser[3], D. Parsons[4], and S. Russell[5]**

[1] Management and Accountancy
[2]Departments of Mathematics
[3]New Media
The University of North Carolina Asheville
Asheville, NC 28804, USA

[4]Department of Business
Mars Hill University
Mars Hill, NC 28754, USA

[5]Department of Statistics
North Carolina State University
Raleigh, NC 27606, USA

Corresponding author's Email: yearout@unca.edu

**Author Note:** Nguyen Khanh graduated from the University of North Carolina Asheville with a degree in Accountancy in May 2015. Jimin Lee, Associate Professor of Statistics, has published many articles in statistics and bio-statistics; she has also published in international industrial engineering journals and spoken in conference proceedings. Donna Parsons, Assistant Professor of Business, has published numerous business articles as well as in industrial engineering journals and spoken in proceedings. Susan Reiser, Professor of New Media, has published a significant number of articles in international journals and proceedings. Sara Russell graduated from North Carolina State University with a Masters of Statistics with a concentration in biostatistics in May 2015,and Robert Yearout, Professor of Industrial Engineering Management, has published a significant number of articles in international journals and proceedings.

**Abstract:** *A Methodology for Appropriate Testing When Data is Heterogeneous* was published in the mid-1990s using Turbo Pascal and a16-bit operating system. This technique of applying linear combinations with adjusted degrees of freedom allows the use of t-Table criteria for group comparisons without using nonparametric techniques. Current operating systems and efficient programming languages have made the software obsolete and unusable. Using the old system could result either in returns being incorrect or the system terminating. The purpose of this research was to develop a spreadsheet (EXCEL) algorithm that will efficiently apply Satterthwaite's Approximation with Bonferroni's Adjustment for solving messy data. A comparison between this technique and EXCEL's Add-Ins Analysis ToolPak for a *t-test Two-Sample Assuming Unequal Variances*was conducted using several different data sets. The results of this comparison were that the EXCEL Add-Ins returned incorrect differences. Industrial engineers, ergonomists, and social scientists will find the program very useful.

*Keywords*: Heterogeneous Data, Unequal Sample Sizes, Satterthwaite's Approximation with Bonferroni's Adjustment, EXCEL