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10-5-2018

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#### Recommended Citation

Hilty, Dale, "Using Visual Images to Teach Variability in a BSN Statistics Course" (2018). *Scholars Showcase 2018: Innovations in Leadership and Learning*. 41.  
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# Using Visual Images to Teach Variability in a BSN Statistics Course

Dale Hilty, PhD



## Background

### Introduction

In educational interventions, Hilty and colleagues (Gish & Hilty, 2018; Hilty, 2017; Hilty, Gish, Gill-Rocha, 2017a, 2017b; Hilty et al., 2017c; Hilty et al., 2018a, 2018b, 2018c, 2018d, 2018e, 2018f) have evaluated teaching strategies for increasing student self-efficacy in relation to statistics. One teaching strategy intervention involved RN Faculty offering 20-minute presentations in their expert areas. A hypothetical database was created based on the RN presentation demonstrating the relationship between the field of nursing and statistics. The database was analyzed using an inferential test(s), and students interpreted the findings (Hagen, Awosoga, Kellett, & Dei, 2013; Neuman, Hood, & Neumann, 2013). The findings of these educational interventions were statistically significant ( $p < .05$ ).

### Summary of Hilty et al. Research Design

Research Question:

How do nursing students in a statistics course, with a cognitive-affective intervention, perceive the role of statistics in nursing practice at the completion of the course?

- *Cognitive Motivation*: Statistics Required Course for Completion of BSN Degree & Maintain Current GPA. Goal(s)
- *Affective Obstacles*: Math & Statistical Anxiety, K-12 Inadequate Math Instructional Foundation & Non-Rewarding Teaching Strategies

Goals:

- To Build Motivation & Self-Efficacy for Learning & Applying Statistics in Nursing Students.
- Use Bandura's observational learning stages: Attention to behavior, Create memory of the behavior, Transform memory representation into an action, & Motivation to initiate the behavior (Bandura, 1986)
- Develop an Interdisciplinary Team of Nursing & Statistics Faculty to achieve positive cognitive and affective student outcomes (Alberto & Herth, 2009).

Objectives:

- Increase Positive Self-Efficacy & Appreciation for Statistics (Bandura, 1986).
- Disengagement from Negative Thoughts about Statistics.
- Developing Student Competency with Statistics & Nursing (Oernann, 2015).
- Apply Statistics & Nursing Practice to Chronic Disease Prevention, Patient Education, & Clinical Decision-Making.

Independent Variables:

Resources

- Interdisciplinary Statistics & Nursing Faculty Team (Alberto & Herth, 2009)
- Developed hypothetical data set based on published researching for Chronic Diseases
- SPSS software
- Related trends in the data to risk factor stratification to Chronic Diseases
- Application of Statistical finding to EBP in Nursing

## Background (Cont'd)

Plan:

- 20-minute presentation by nursing faculty (i.e., caring, angina, hypertension, leadership, food desert, mental health, death/dying)
- 10-minute demonstration by the statistics faculty converting nursing constructs to nursing variables
- Students received a graded worksheet assignment and interpreted the SPSS findings based on ANOVA and linear regression.
- Interdisciplinary faculty reported experiential learning (Alberto & Herth, 2009)

Dependent Variable:

Participants answered pre/post-test assessing knowledge about the 20 minute nursing faculty presentations and the 10 minute statistics and nursing faculty presentation of the hypothetical data base and SPSS findings.

## Methods

In this educational intervention, a 60-minute lecture integrating a visual image for the concepts of standard deviation and the variances with basic introductory instruction was presented to the participants (N=59). Students completed pre- and post-test visual image rating (Likert 5-point scale). Using SPSS 25, a dependent t-test analysis would be used to analyze the pre- and post-test ratings. Hypothesis: There would be a difference between the pre- and post-test ratings.

## Results & Discussion

The dependent t-test found a significant difference ( $t(58) = 23.407, p = .001$ ) between pre- and post-test visual image ratings. The mean pre-test rating was 1.31 and the mean for the post-test rating was 4.14, for a mean gain of 2.829.

Further research investigations are required to specifically explore the role of visual images as a statistics teaching strategy. Plans to evaluate the relationship among critical thinking, visual (images) thinking, and verbal thinking in the statistics classroom environment are being designed will be implemented in the near future.

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