Abstract

Readers of mass media often do not understand statistics used or how to interpret the results indicating a need to verify and interpret printed information (Tal, 2016; von Roten, & de Roten, 2013; von Roten, 2016). This supports the need to analyze the PAWS data to check the accuracy of the newspaper headline.

Franke, Ho, and Christie (2012) analyzed articles that used chi-square analysis in four journals. Unfortunately, they found many instances where researchers “over interpret or incorrectly interpret the results” (Franke, et al., 2012). Thus, there is a need to show how to correctly use chi-square analysis.

Chandranitha (2014, 2015) noted that people have a difficult time understanding hypothesis testing. Analysis of state and district data will show researchers how to use their local data for data driven decisions.

Relevant Literature

The Programme for International Student Assessment (PISA) noted that in several countries, including the US, “boys outperform girls by more than 20 score points, close to one-third of a proficiency level” in Mathematics (OECD, 2011). This led to the last research question.

Research Questions

Local newspaper headlines and articles expressing concern about readers understanding of statistical information led to the development of the first two research questions.

RQ1: Was the distributions of PAWS Math scores in LCSD#1 in 2013-14 and 2014-15 significantly different or not?

RQ2: Was the distributions of PAWS 2014-15 Math scores for LCSD#1 and Wyoming state scores significantly different or not?

RQ3: Is there a significant relationship between gender and 2014-15 PAWS Math scores in LCSD#1?

Procedures

The Wyoming Department of Education (WDE) website lists proficiency information which can be filtered by district, grade level, and content area. Data use in the study is shown in Tables 1 and 2. The data shows a range of 10 for the number of students taking the assessment and the percent of students in each proficiency level.

Findings

RQ1: The fourth grade students showed no difference in Math PAWS scores proficiency distribution from 2013-14 to 2014 – 15, $\chi^2(3, n = 2149) = 3.77, p = .29$, which is also supported by a small effect size ($V = 0.04$).

RQ2: The LCSD#1 fourth grade Math PAWS scores proficiency distribution were different than state scores, $\chi^2(3, n = 1054) = 830.69, p < .001$, with a small to medium effect size ($V = 0.26$).

RQ3: The fourth grade Math PAWS scores proficiency for 2014 – 15 students showed that gender and proficiency level are independent, $\chi^2(3, n = 1062) = 4.33, p = .29$, which is also supported by a small effect size ($V=0.06$).

Conclusions

The first conclusion was that the newspaper headline of a drop in scores was not supported by the data for fourth graders in LCSD#1.

The second conclusion was that PISA study indicating a difference in scores by gender was also not supported for fourth graders in LCSD#1.

However, the analysis did indicate that LCSD#1 fourth grade student scores were lower than the state scores.

Social Change Implications

This study shows that data driven decisions should be made based on statistical analysis and not just descriptive data. When researchers and educators accurately analyzing their data for statistical significance, the quality of educational studies will be improved and have more credibility.