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Assignment 1

EDTC 810: Statistics for Educational Research

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Statistical Inferences in the Media

Introduction:

This project is based on two examples of statistical inferences in the media related to Science, Technology, Engineering and Math (STEM). The first study was based on the findings from U.S. News and World Report in which 500 public schools were ranked on their STEM performance. The second article was retrieved from the Journal of STEM Education: Innovation and Research. The article was based on the interests of both male and female middle school students in STEM related topics prior to attending the STEM summer program and throughout the course of the year.

Part 1: Mainstream Media

 In a recent study, 500 public high schools were ranked based on their performance in mathematics and science. The top performing schools were ranked as Best High Schools for STEM methodology in U.S. News & World Report. High Schools that had been previously ranked as a gold medal winner for the 2015 U.S. News Best High School Rankings were eligible to participate. The eligible schools were judged nationally based on their level of success on mathematics and science data using the Advanced Placement STEM test data for 2013 graduates. The data was used as the benchmark to conduct the analysis.

 According to the College Board, AP STEM math courses include AP courses in Calculus AB, Calculus BC, Computer Science A and Statistics; STEM AP science courses include Biology, Chemistry, Environmental Science, Physics B, Physics C: Electricity and Magnetism and Physics C: Mechanics (Morse, 2015).

The STEM Achievement Index was used to determine math and science performance for each of the 500 schools. The STEM Math Achievement Index was based on the percentage of AP test takers from the graduating class of 2013 who took at least one STEM math course which was weighted at 25 percent. The second percentage was based on the number of AP students that had passed an AP STEM math test with a score of 3 or higher. The weight of this variable was 75% (Morse, 2015). The STEM Science Achievement Index was calculated similar to the manner in which the STEM Math Achievement Index was calculated. The maximum STEM Achievement Index value was 100 and the highest index that was recorded was 98.3.

As part of the next phase of the process, the combined scores of both the STEM Math and Science Achievement Index were calculated with each category weighing 50 percent. The combined scores were calculated to create a composite value which is known as the STEM Achievement Index Score. The scores were then recorded in descending order. Not enough information is provided in this article to determine the p-value of the test, the mean, the median, the mode and the standard deviation.

Part 2: Scholarly Article

The participants in this study were primarily middle school students from a rural district which were involved in a STEM summer program with academic year follow-up requirements. The purpose of this study was to measure the participants’ interests in, aptitude for, and enjoyment of science, mathematics, technology and other content areas including English and social studies.

As part of the study, the students were required to complete a questionnaire which assessed the study habits of the participants and their related behaviors. The questionnaire was based on general science and mathematics related items using a 5-point Likert-type measure. The scaled responses ranged from “a lot like me” to “not like me at all” and were used to measure study habits and behaviors. The questionnaire was completed by the participants before the beginning of the summer program, then at the beginning of the fall semester and lastly during the following spring (Naizer, Hawthorne, and Henley, 2014, p. 30).

During the initial year, 32 students took part in the questionnaire. The participants consisted of (21) sixth graders, (1) fifth grader, (9) seventh graders and (1) eighth grader. The group was comprised of 17 females and 15 males from all from rural areas in neighboring school districts. The following year, data was gathered on 34 students. The participants were comprised of (21) sixth graders, (12) seventh graders and (1) eighth grader. There were 18 females and 16 males involved in the study which was representative of the demographics in their rural communities. Due to the fact that the sample size was small, a Mann-Whitney U test was conducted to determine if there were any differences (at p < .05) between males and females on their responses to the questionnaire. Different response patterns were noted between the first year and the second year (Naizer et al., 2014, p. 31).

During the initial year, there was sufficient evidence to indicate that the program had a positive impact on the female students; furthermore, differences in attitudes about science had disappeared by the spring follow-up. The subsequent year, there were minimal gender differences between the female students and their male counterparts. Each year, after completing the program, the students were asked to provide retrospective data regarding changes in attitude that had taken place throughout program. The students used a 6-point Likert scale (1-strongly disagree through 6-strongly agree) to indicate their level of agreement. The students recorded how they felt at the present time and how they would have answered at the beginning of the camp (Naizer et al., 2014, p. 32).

A Mann-Whitney U test was conducted to determine if there were any differences between how students thought they would have responded compared to how they actually felt at the conclusion of the camp. The differences noted were significant with students indicating that they had developed an appreciation of STEM related careers and activities. Students also indicated positive attitudes towards attending college as a result of their work at the camp.

The retrospective data which was reported during the initial year (See Table 1) and the data from the subsequent year (See Table 2) both indicate a p-value (p < .05) based on the z-score. Given the fact that the p-value is (p<.05) this would likely indicate a high probability against the H0.

Table 1. Retrospective Data: Initial Year



**Source:** Journal of STEM Education, Narrowing the Gender Gap: Enduring Changes in Middle School Student’s Attitude Toward Math, Science and Technology: 2014

Table 2: Retrospective Data: Subsequent Year



**Source:** Journal of STEM Education, Narrowing the Gender Gap: Enduring Changes in Middle School Student’s Attitude Toward Math, Science and Technology: 2014

References

Morse, R. (2014, May 11). U.S. News & World Report. (Web Log Post). Retrieved from

<http://www.usnews.com/education/best-high-schools/articles/stem-rankings-methodology>

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