

### Introduction

ATI TEAS SmartPrep is a self-directed tutorial and the most comprehensive preparation method available for the ATI TEAS test. SmartPrep aligns to the ATI TEAS exam blueprint, which means the lessons and questions are weighted according to the subjects tested by TEAS. SmartPrep features a pretest for each module, 65 lessons, more than 650 questions, comprehension checks at the end of each lesson, targeted remediation, and a posttest for each module.

TEAS SmartPrep is designed to help students focus on their weaknesses, so each of the four content modules starts with a diagnostic test that helps students understand what they know – and what they don't. Then SmartPrep creates a personalized study plan based on their results. Whether students are preparing for their initial TEAS attempt or seeking to improve their original TEAS score, ATI TEAS SmartPrep is the only customizable, learner-directed TEAS prep solution on the market. Aligned to the ATI TEAS exam blueprint, SmartPrep prepares students to succeed in the subjects that lead to better ATI TEAS scores.

Since the release of the program in October 2016, students' SmartPrep data as well as their ATI TEAS test score data have been collected for evaluating the effectiveness of the SmartPrep program in improving ATI TEAS performance. This report describes the approach used, summarizes the findings, and discusses the implications for nurse educators.

### General Findings

The total scores achieved before and after the use of the SmartPrep program were compared for estimating the gains in ATI TEAS proctored test total scores. Because pre-post score gains might be expected to vary based on initial ATI TEAS score, users were divided into two groups based on their initial ATI score, and differential gains by starting status were examined. The two groups were defined as “below Proficient” and “Proficient and above” based on the ATI TEAS preparedness levels previously defined<sup>1</sup>. The general findings are summarized as follows:

1. The use of the SmartPrep program in each subject alone helped improve ATI TEAS total score by 7.5% points on average.
2. Below Proficient-status students improved at a higher rate than Proficient-status students, with about 2.0%-point more gains.
3. For the Below Proficient students, over half (about 55%) achieved a score at or above Proficient level after the use of the SmartPrep program.

*<sup>1</sup>“Below Proficient” is defined as achieving a total score below 58.7% on ATI TEAS test. Proficient level is defined as achieving a total score of 58.7% or more on ATI TEAS test. Please refer to the TEAS V National Standard Setting Study document for more details.*

## Methods

The effectiveness of SmartPrep programs was evaluated using a pretest–posttest approach. Pretest–posttest designs are widely used in behavioral research for measuring change resulting from an intervention program. The procedures for this design involve obtaining a pretest measure of the outcome of interest prior to administering some treatment, followed by a posttest on the same measure after treatment occurs.

The pretest and posttest measure in this study is the ATI TEAS test. The treatment program is the SmartPrep program. The measurement of change is the total score difference on the ATI TEAS test before and after the use of the SmartPrep program.

To obtain a valid sample for this study, only SmartPrep users who had ATI TEAS proctored test scores both before and after the program were included. It is often observed that students may attempt ATI TEAS test two or more times. For this analysis, only pretest attempts taken within a month before the program started and posttest attempts taken within a month after the program ended were included. The total scores from these two attempts were used as the pretest and the posttest measure for change. Students whose pretest and posttest were taken outside the specified interval were excluded. The requirement for a short interval was to ensure that the measurement of change was indeed due to the effect of the intervention rather than learning (from some other source) or maturation.

Multiple statistical and graphical approaches were utilized to analyze the change of total scores on the pretest and posttest TEAS. Descriptive statistics as well as a paired t-test examined the change in means from pretest to posttest. Cross tabulation analysis examined the change in means by starting status.

## Sample

Data from SmartPrep users were collected from its release date of October 13, 2016, through January 24, 2018. Table 1 depicts the breakdown of the demographic variables of the final sample by each SmartPrep content area. Because a single individual could complete more than one content area, there is some overlap in the samples for each content area. The demographic table shows heterogeneous characteristics of the sample demographics.

**Table 1** Demographic table for SmartPrep Samples

| Group     | Category          | English |       | Math |       | Reading |       | Science |       |
|-----------|-------------------|---------|-------|------|-------|---------|-------|---------|-------|
|           |                   | N       | %     | N    | %     | N       | %     | N       | %     |
| Gender    | Female            | 181     | 82.3  | 124  | 80.5  | 141     | 82.5  | 160     | 82.1  |
|           | Male              | 22      | 10.0  | 15   | 9.7   | 18      | 10.5  | 20      | 10.3  |
| Language  | English - US      | 183     | 83.2  | 127  | 82.5  | 140     | 81.9  | 160     | 82.1  |
|           | French - France   | 1       | 0.5   | 1    | 0.6   | 2       | 1.2   | 2       | 1.0   |
|           | Other             | 13      | 5.9   | 10   | 6.5   | 13      | 7.6   | 14      | 7.2   |
|           | Spanish - Mexico  | 6       | 2.7   | 4    | 2.6   | 5       | 2.9   | 7       | 3.6   |
| Program   | ADN               | 131     | 59.5  | 95   | 61.7  | 102     | 59.6  | 112     | 57.4  |
|           | ATI Allied Health | 0       | 0.0   | 0    | 0.0   | 1       | 0.6   | 1       | 0.5   |
|           | Allied Health     | 4       | 1.8   | 4    | 2.6   | 4       | 2.3   | 4       | 2.1   |
|           | BSN               | 59      | 26.8  | 39   | 25.3  | 46      | 26.9  | 54      | 27.7  |
|           | Diploma           | 2       | 0.9   | 2    | 1.3   | 2       | 1.2   | 2       | 1.0   |
|           | LPN to RN         | 1       | 0.5   | 0    | 0.0   | 0       | 0.0   | 0       | 0.0   |
|           | Other             | 3       | 1.4   | 3    | 1.9   | 4       | 2.3   | 3       | 1.5   |
|           | PN                | 18      | 8.2   | 10   | 6.5   | 10      | 5.8   | 19      | 9.7   |
|           | Testing Center    | 2       | 0.9   | 1    | 0.6   | 2       | 1.2   | 0       | 0.0   |
| Ethnicity | African American  | 35      | 15.9  | 25   | 16.2  | 27      | 15.8  | 32      | 16.4  |
|           | Asian             | 24      | 10.9  | 15   | 9.7   | 25      | 14.6  | 22      | 11.3  |
|           | Caucasian/White   | 105     | 47.7  | 73   | 47.4  | 78      | 45.6  | 92      | 47.2  |
|           | Hispanic          | 24      | 10.9  | 21   | 13.6  | 18      | 10.5  | 27      | 13.8  |
|           | Native American   | 1       | 0.5   | 1    | 0.6   | 1       | 0.6   | 1       | 0.5   |
|           | Other             | 9       | 4.1   | 5    | 3.2   | 7       | 4.1   | 6       | 3.1   |
| Region    | Midwest           | 39      | 17.7  | 26   | 16.9  | 26      | 15.2  | 31      | 15.9  |
|           | Northeast         | 39      | 17.7  | 31   | 20.1  | 30      | 17.5  | 37      | 19.0  |
|           | South             | 81      | 36.8  | 58   | 37.7  | 68      | 39.8  | 74      | 37.9  |
|           | West              | 52      | 23.6  | 36   | 23.4  | 44      | 25.7  | 47      | 24.1  |
|           | Total             | 220     | 100.0 | 154  | 100.0 | 171     | 100.0 | 195     | 100.0 |

## Results

Table 2 reports the descriptive statistics and t-test results for pretest and posttest comparison of ATI TEAS scores by SmartPrep content area completed. For students taking each content area of the SmartPrep, the mean total score on pretest TEAS was around 61% (SD =12.0) and the mean total score on posttest TEAS was around 68.5% (SD = 12.0). On average, the mean growth was about 7.5% points from pretest to posttest on each of the SmartPrep content areas. The mean growth was statistically significant as shown by the t-test results,  $t(219)=18.1$ ,  $p<.01$ , for SmartPrep English;  $t(153)=14.9$ ,  $p<.01$ , for SmartPrep Math;  $t(170)=15.8$ ,  $p<.01$ , for SmartPrep Reading; and  $t(194)=16.0$ ,  $p<.01$ , for SmartPrep Science.

The distribution of the pretest and the posttest total scores is compared in histograms in Appendix A for each SmartPrep content area. The distributions show that overall the posttest scores were higher than the pretest scores.

The total sample was divided into two groups based on ATI TEAS pretest preparedness level: below-Proficient students (with ATI TEAS total score lower than 58.7%) and Proficient students (with ATI TEAS total score equal to 58.7% or higher). Table 3 displays the mean gain scores for each group. On average, the below-Proficient group achieved an 8.5% – 8.9% gain and the Proficient group a 6.6% – 6.8% gain. Students in the below-Proficient group achieved, on average, a gain of approximately 2.0 percentage points more than students in the Proficient group. The result is also graphically shown in Figure 1. The red bar represents the below-Proficient group and the blue bar represents the Proficient group. The length of the bars represents the magnitude of the gain. All the red bars are about two points longer than the blue bars.

An examination of the below-Proficient group indicated that a substantial number of students were able to achieve the Proficient level after using the SmartPrep program. As shown in Table 4, of all the below-Proficient students, the percentage of achieving Proficient level by SmartPrep content area completed is about 52% (49 out of 94) for SmartPrep English; 54% (39 out of 72) for SmartPrep Math; 57% (40 out of 70) for SmartPrep Reading; and 56% (50 out of 90) for SmartPrep Science.

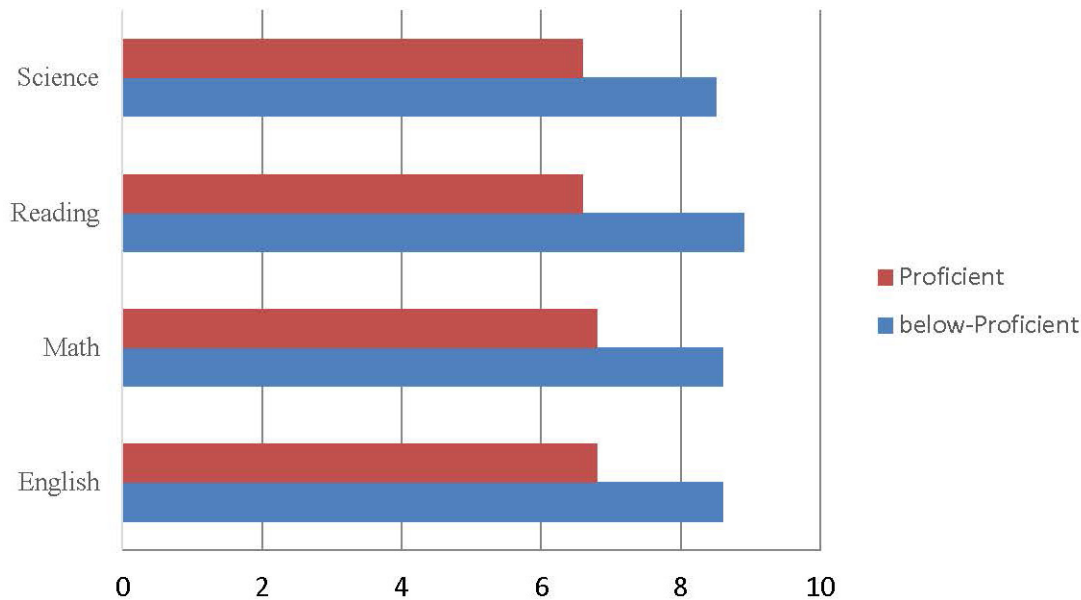
**Table 2** Results of t-test and Descriptive Statistics for ATI TEAS Total Scores by SmartPrep program

|         | n   | Pretest |       | Posttest |       | Mean Difference | 95% CI for Mean Difference | t       | df  |
|---------|-----|---------|-------|----------|-------|-----------------|----------------------------|---------|-----|
|         |     | M       | SD    | M        | SD    |                 |                            |         |     |
| English | 220 | 60.92   | 11.84 | 68.49    | 12.09 | 7.57            | 6.74, 8.40                 | 18.05** | 219 |
| Math    | 154 | 60.32   | 11.96 | 68       | 12.14 | 7.68            | 6.66, 8.70                 | 14.89** | 153 |
| Reading | 171 | 61.34   | 11.89 | 68.9     | 11.81 | 7.56            | 6.61, 8.50                 | 15.79** | 170 |
| Science | 195 | 60.71   | 11.68 | 68.9     | 11.81 | 7.46            | 6.54, 8.38                 | 15.97** | 194 |

\*\* $p < .01$

**Table 3** Mean Gains on Posttest ATI TEAS Total Scores by Pretest Proficiency Level

| SmartPrep Program | Pretest ATI TEAS Proficiency Level | <i>n</i> | Mean Gain | <i>SD</i> |
|-------------------|------------------------------------|----------|-----------|-----------|
| English           | Below-Proficient                   | 94       | 8.6       | 7.0       |
|                   | Proficient                         | 126      | 6.8       | 5.4       |
| Math              | Below-Proficient                   | 72       | 8.6       | 7.0       |
|                   | Proficient                         | 82       | 6.8       | 5.7       |
| Reading           | Below-Proficient                   | 70       | 8.9       | 7.0       |
|                   | Proficient                         | 101      | 6.6       | 5.5       |
| Science           | Below-Proficient                   | 90       | 8.5       | 7.4       |
|                   | Proficient                         | 105      | 6.6       | 5.6       |

**Figure 1** Pretest-posttest gain comparisons for ATI TEAS pretest groups by SmartPrep content area

**Table 4** *The Change in Proficiency Levels from Pretest to Posttest*

|               |                  | Posttest Level   |            | Subject |
|---------------|------------------|------------------|------------|---------|
|               |                  | Below Proficient | Proficient |         |
| Pretest Level | Below-Proficient | 45               | 49         | English |
|               | Proficient       | 2                | 124        |         |
|               | Below-Proficient | 33               | 39         | Math    |
|               | Proficient       | 1                | 81         |         |
|               | Below-Proficient | 30               | 40         | Reading |
|               | Proficient       | 1                | 100        |         |
|               | Below-Proficient | 40               | 50         | Science |
|               | Proficient       | 0                | 105        |         |

## Discussion

It is important to note that there are two primary modes of SmartPrep usage: preparation and remediation. Preparation users are those who take SmartPrep prior to their initial ATI TEAS attempt. Remediation users are those who take the SmartPrep after at least one ATI TEAS attempt. Students using SmartPrep for remediation could be preparing for a future TEAS attempt to improve upon initial scores, or they could be improving core academic skills following admission to a nursing program. The data used in this study were drawn from remediation users preparing for a subsequent proctored TEAS attempt. The distribution of the pretest total scores (see Appendix A) was well balanced, indicating that SmartPrep users are not only extremely low-scoring individuals. The demographics of the final sample also indicate the heterogeneous characteristics of subjects used for the study. The final sample was constructed with sampling bias reduced as much as possible. However, more ADN students than BSN students ended up in the final sample. Future research studies should examine potential differences in SmartPrep usage by nursing program type.

Appendix A. Total Score Distribution Comparisons between Pretest and Posttest

Figure 1 Total Score Distribution of Pretest and Posttest for SmartPrep English Program

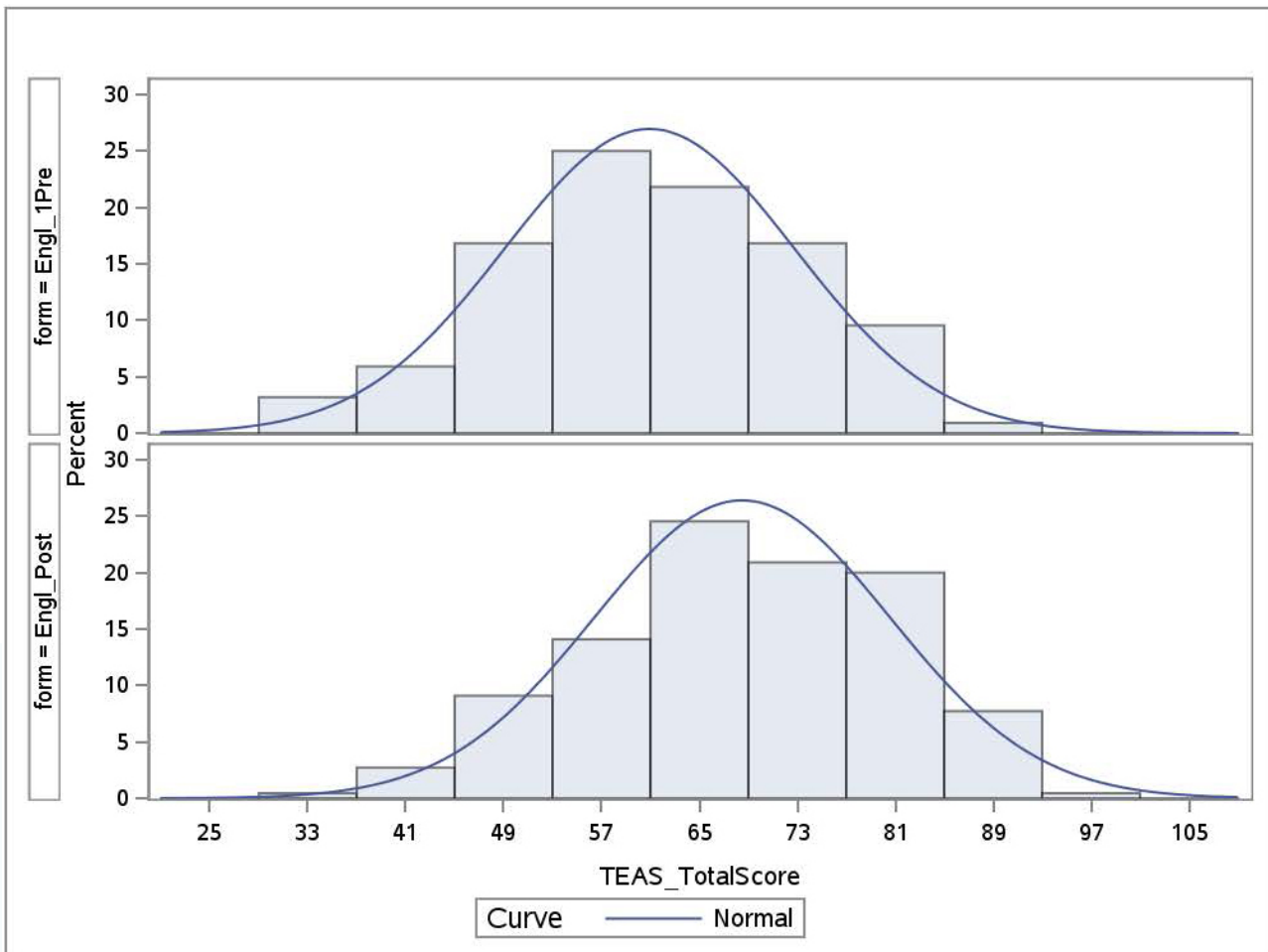


Figure 2 Total Score Distribution of Pretest and Posttest for SmartPrep Math Program

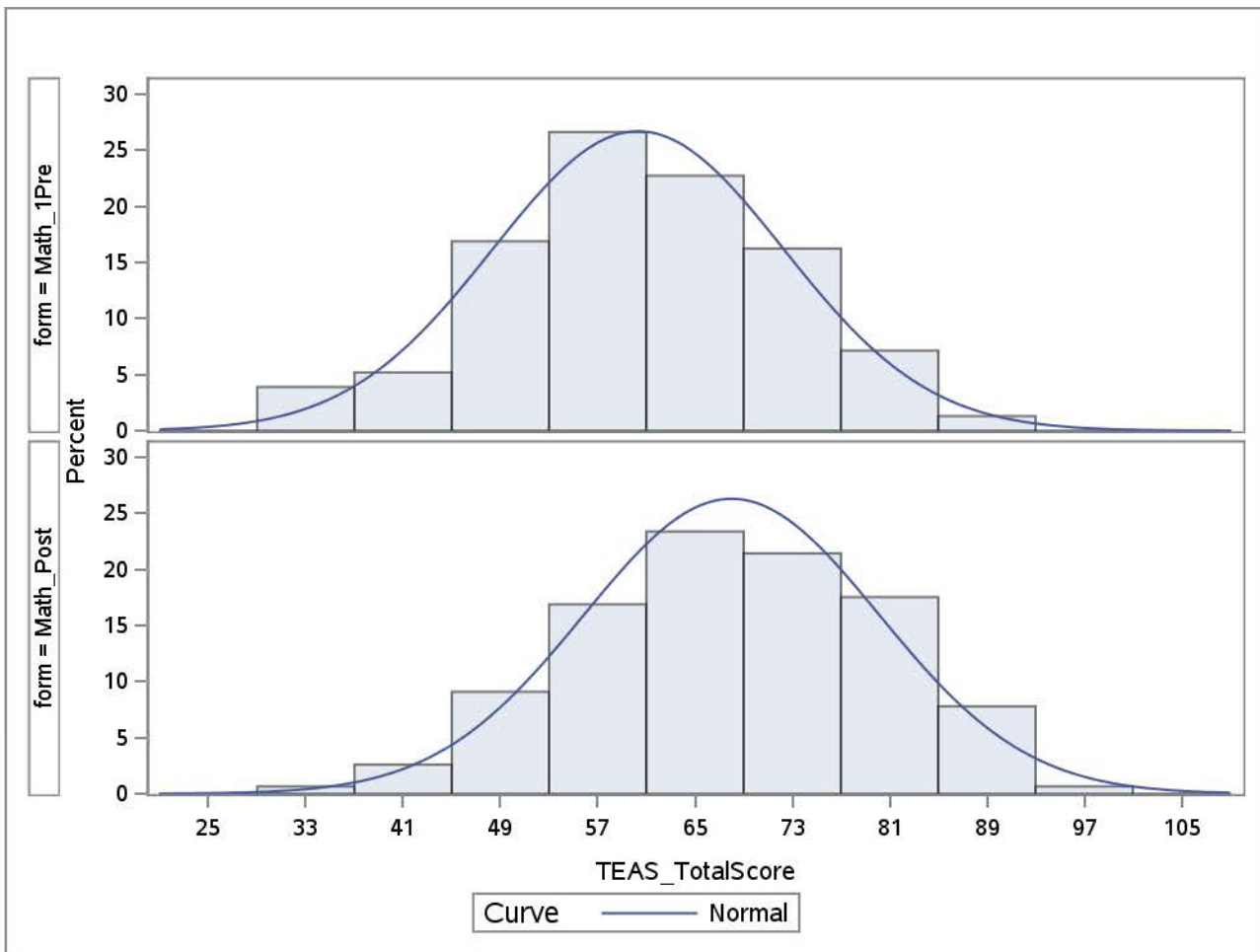




Figure 3 Total Score Distribution of Pretest and Posttest for SmartPrep Reading Program

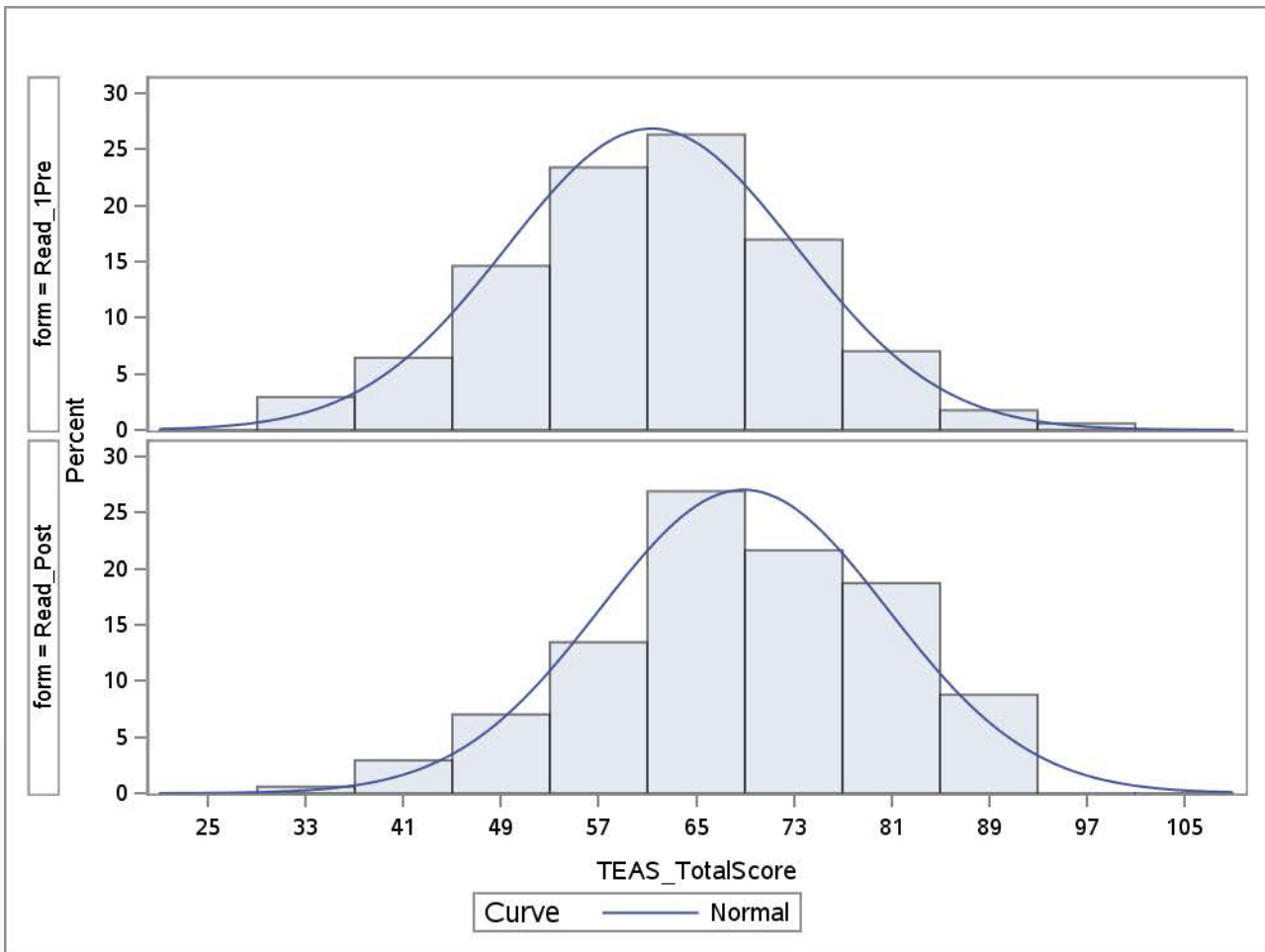


Figure 4 Total Score Distribution of Pretest and Posttest for SmartPrep Science Program

