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Results

Four trials of regular instruction and four trials of experimental instruction were conducted incorporating the use of frequent quizzing. At a rate of one trial per week, the entire study lasted eight weeks, yielding a total of eight quiz scores per participant. Quizzes were scored on a 10-point scale. Each quiz was made up of 10 short answer response questions, each worth one point. The table and histograms below demonstrate the average scores and the variations for both types of instruction.

Table 1.1

Means and Standard Deviations of Quiz Scores for Two Types of Instruction

Instruction Type	Mean	Standard Deviation
Regular Instruction	8.00	1.66
Instruction with Frequent Quizzing	8.46	1.43

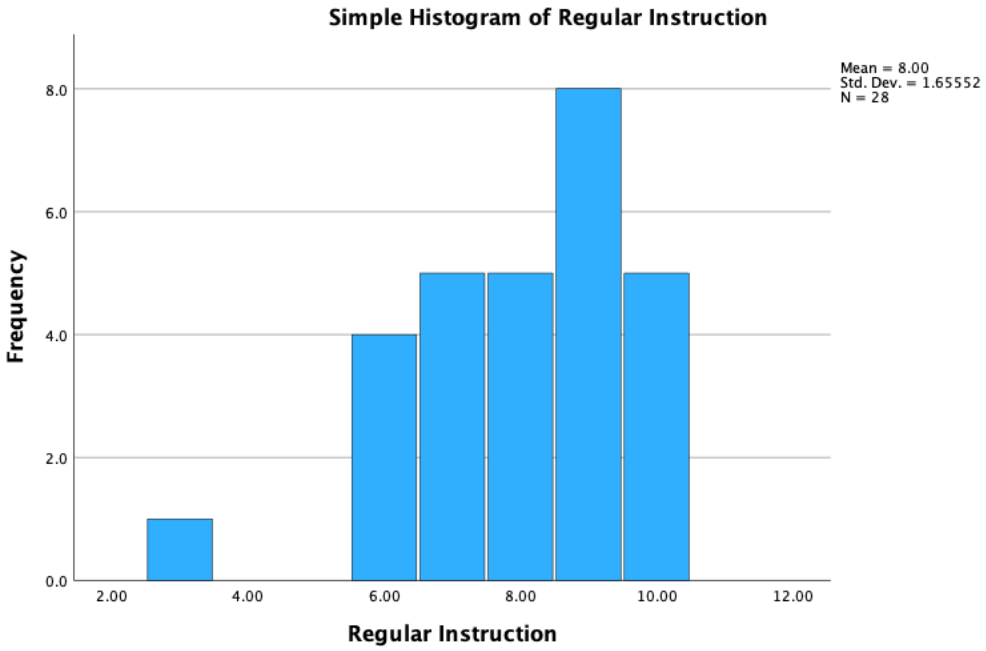

Figure 1. Simple histogram of regular instruction.

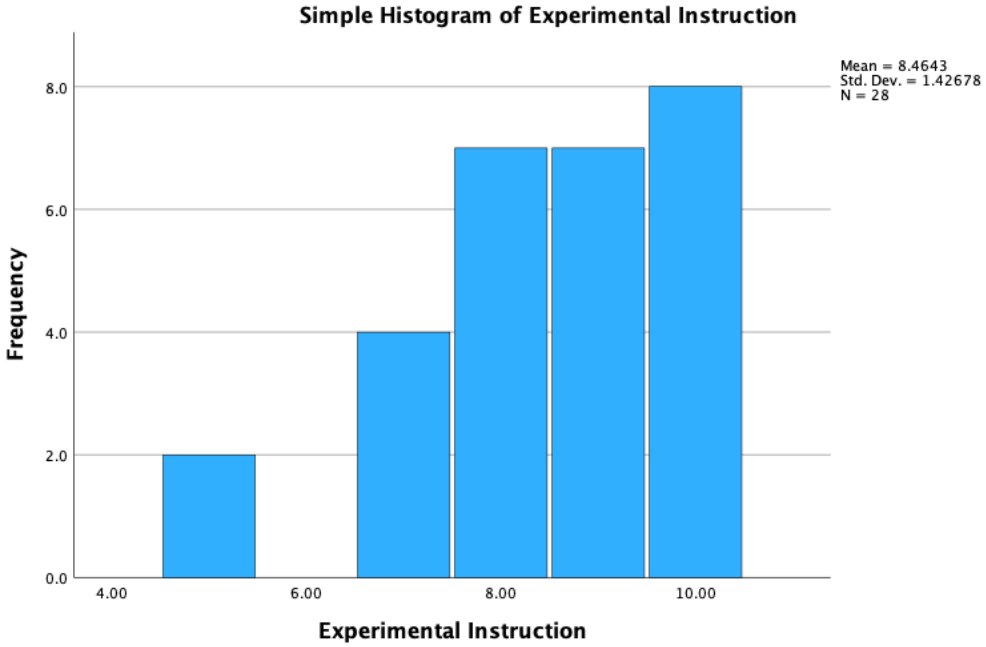

Figure 2. Simple histogram of experimental instruction.

A paired samples *t* test was performed to analyze the data collected in this study and to determine if the null hypothesis could be rejected. The results of this test are presented in the table below. The null hypothesis (H_0) states there is no significant change in the students' test scores between the two treatment periods. According to the data, the mean quiz score increased from 8.00 (*sd* = 1.66) during regular instruction to 8.46 (*sd* = 1.43) with the use of frequent quizzes as seen in Table 1.1. The difference between the two means is statistically significant at the .05 level ($t = -2.56$, $p = .017$). Based on the *t* test, the null hypothesis can be rejected, meaning that there is in fact a difference in students' scores between the two treatment periods.

Table 2

Paired Samples t Test for Regular and Experimental Instruction

Paired Samples Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Regular Instruction - Experimental Instruction	-.46429	.96156	.18172	-.83714	-.09143	-2.555	27	.008	.017

Discussion

The findings from this study illustrate the relationship between consistent retrieval practice and fourth grade students' academic performance on history tests. The findings demonstrate the positive effect that utilizing frequent low stakes quizzing as a tool for instruction has on summative assessment scores. According to the data, the students performed significantly

better on assessments when provided with instruction that included the use of frequent quizzing in comparison to their regular method of instruction. These results are consistent with the findings from other published studies.

Jones et al. (2015) found in each of their three experiments that primary grade students performed better on exams when consistent quizzing was embedded into the instruction. Variations in the experiments allowed Jones et al. to rule out any other factors that could have been contributing to the students' increased performance levels. Gokcora and DePaulo (2018) concluded that frequent quizzing is beneficial on the college level as well. While this current study seems to support the theories of the testing effect and test-potentiated new learning defined by Sotola and Crede (2021), more research would need to be completed to determine the certainty of this theory.

Limitations

There are some limitations to this study. First, the sample size was very small. Because the study was conducted in a private school, the class sizes are very limited, resulting in a sample size of only seven students. Future research should seek to include more participants in order to allow for more generalizability. Furthermore, the sample included only two boys. In the future, researchers should attempt to use a random sample that more closely resembles the population regarding culture and gender.

Implications for Practice

This study centered on the use of frequent quizzing in the classroom. The implications of this experiment offer significant changes to instruction that are beneficial to students and educators. First, frequent quizzing improves academic performance. This is beneficial to students, especially in the upper grades, who have difficulty preparing for exams on their own

but want good grades and a good grade point average for eventual college and university admission. This can also help teachers to improve their class scores on high stakes standardized tests. Second, frequent quizzing helps students to better retain information learned. Consistent retrieval practice will over time improve retention of the material being retrieved. Upon retention of the basic foundational knowledge, students can start to interact with the material on a higher level such as discussions, debates, and experiments.

Conclusion

Grade school students often experience many difficulties regarding taking exams. Just one of these difficulties lies in preparing for the test and achieving the scores they so desire. They often study ineffectively or even fail to study at all. Their consistent poor grades might even become a sense of insecurity, leading to yet another problem, testing anxiety. Despite the evidence shown by previous studies that frequent, formative, low-stakes assessments aid in the improvement of scores on summative and high stakes assessments, this practice is not yet a widely accepted method of instruction. This study adds to the body of literature already in existence illustrating the effectiveness of frequent quizzing. Quizzes are not only a tool for assessment but are also a vital instructional tool to supplement regular instruction.