

WALKSMART / BIKESMART VERMONT!



Evaluation of the *WALKSMART / BIKESMART VERMONT!* Curriculum Implementation in Vermont SRTS Classrooms 2007-08

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Introduction

The *WalkSmart / BikeSmart Vermont!* curriculum is a pedestrian and bicycle safety education program that teaches walking and bicycling safety to children in grades K-6. The goal is to provide pedestrian safety education each fall and bicycle safety education each spring to children in Vermont schools. The aim is to give children the knowledge and skills to walk and bike safely in traffic.

The curriculum, which was developed by the Center for Health and Learning under a contract from the Vermont Agency of Transportation during 2007-2009, teaches critical content, concepts and skills for pedestrian and bicycle safety. An evaluation component for the classroom instruction was designed early to collect data on implementation and to assess student attitudes toward, and knowledge about, pedestrian and bicycle safety before and after the program.

Key concepts and skills include:

WalkSmart Vermont!

- Walking Safely in Traffic
- Crossing Roads Safely
- Getting Out of a Car Safely
- Getting Off a Bus Safely

BikeSmart Vermont!

- Helmet Safety
- Dressing for Safety
- Bike Quick Check
- Rules of the Road

In 2008-09 ten schools reported teaching the *WalkSmart* lesson to 1013 children in kindergarten through second grade and the *BikeSmart* lesson to 1229 children in second through sixth grade. This represents less than half of the schools responsible for implementing the lesson. School-based instructors at seven schools volunteered to administer the pre- and post- testing to a smaller sample of students and adhere to an evaluation administration protocol.

First year results show that, while the knowledge was impressively high to begin with, classroom instruction significantly improved students' information base in important safety areas, such as riding safely, knowing one's bike and the rules of the road. Evaluation results were also used to clarify and revise some components in the curriculum.

Methodology

In both the WalkSmart and BikeSmart programs, students were administered a series of questions before and after they received instruction in a pre-post design. Teachers were provided with a protocol in advance which detailed administration procedures of the instruments. The WalkSmart instrument was given to first and second grade students while the BikeSmart instrument was given to students in grades 2-6. Due to the age variation, two BikeSmart instruments were created; the first instrument was for grades 2-3 consisting of ten questions while the second was for grades 4-6 consisting of eleven questions. There were eight common questions in the BikeSmart instruments. For all instruments, students selected an answer from a multiple-choice format.

In Tables 1-3 following, counts and percentages are presented for each of the questions for both the pre-test and post-test. The correct responses and the associated counts and percentages have been placed in bold print. For more information on the statistical methods see *Appendix 1: Methodology*.

Summary of Results

WalkSmart Vermont! Grades K-2

The following represents a summary of the *WalkSmart* survey results administered to 110 students in grades 1-2 shown in Table 1 and Chart 1:

- In the eight of the ten questions, the proportion of correct responses on the post-test was higher than the pre-test. Six of these instances were statistically significant.
- On question 1, the proportion of correct responses was 99.1% on both the pre-test and post-test. Since nearly all the children got the question correct initially, it was difficult to observe statistical significance.
- On question 6, the proportion of correct responses *declined* from 93.6% to 88.2% on the pre-test and post-test respectively.

BikeSmart Vermont! Grades 2-3

The following represents a summary of the *BikeSmart* survey results administered to 107 students in grades 2-3 shown in Table 2 and Chart 2:

- In the eight of the ten questions, the proportion of correct responses on the post-test was higher than the pre-test. All eight of these instances were statistically significant.
- On question 4, the proportion of correct responses *declined* from 99.1% to 97.2% on the pre-test and post-test respectively. This represented a change in only two students. On question 1, the proportion of correct responses was 99.1% on both the pre-test and post-test. In both instances, since nearly all the children got the questions correct initially (a poor discriminator), it was difficult to observe statistical significance.

BikeSmart Vermont! Grades 4-6

The following represents a summary of the *BikeSmart* survey results administered to 170 students in grades shown in Table 3 and Chart 3:

- In all eleven questions, the proportion of correct responses on the post-test was higher than the pre-test. Ten of the eleven questions were statistically significant.
- On question 1, the proportion of correct responses increased from 97.1% to 98.8% on the pre-test and post-test respectively but was not statistically significant. Since nearly all the children got the question correct initially, it was difficult to observe statistical significance.

Table 1

WalkSmart Results - Grades 1-2

Question	Response Choices	Pre-Test		Post-Test		z stat.	p-value
		n	%	n	%		
Q1. When you are walking down a road and there is a sidewalk should you walk on the sidewalk?	Sidewalk	109	99.1	109	99.1	0.000	0.500
	Along the road	1	0.9	1	0.9		
Q2. When you are walking in a road without sidewalks should you walk facing the cars or with the cars coming from behind you?	Facing the cars	71	64.5	95	86.4	4.800	0.000*
	With the cars behind you	39	35.5	15	13.6		
Q3. When you are crossing a road should you look Left-Right-Left or Right-Left-Right?	Left-Right-Left	74	67.3	100	90.9	5.276	0.000*
	Right-Left-Right	36	32.7	10	9.1		
Q4. When you are crossing the road should you continue to look Left-Right-Left or straight toward where you are going?	Look Left-Right-Left	62	56.4	84	76.4	4.230	0.000*
	Look straight ahead	48	43.6	26	23.6		
Q5. What is the edge of the road?	The side of the road	106	96.4	109	99.1	1.520	0.064
	The middle of the road	4	3.6	1	0.9		
Q6. When crossing a road do you cross in a straight line or at an angle?	Straight line	103	93.6	97	88.2	-2.314	0.990
	At an angle	7	6.4	13	11.8		
Q7. When crossing a road between parked cars or parking lot with parked cars where do you start crossing from?	Between the cars	49	44.5	37	33.6	2.300	0.011*
	The edge of the car	61	55.5	73	66.4		
Q8. When you get out of a parked car do you get out into the road, or toward the curb?	Into the road	12	10.9	5	4.5	2.154	0.016*
	Toward the curb	98	89.1	105	95.5		
Q9. When you get off a school bus and you need to cross the road do you cross in front of the bus or behind the bus?	In front of the bus	79	71.8	86	78.2	1.492	0.068
	Behind the bus	31	28.2	24	21.8		
Q10. What is a good reason to walk	It is good exercise and fun	43	39.1	20	18.2	4.253	0.000*
	It cuts down on pollution	3	2.7	4	3.6		
	both a and b	64	58.2	86	78.2		

Note: *p ≤ 0.05

Chart 1
Comparison of Walk Smart Pre- and Post-test Scores
Grades 1-2

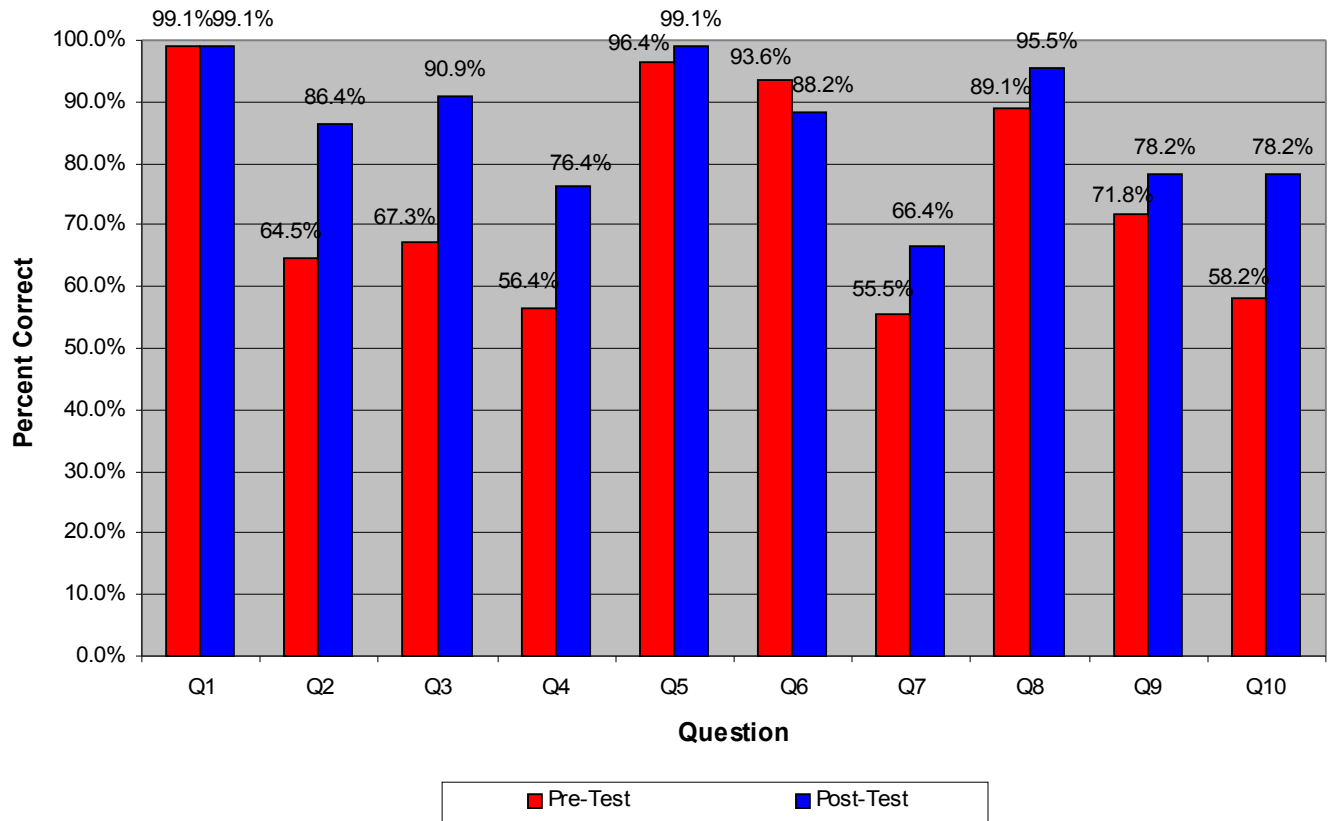


Table 2

BikeSmart Results- Grades 2-3

Question	Response Choices	Pre-Test		Post-Test		z stat.	p-value
		n	%	n	%		
Q1. When should you wear a bicycle helmet?	When riding in traffic	1	0.9	1	0.9	0.000	0.500
	Whenever you are riding	106	99.1	106	99.1		
Q2. When is it time to get a new helmet?	When it is more than five years old or has been in an accident	14	13.1	58	54.7	12.694	0.000*
	Every year	93	86.9	48	45.3		
Q3. What color clothes should you wear when riding a bike?	Light	89	83.2	100	93.5	2.850	0.002*
	Dark	9	8.4	4	3.7		
	Doesn't Matter	9	8.4	3	2.8		
Q4. How should you carry something when riding a bike?	In your left hand	1	0.9	3	2.8	-2.081	0.981
	In a backpack or on a rack	106	99.1	104	97.2		
Q5. When you are riding a bicycle should you ride facing the cars or with the cars coming from behind you?	Cars coming from behind you	35	32.7	58	54.7	4.828	0.000*
	Facing the cars	72	67.3	48	45.3		
Q6. Should you stop at stop signs?	At all times	91	85.0	101	94.4	2.723	0.003*
	When traffic is coming	16	15.0	6	5.6		
Q7. Should you give a hand signal when making a right turn?	Yes	90	84.9	104	97.2	3.553	0.000*
	No	16	15.1	3	2.8		
Q8. Should you give a hand signal when slowing down or stopping?	Yes	80	75.5	104	97.2	5.219	0.000*
	No	26	24.5	3	2.8		
Q9. When you do the ABC-Quick Check, which should you check?	Air in the tires	6	5.6	3	2.8	1.846	0.032*
	Chain	2	1.9	0	0.0		
	both a and b	99	92.5	104	97.2		
Q10. What is a good reason to ride your bike?	It is good exercise and fun	18	16.8	3	2.8	4.056	0.000*
	It cuts down on pollution	1	0.9	0	0.0		
	both a and b	88	82.2	104	97.2		

Note: *p ≤ 0.05

Chart 2
Comparison of Bike Smart Pre- and Post-test Scores
Grades 2-3

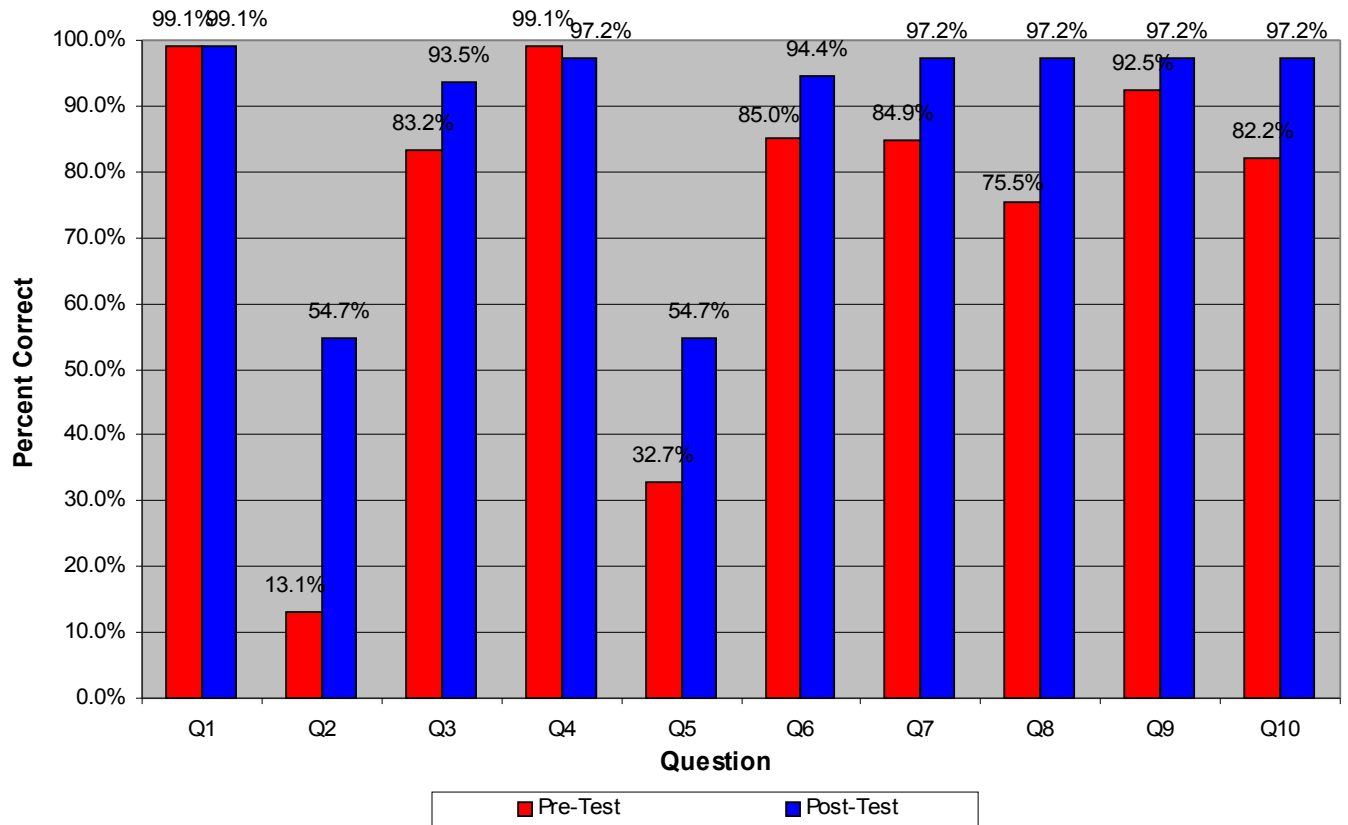


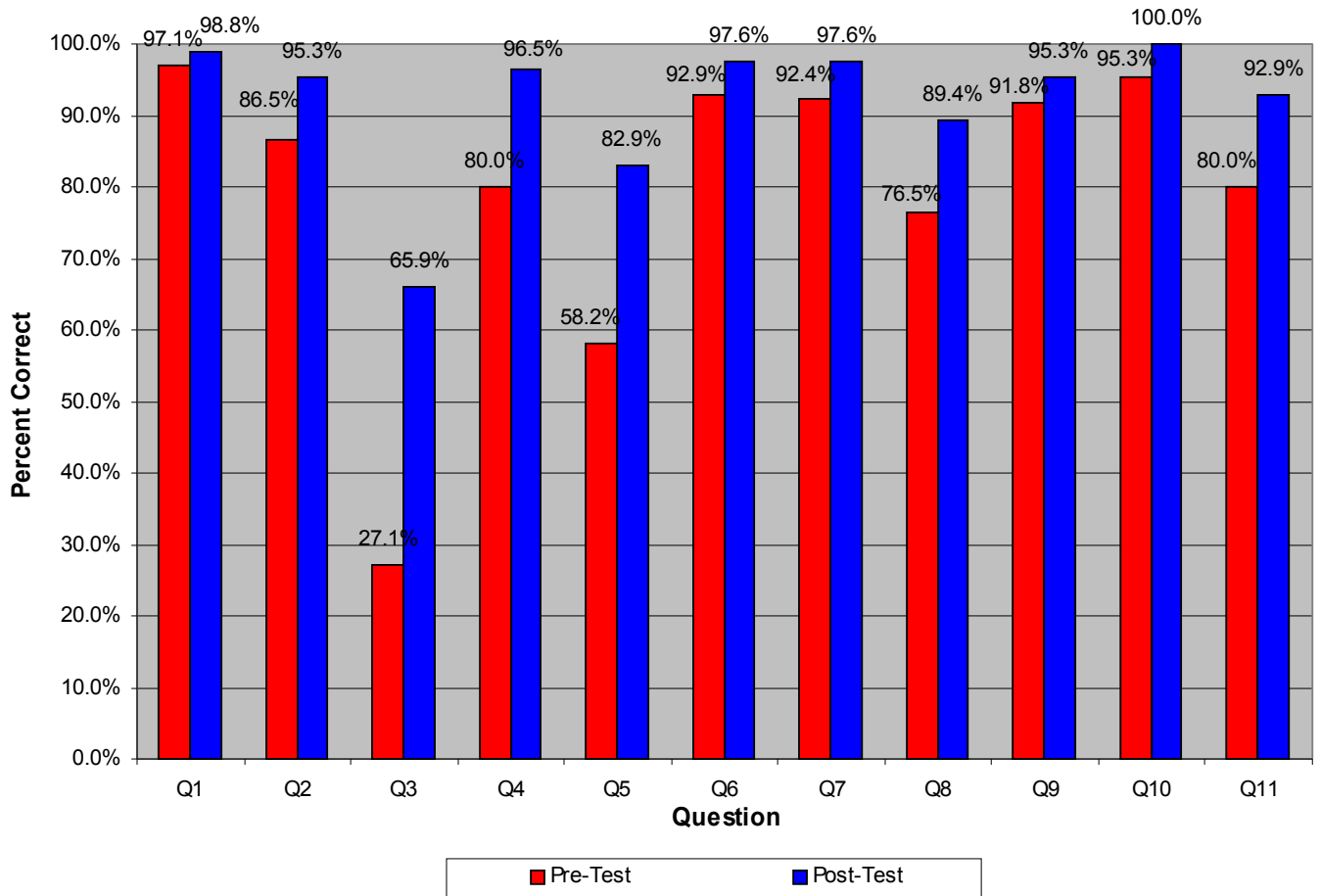
Table 3

BikeSmart Results - Grades 4-6

Question	Response Choices	Pre-Test		Post-Test		z stat.	p-value
		n	%	n	%		
Q1. When should you wear a bicycle helmet?	When riding in traffic	5	2.9	2	1.2	1.321	0.093
	Whenever you are riding	165	97.1	168	98.8		
Q2. Is it safe to wear an iPod when riding a bicycle?	Yes, it is safe	23	13.5	8	4.7	3.358	0.000*
	No, it is not safe	147	86.5	162	95.3		
Q3. When is it time to get a new helmet?	When it is more than five years old or has been in an accident	46	27.1	112	65.9	11.382	0.000*
	Every year	124	72.9	58	34.1		
Q4. What color clothes should you wear when riding a bike?	Light	136	80.0	164	96.5	5.378	0.000*
	Dark	8	4.7	0	0.0		
	Doesn't Matter	26	15.3	6	3.5		
Q5. When you are riding a bicycle should you ride facing the cars or with the cars coming from behind you?	Cars coming from behind you	99	58.2	141	82.9	6.529	0.000*
	Facing the cars	71	41.8	29	17.1		
Q6. Should you stop at stop signs?	At all times	158	92.9	166	97.6	2.386	0.009*
	When traffic is coming	12	7.1	4	2.4		
Q7. Should you give a hand signal when making a right turn?	Yes	157	92.4	165	97.6	2.551	0.005*
	No	13	7.6	4	2.4		
Q8. Does "yield" mean stop or slow down and look for traffic?	Slow down and look for traffic	130	76.5	152	89.4	3.967	0.000*
	Stop	40	23.5	18	10.6		
Q9. When you are riding with a friend who is also riding, is it best to ride next to the friend or single file?	Next to the friend	14	8.2	8	4.7	1.658	0.049*
	Single file	156	91.8	161	95.3		
Q10. When you do the ABC-Quick Check, which should you check?	Air in the tires	4	2.4	0	0.0	2.896	0.002*
	Chain	4	2.4	0	0.0		
	both a and b	162	95.3	170	100.0		
Q11. What is a good reason to ride your bike?	It is good exercise and fun	33	19.4	11	6.5	4.205	0.000*
	It cuts down on pollution	1	0.6	1	0.6		
	both a and b	136	80.0	158	92.9		

Note: * $p \leq 0.05$

Chart 3
Comparison of Bike Smart Pre- and Post-test Scores
Grades 4-6



Conclusions

Implementation of the *WalkSmart / BikeSmart Vermont!* curriculum had a significant impact on the knowledge and attitudes of school-age children grades K-6. When responses for both lessons and all three tests were combined, the percentage of children getting correct responses improved on 27 out of 31 questions, with 24 of the questions showing statistically significant gains. This indicates that the program is a reliable approach to increasing knowledge and promoting positive attitudes about pedestrian and bicycle safety.

- In the eight of the ten questions for *WalkSmart K-2*, the proportion of correct responses on the post-test was higher than the pre-test. Six of these instances were statistically significant.
- In the eight of the ten questions for *BikeSmart 2-3*, the proportion of correct responses on the post-test was higher than the pre-test. All eight of these instances were statistically significant.
- In all eleven questions for *BikeSmart 4-6*, the proportion of correct responses on the post-test was higher than the pre-test. Ten of the eleven questions were statistically significant.

The one question that showed a slight decline in knowledge relied on a visual image in the curriculum. This information was used to change the graphic in the revision of the curriculum. The first year results show that classroom instruction significantly improved students' information base in very important safety areas including whether they should walk in a road facing the cars or with the cars coming from behind them, whether they should look Left-Right-Left or straight ahead when crossing a road, whether they should ride a bicycle facing the cars or with cars coming from behind them, whether they should give a hand signal when slowing down or stopping, what color clothes they should wear when riding a bike, and when it is time to get a new helmet.

Post-Script

Thank you....to the educators who implemented the program and collected the pre-post data:

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This evaluation data helps support initiatives to promote walking and bicycling in Vermont communities!

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Appendix 1: Methodology

In both the *WalkSmart* and *BikeSmart* programs, students were administered a series of questions before and after they received instruction in a pre-post design. Teachers of the students were provided a protocol in advance detailing administration procedures of the instruments. The *WalkSmart* instrument was given to first and second grade students while the *BikeSmart* instrument was given to students in grades 2-6. Due to the age variation, two *BikeSmart* instruments were created; the first instrument was for grades 2-3 consisting of ten questions while the second was for grades 4-6 consisting of eleven questions. There were eight common questions in the *BikeSmart* instruments. For all instruments, students selected an answer from a multiple-choice format.

To test whether there was a statistically significant difference in the proportion of correct answers from the pre-test to the post-test, the one-sample test for a binomial proportion was used. This statistical procedure compares the proportion of correct responses on the pre-test to the proportion of correct responses on the post-test for each of the questions. A z test is used to determine whether the proportions are significantly different. Since it is expected that the proportion of correct responses will increase after instruction, a one-tailed z-test will be used. P values that are less than or equal to 0.05 are statistically significant and are noted in the tables with an asterisk. The null and alternative hypotheses for the one-sample test for a binomial proportion are as follows:

- H_0 : The proportion of correct responses on the pre-test and the post-test are the same.
- H_1 : The proportion of correct responses on the post-test are greater than the pre-test.