

TABLE 1

Frequency and percentage of participants' explanations of average speed categorized as accurate and inaccurate definitions of average speed.

	Pre-test N = 84		Post-Test N = 55	
	Definitions of average speed			
	Accurate	Inaccurate	Accurate	Inaccurate
	n (%)			
	17 (20.3)	67 (79.8)	16 (29.1)	39 (70.9)
Explanations				
Average speed is explained using the concept of instantaneous speed.	9 (52.9)	26 (38.8)	10 (62.5)	22 (56.4)
Average speed is explained as the mean of multiple recordings of an object's speed.	9 (52.9)	20 (29.9)	8 (50.0)	9 (23.1)
Average speed is explained using real-world examples.	8 (47.1)	19 (28.4)	5 (31.3)	16 (41.0)
Average speed is explained with visual examples.	8 (47.1)	33 (49.3)	7 (43.8)	16 (23.1)
Average speed is explained by providing examples of using the formula for average speed.	1 (5.9)	7 (10.4)	0 (0)	1 (2.6)
Average speed is explained by using objects (e.g., cars, marbles, ramps).	11 (64.7)	33 (49.3)	11 (68.8)	27 (69.2)
Average speed is explained by hands-on activity.	5 (29.4)	17 (25.4)	4 (25.0)	9 (23.1)

TABLE 2

Samples of participants' accurate and inaccurate definitions of average speed and related explanations of average speed.

Accurate definitions of average speed		Inaccurate definitions of average speed	
Pretest	Posttest	Pretest	Posttest
Average speed is the total distance traveled by an object divided by the elapsed time it took the object to cover the distance.	Average speed is the total distance travelled divided by the total time taken.	Average speed is the most likely speed at which a number of something travels.	Average speed is the time traveled by an object from point A to point B.
Explanations of average speed			
The way I would teach average speed would require me to first offer the students a real-life example by asking if any of the students has rode their bike around their home and wondered how fast they were going. If they respond yes to this, then I would simply state to them that all they would need to do is measure the distance wherever they rode their bike and time themselves, which can easily calculate something called average speed.	The way I would teach average speed would be through scenarios and also the roller coaster activity, so that they are able to participate in a more hands-on approach to understand the concept.	When teaching average speed, I would include a hands-on model of a toy car on a ramp (that can be adjusted to different lengths). I would have the students record the distance the car travels, as well as the time it takes for the car to travel so far.	I would have students conduct an experiment, measuring the average speed three times per object. This way they would record each trial and find the average speed.

TABLE 3

Frequency and percentage of teaching contexts expressed during participants' explanation of average speed, categorized under accurate and inaccurate definitions.

	Pretest N = 84		Posttest N = 55	
	Accurate	Inaccurate	Accurate	Inaccurate
Taught by using a frame of reference, the total distance travelled, and total time taken	1 (5.9)	0 (0)	0 (0)	0 (0)
Taught by providing examples that use average speed formula	1 (5.9)	7 (10.4)	0 (0)	1 (2.6)
Taught by using objects (e.g., cars, marbles, ramps)	11 (64.7)	33 (49.3)	11 (68.8)	27 (69.2)
Taught by doing hands-on activity	5 (29.4)	17 (25.4)	4 (25.0)	9 (23.1)