"I know it's unconventional, but there's only so much homework one dog can eat."

EVALUATING HOMEWORK IN HIGH SCHOOL PHYSICS

David Johnson

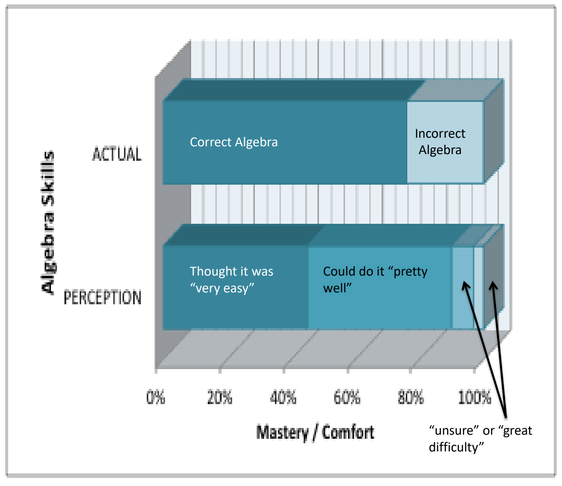
Harwood Union H.S. Moretown, VT 05660

The Method

What are the best and most effective methods of administering homework in the high school physics class to maximize learning? Ideally it would take years of study to answer this question. I looked at analyzing two specific policies: Checking off for completion only and collecting and grading on correctness. The effectiveness of the policies was measured by giving student quizzes based strictly on previous assigned and completed homework and tracking improvement in seven areas: known and unknown value identification, equation identification, ability to substitute values into equations, algebraic skills, computations / conversions and concept understanding.

Some student performance data prior to research:

Correctly Performing Algebra



Student's perception to do correct algebra was over estimated by 14%

Background

The Capstone Project was conducted at Harwood Union High School, a school of about 550 students. I worked with two standard algebra-based physics classes. In the two months before the treatment began, I saw that many of the students lacked in basic algebra and trigonometry skills. So along with teaching and evaluating physics concepts, I would also be appraising students' math and problem solving skills as part of the research.

Triangulation Matrix

Research Questions	Data Source 1	Data Source 2
Applying Physics Concepts	Pre and Post Survey	Conceptual Multiple Choice Questions
Known and Unknown Value Identification	Pre and Post Survey	Rubric Evaluated Problems
Equation Identification	Pre and Post Survey	Rubric Evaluated Problems
Ability to Substitute Values into Equations	Pre and Post Survey	Rubric Evaluated Problems
Algebraic Skills	Pre and Post Survey	Rubric Evaluated Problems
Computations and Conversions	Pre and Post Survey	Rubric Evaluated Problems
Teacher Attitudes Toward Homework	Survey	

Physics **Name**_____
Quiz 1

Conceptual Multiple Choice

1. If an object is in mechanical equilibrium then which of these statements must be true:
   A) The object must be accelerating
   B) The object's velocity is constant
   C) The net force on the object equals its weight
   D) The object is in free-fall
   E) The object must be at rest and not moving

Problem *(Solve the problem showing all work, equations, and units for full credit)*

A baseball pitcher throws a ball with an average force of 35 N with an acceleration of 55 m/s². What is the mass of the baseball

A quiz of this format was given after each homework was reviewed and evaluated using this rubric

Skill Evaluation Rubric	
Skills to be evaluated	Yes / No
Student identified all information in the problem	
Student identified all information sought in the problem	
Student listed any equations needed to solve the problem.	
All equations listed were correct	
Student replaced all variables in equations with correct values	
Student correctly performed all necessary algebra correctly	
Student correctly did all calculations	
Student correctly labeled answer with units	

The Literature

Homework has been controversial for as long as public education has been around. During the first half of the 20th century it was thought that it was harmful to children and unfair to parents (Gill & Schlossman,1996). This changed after Sputnik when educators thought that there was a lack of rigor in public education, especially in the sciences. The anti-homework movement was back by the 1980's when learning theorists thought it could be harming students' mental health (Marzano & Pickering, 2007). Despite the controversy however, there is evidence that homework, along with parent involvement, does have a positive association with academic achievement (Maltese, 2012).

References:

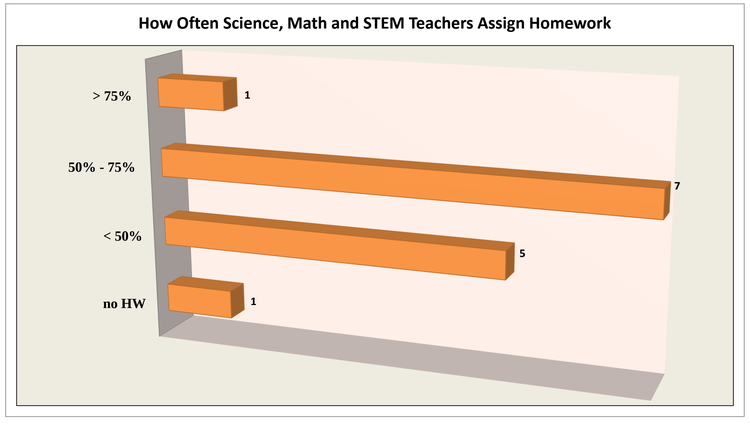
Gill and Schlossman (1996) "A sin against childhood": Progressive education and the crusade to abolish homework, 1897-1941. *American Journal of Education*, 105 (1), 27-66

Maltese, A (2012) When is homework worth the time? Evaluating the association between homework and achievement in high school science and math. *The High School Journal*, *96* (1), 52-72

Marzano, R., & Pickering, D (2007) Special topic / The case for and against homework. *Educational Leadership*. *64*, (6), 74-79

What Other Teachers Do

The use of homework by the 14 STEM teachers at my school as an educational tool is varied, to say the least. Advanced classes such as A.P. and "Honors" assign homework on a regular basis, but few teachers check or collect it. Many of the regular classes do not assign homework at all but spend a large amount of class time allowing students to practice and solve problems in groups. If students do not finish the class work they are encouraged to finish it as homework. A common practice of the younger teachers is to allow retakes of quizzes and exams only if the student can show they have done all the assigned homework that was not checked.



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