

High School Physics Textbooks

Results from the 2008-09 Nationwide Survey of High School Physics Teachers

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REPORTS ON HIGH SCHOOL PHYSICS

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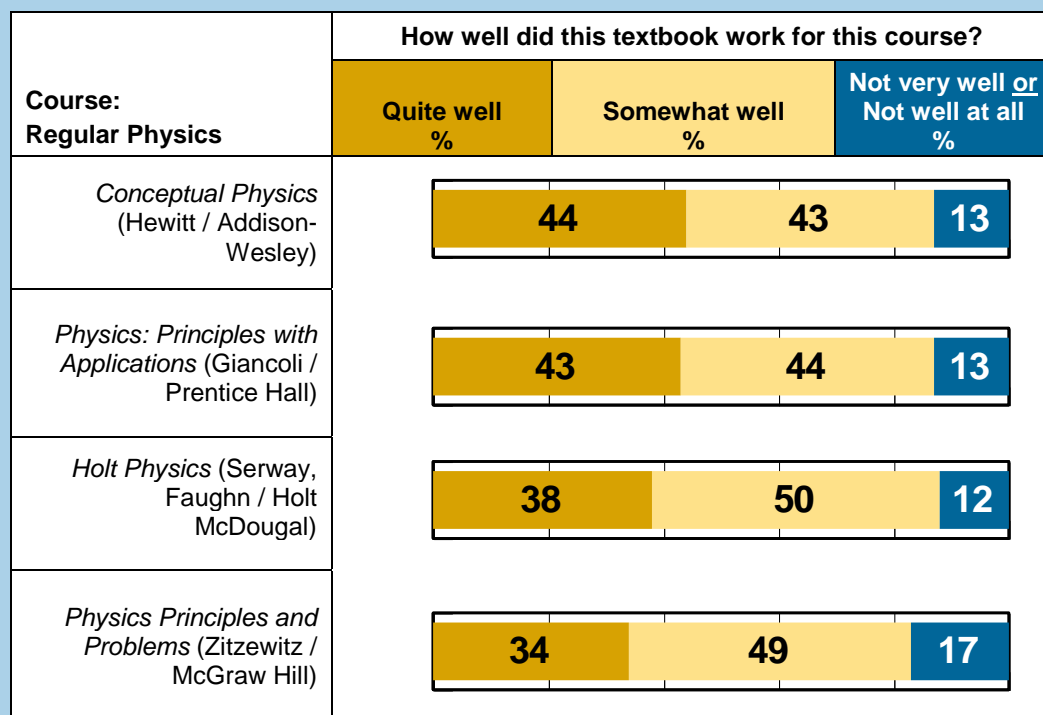
THE 2008-09 NATIONWIDE SURVEY OF HIGH SCHOOL PHYSICS TEACHERS

During the 2008-09 academic year, we contacted a representative national sample of about 3,600 public and private high schools across the US to inquire about physics availability and offerings. These reports describe our findings.

What textbooks are physics teachers using? How well do they rate? The textbooks used by high school physics teachers in the US have evolved along with the changing demands of physics classes. In this report, we examine the teachers' ratings of the textbooks they use, by type of physics class, and the evolution of textbooks used for each type of physics class.

Figure 1

Teachers' Ratings of Textbooks for Regular Physics, US High Schools, 2008–2009



Ratings based on a four-point scale: Quite well, Somewhat well, Not very well, Not well at all
Differences less than 5% are not statistically significant

<http://www.aip.org/statistics>

Since we started tracking textbook use in regular physics classes in 1987, *Physics Principles and Problems* (Zitzewitz) has been the most widely used textbook. A couple of books have gained popularity in recent years, and *Holt Physics* (Serway et al.) is now as widely used as Zitzewitz, and *Conceptual Physics* (Hewitt) has also become significantly more common.

Of these three dominant regular physics texts, Hewitt rates the highest among teachers (**Figure 1**), and Zitzewitz rates the lowest. *Physics: Principles with Applications* (Giancoli) also rated highly with teachers but is not used by as many teachers as the other three.

Table 1

**Most Widely Used Physics Textbooks for Regular Physics,
US High Schools, 1987–2009**

	% Using						
	2008	2005	2001	1997	1993	1990	1987
<i>Holt Physics</i> (Serway, Faughn, Holt McDougal)	32%	25%	13%	---	---	---	---
<i>Physics Principles and Problems</i> (Zitzewitz / McGraw Hill)	32%	40%	49%	53%	44%	42%	33%
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)	23%	16%	13%	13%	9%	*	*
<i>Physics: Principles with Applications</i> (Giancoli / Prentice Hall)	6%	5%	---	---	---	---	---

* Less than 5%

--- Not separately rated

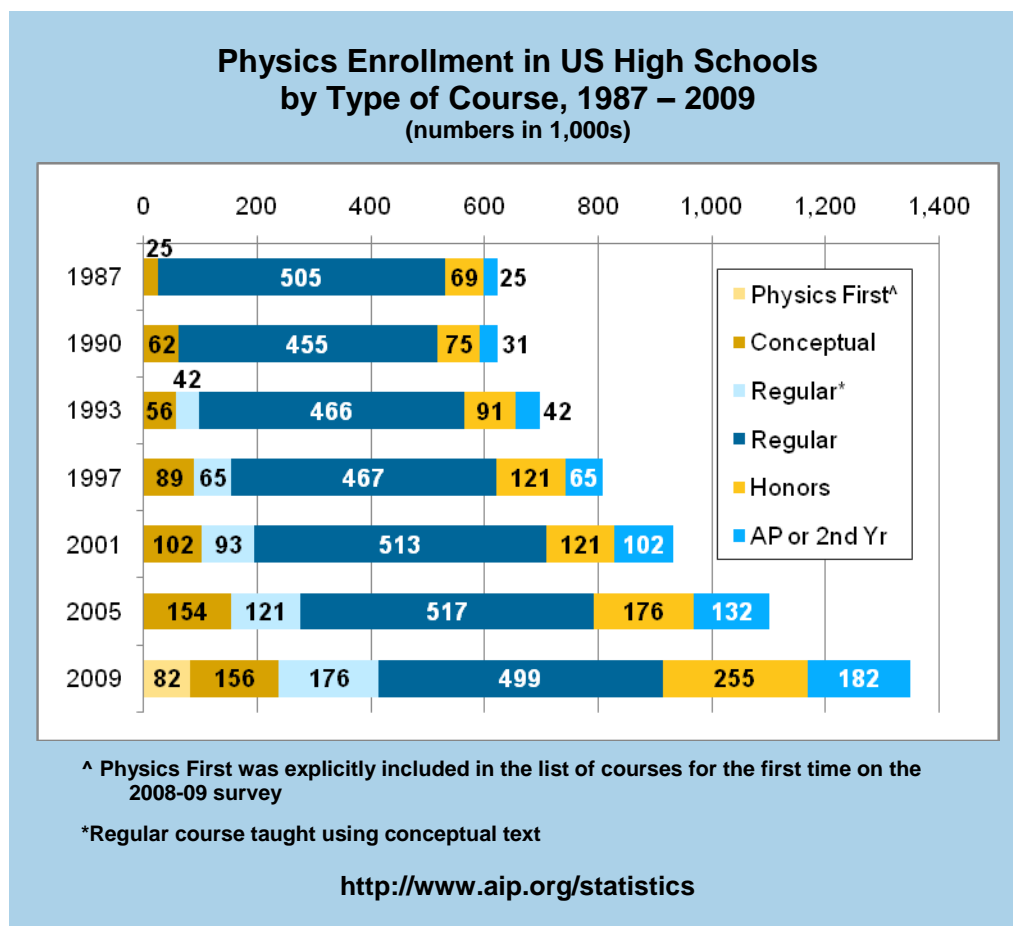
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While the vast majority of physics teachers relies primarily on the textbooks represented in this report, some teachers don't use a textbook for their class, and others have replaced their physics textbooks with an increasingly common array of online resources.

The changes in the type of textbooks used by regular physics classes reflect changes in high school physics enrollments. Total enrollments in high school physics classes have doubled since our surveys began in 1987. However, enrollments in separate conceptual physics classes have increased substantially, while enrollments in regular physics classes have remained fairly stable. Regular physics is still the most common type of physics class, but the use of conceptual physics texts in regular physics has grown significantly. These changes can be seen in **Figure 2**.

Figure 2



More regular physics classes are using conceptual physics textbooks. Conceptual physics enrollments are on the rise.

As you can see in **Table 2**, the dominant book for the growing field of conceptual physics courses is *Conceptual Physics* (Hewitt). Of the teachers using it, 90% reported that it worked somewhat or quite well for their courses. A much smaller proportion of teachers use *Physics Principles and Problems* (Zitzewitz) for their conceptual physics courses, and they were much less pleased: half of the teachers using this book reported that it worked not very well or not well at all for their classes.

This is the first survey to specifically address textbooks for Physics First classes, and *Conceptual Physics* (Hewitt) is clearly the dominant book for the class. It is used by 74% of the Physics First teachers.

Table 2

Most Widely Used Physics Textbooks for Conceptual Physics, US High Schools, 1987–2009

Course:	% Using						
	2008	2005	2001	1997	1993	1990	1987
Physics First*							
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)	74%	---	---	---	---	---	---
Physics for Non-Science Students or Conceptual Physics							
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)	80%	76%	75%	74%	79%	75%	27%
<i>Physics Principles and Problems</i> (Zitzewitz / McGraw Hill)	7%	*	6%	7%	8%	7%	28%

^ Physics First was explicitly included in the list of courses for the first time on the 2008-09 survey

* Less than 5%




--- Not separately rated

Differences less than 5% are not statistically significant

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Figure 3

Teachers' Ratings of Textbooks for Conceptual Physics, US High Schools, 2008–2009

Course:	How well did this textbook work for this course?		
	Quite well %	Somewhat well %	Not very well or Not well at all %
Physics First			
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)			
Physics for Non-Science Students or Conceptual Physics			
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)			
<i>Physics Principles and Problems</i> (Zitzewitz / McGraw Hill)			

Ratings based on a 4 point scale: Quite well, Somewhat well, Not very well, Not well at all

Differences less than 5% are not statistically significant

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*Teachers find that
Hewitt's text works well
for conceptual physics
courses.*

The most common books used for First Year Honors, Accelerated or Gifted and Talented Physics classes continue to be *Holt Physics* (Serway et al.), *Physics Principles and Problems* (Zitzewitz) and *Physics: Principles with Applications* (Giancoli).

Table 3

**Most Widely Used Textbooks for First Year Honors,
Accelerated or Gifted and Talented Physics,
US High Schools, 1987–2009**

	% Using						
	2008	2005	2001	1997	1993	1990	1987
<i>Holt Physics</i> (Serway, Faughn, Holt McDougal)	28%	26%	9%	---	---	---	---
<i>Physics Principles and Problems</i> (Zitzewitz / McGraw Hill)	21%	18%	30%	25%	18%	*	*
<i>Physics: Principles with Applications</i> (Giancoli / Prentice Hall)	20%	17%	16%	19%	14%	10%	7%
<i>College Physics</i> (Serway, Faughn, Vuille / Brooks / Cole)	8%	8%	9%	*	---	---	---
<i>Conceptual Physics</i> (Hewitt / Addison-Wesley)	8%	6%	*	*	*	*	*

* Less than 5%

--- Not separately rated

Differences less than 5% are not statistically significant

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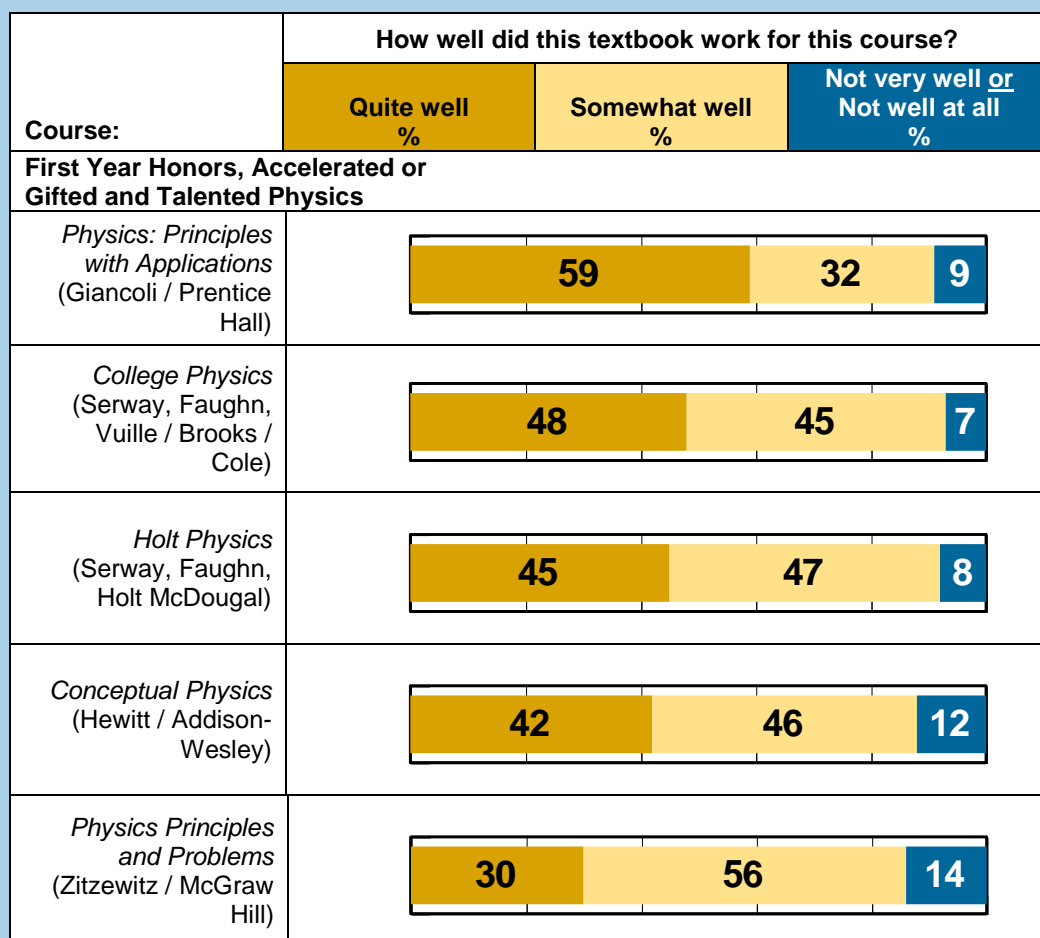
Although Zitzewitz is widely used, it is not as highly rated as other texts.

Giancoli's text is very highly rated (**Figure 4**). Not only did 59% of teachers say that this textbook worked quite well for their courses, only 9% said that it worked not very well or not well at all. Serway and Faughn's text was rated quite highly as well. Two less widely used books, *College Physics* (Serway et al.) and *Conceptual Physics* (Hewitt), rated highly enough to demonstrate potential for growth.

Although the Zitzewitz text received few poor ratings for the course, it received the smallest proportion of strongly positive response. This was the lowest rating of all of the textbooks used for Honors, Accelerated or Gifted and Talented Physics.

Figure 4

**Teachers' Ratings of Textbooks for First Year Honors,
Accelerated or Gifted and Talented Physics,
US High Schools, 1987–2009**



Ratings based on a 4 point scale: Quite well, Somewhat well, Not very well, Not well at all
Differences less than 5% are not statistically significant

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Teachers report that most of these texts work well for Honors Physics.

Advanced Placement Physics classes rose in prevalence and prominence in the 1990s. AP Physics B is an introductory course that relies on algebra and trigonometry, and AP Physics C is an intensely analytical course that relies heavily on calculus and often stretches across two academic years. The material in AP Physics C often helps to form a foundation in physics for students who major in science and engineering in college.

The two most widely used textbooks for AP Physics B continue to be *Physics: Principles with Applications* (Giancoli) and *College Physics* (Serway et al.). Both rated quite highly among physics teachers. Of the physics teachers responding, only 3% and 5%, respectively, reported that they worked not very well or not well at all, and 64% of physics teachers reported that the books worked quite well for their classes.

AP Physics C texts focus on solutions to challenging problems in both mechanics and electricity and magnetism. Two widely used texts for AP Physics C classes were *Physics for Scientists & Engineers* (Serway et al.) and *Physics* (Halliday et al.). The texts are used in about a quarter of AP Physics C classes.

Table 4

**Most Widely Used Textbooks for AP Physics,
US High Schools, 1987–2009**

Course:	% Using				
	2008	2005	2001	1997	1993
Advanced Placement Physics B					
<i>Physics: Principles with Applications</i> (Giancoli / Prentice Hall)	36%	35%	33%	27%	28%
<i>College Physics</i> (Serway, Faughn, Vuille / Brooks / Cole)	26%	20%	25%	24%	10%
<i>College Physics</i> (Wilson, Buffa, Lou / Prentice Hall)	6%				
<i>Physics</i> (Walker / Pearson)	6%				
<i>Essentials of Physics</i> (Cutnell, Johnson / Wiley)	5%	19%	15%	9%	---
Advanced Placement Physics C					
<i>Physics for Scientists & Engineers</i> (Serway, Jewett / Cengage Learning)	19%	---	---	---	---
<i>Physics</i> (Halliday, Resnick, Krane / Wiley)	7%	45%	47%	41%	39%

* Less than 5%

--- Not separately rated

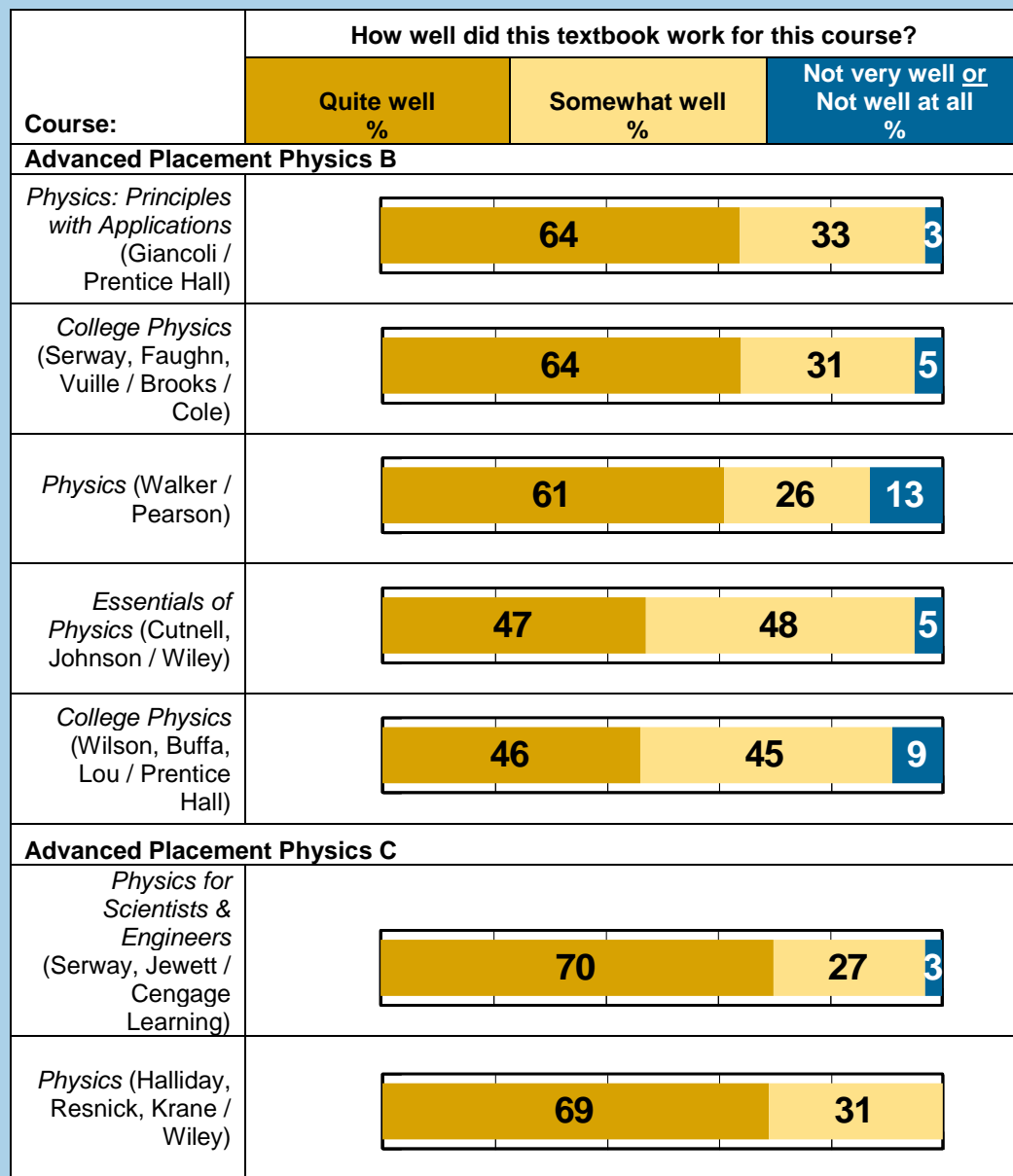
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AP Physics C is intense, analytical and calculus based. It often extends to one and a half or two school years.

Figure 5

Teachers' Ratings of Textbooks for AP Physics, US High Schools, 2008–2009



Ratings based on a four-point scale: Quite well, Somewhat well, Not very well, Not well at all
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Survey Methodology

In the fall of 2008, we contacted a representative sample of over 3,600 high schools in the US, both public and private, to determine whether or not physics was taught there. We received responses from over 99% of the schools. For the schools which indicated they were offering physics, we obtained contact information for the teachers. In the spring of 2009, we contacted each of the teachers who were thought to be teaching physics. We received responses from over 2,500 teachers (a 62% response rate). Our findings are based on their responses.

For a copy of the principal or teacher questionnaire, please contact Susan White at swhite@aip.org.

We were able to conduct this research only with the gracious help of the more than 6,000 people who provided responses, including an administrator at each school and each of the teachers who responded. We are deeply grateful for their assistance and their time.

This marks the seventh time we have conducted a survey examining physics in US high schools. The first six studies were directed by Michael Neuschatz, who retired from AIP in 2008. We hope to continue the tradition of excellent work in this area that he began.