Who is Paul Hewitt?

Paul G. Hewitt is a former boxer, uranium prospector, author, cartoonist and a physicist, born in Saugus, Massachusetts in 1931, and now living in St. Petersburg, Florida.

In 1964, Hewitt began his teaching career at the City College of San Francisco. In 1980 he began teaching evening courses for the general public at the Exploratorium in San Francisco, then moved to Hawaii to teach at the University of Hawaii.

In 1987, Hewitt began writing a high-school version of conceptual physics, which was published by Addison–Wesley. Conceptual Physics is now on its eleventh edition. Prior to Conceptual Physics, Hewitt co-authored Thinking Physics with Lewis Carroll Epstein, another book using cartoons to illustrate scientific concepts. He has been a regular columnist for the magazine The Physics Teacher.

Hewitt's textbooks have several memorable characteristics. As well as teaching physics concepts with minimal mathematics, Hewitt occasionally and spontaneously reminds the reader that looking prematurely at the answers to physics problems is like exercising the body by watching others do push-ups.

What Conceptual Physics is not?

Physics courses sometimes are 'watered down' in order to serve students who appear to lack mathematical skills. Conceptual Physics is not about 'dumbing down' the maths, nor is it about a random collection of mathematical equations.

About Conceptual Physics.

The value of teaching physics conceptually is about maximising the use of students' personal experiences in their everyday world and in their everyday language. They need to see that physics is not something they only do in a classroom or laboratory, but should see physics everywhere, as part of everything they experience. People with a conceptual understanding of physics are more alive to their surroundings. Richness of life is not only seeing the world with eyes wide open, but also knowing what to look for. What many students enjoy about a subject is not finding that it is easy, but finding that they can comprehend 'non-easy' material. Students know the intellectually demanding reputation of physics so it is rewarding for physics teachers when appreciative students thank us for helping them to get the best from their own brains.

Physics has always been recognised as an excellent way to teach mathematics logically. But physics can serve a higher purpose teaching students to THINK!

Testimonials

I find students who have had a conceptual physics course in high school are generally better prepared for university physics than those who have had a traditional problem-solving course.
Eric Mazur (Dept. of Physics Harvard University)

In my opinion, Paul Hewitt's Conceptual Physics provides a wonderful introduction to the concepts and spirit of physics.
Edwin Taylor (Senior Research Scientist, Emeritus, Dept. of Physics Massachusetts Institute of Technology)

Conceptual Physics is not an 'about physics' course, nor a physics appreciation course – it is REAL physics. It is the book that best prepares students for college-level physics
Sumner Davis (Dept of Physics, University of California at Berkeley)

What Paul Hewitt says about Conceptual Physics

You can't fully enjoy a game unless you know its rules. Whether it's a ball game, computer game or party game – if you don't know the rules, it can be boring. You miss out on what others enjoy. Just as a musician hears what untrained ears cant, and just as a cook tastes in food what others miss, a person who knows nature's rules can better appreciate nature.

Learning that satellites follow the same rules as tossed baseballs changes the way you see orbiting astronauts on TV. Learning the rules of light changes the way you see blue skies, white clouds and rainbows. Richness in life is not only seeing the world with wide open eyes, but knowing what to look for. Nature's basic rules can be found in physics.

Conceptual Physics Course Materials

Look up www.booko.com.au to find current availability of printed resources

- Text Book (Now up to 12th edition) *(Available from Amazon $110+)*
- Concept Development Exercises or Concept-Development Practice Book *(Available from Book Depository < $30)*
- Laboratory Manual 11th Edition *($68 Book Depository)*
- Next Time Questions *(Available for free download from internet eg. Try www.arborsci.com/next-time-questions)*
- Tests
- Videos *(Original lectures videotaped and now available on DVD $1200?)*

Some more of my favourite Practical Activities from Conceptual Physics

MOTION

18 Bull's Eye

My all-time favourite prac where students must successfully predict the motion of a steel ball. My students had to construct suitable 'data measuring' equipment from cheap stopwatches. This also demonstrates that the gravitational potential energy of the ball as it rolls down the ramp is not all converted into useful kinetic energy

26 Wrap Your Energy in a Bow

Energy and work and converting elastic potential energy into kinetic energy. Lots of energy losses in the real world here

LIGHT

70 Shady Business

This activity stresses the importance of careful observation.

75 Images

76 Peppper's Ghost

These look at reflections, and partial reflections on both sides of a sheet of glass. I use anything that relates to my own experience in theatre

78 Funland

Real and virtual images produced by curved mirrors

81 Bifocals

Images produced by converging lens

83 Air Lens

It's not just the convex shape but also the media in and around the lens that defines whether it is converging.

ELECTRICITY

87 Sparky, the Electrician

Simple series and parallel circuits.

88 Ohm. Ohm on the Range – Part 1

89 Ohm. Ohm on the Range – Part 2

90 Ohm. Ohm on the Range – Part 3

These three investigations develop understanding of voltages, currents and resistances in series and parallel circuits. They can also be simulated using Yenka Crocodile Physics or Crocodile Clips.

NUCLEAR ENERGY

96 Nuclear Marbles

Measuring something indirectly and using probability to calculate the size (within reasonable accuracy)

97 Half Life

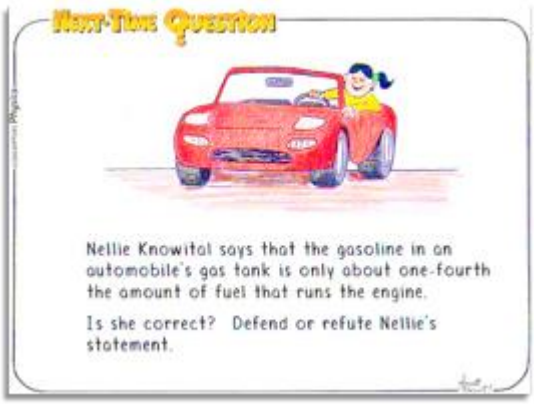
Can use M&Ms which are printed on one side (not smarties). Students can then enjoy cleaning up after the prac.

Next Time Questions can be downloaded from

www.arborsci.com/next-time-questions

These Next-Time Questions are for you!

Next-Time Questions are favourite insightful questions I have asked my students over my teaching career. I have embellished them with cartoons to catch interest. Their intention is to elicit student thinking. My use of them was posting several in a glass case outside my lecture hall—without answers. The wait-time for answers was one week. I could have called them Next-Week Questions, which would have been more appropriate.



Most of these have been published over the years as Figuring Physics in The Physics Teacher magazine. They have also been in ancillaries to my Conceptual Physics textbooks, and physical science textbooks as well. My hope is that teachers will pose the questions, and withhold answers to "next time," which could be as early as the next class meeting. Their educational value is the long wait time!
Although these are copyrighted, teachers are free to download any or all of them for sharing with their students. But please, DO NOT show the answers to these in the same class period where the question is posed!!! Do not use these as quickie quizzes with short wait times in your lecture. Taking this easy and careless route misses your opportunity for increased student learning to occur. In my experience students have benefited by the discussions, and sometimes arguments, about answers to many of these questions. When they'd ask for early "official" answers, I'd tell them to confer with friends. When friends weren't helpful, I'd suggest they seek new friends! It is in such discussions that learning takes place.

You may wish to project these Next-Time Questions rather than post them. One or two projected at the end of a class session is fine. The answer is given "next time" the class meets—or at some interval where wait time is at least a day.

These Next-Time Questions are the outcome of my long and wonderful teaching career. They're yours at the click of a mouse. Please use them as I suggest.
~ Paul Hewitt