

Improved Web Support for Physics Teachers

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AAPT Greensboro



Physics Teaching Web Advisory PATHWAY

- ◆ A dynamic digital library for physics teaching
- ◆ Combining
 - CMU digital video library technology
 - KSU Physics Education expertise
 - Materials contributed by teachers
- ◆ Offering continuously improving web-based assistance and expertise for teachers of all levels



The Old Front End found at www.physicspathway.org



Physics Teaching Web Advisory

[>> Ask Questions about Physics Teaching](#)

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Updated Front End found at www.physicspathway.org



Physics Pathway
(teaching advisory)

enter

Supported by the National Science Foundation
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version was supported by NSF's National
Science, Technology, Engineering, and
Mathematics Education Digital Library Program
under grants 0226219 & 0226157.



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Physics Pathway
(teaching advisory)



The Physics Teaching Web Advisory (Pathway) is creating a proof-of-concept demonstration of a new type of digital library for physics teaching. Combining Carnegie Mellon University's digital video library technology, with pedagogical advances developed at Kansas State University and with materials

contributed by master teachers, the Pathway concept goes beyond simply creating a collection of teaching and learning materials. It provides continuously improving assistance and expertise for teachers and students of all levels. Pathway builds on a unique collaboration between several longstanding

research projects in digital video libraries, advanced distance learning technologies, collaboration technologies, and nationally known experts in physics pedagogy and high quality content.



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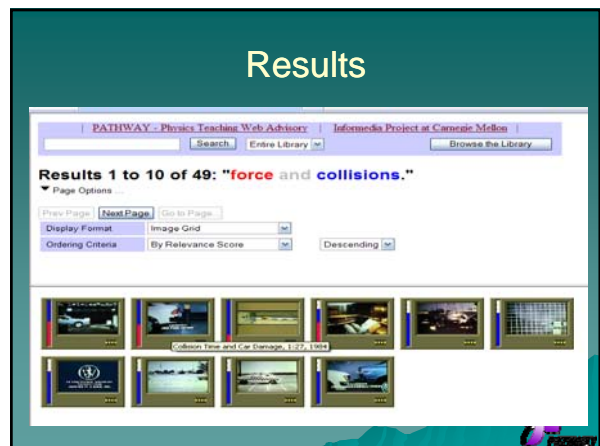
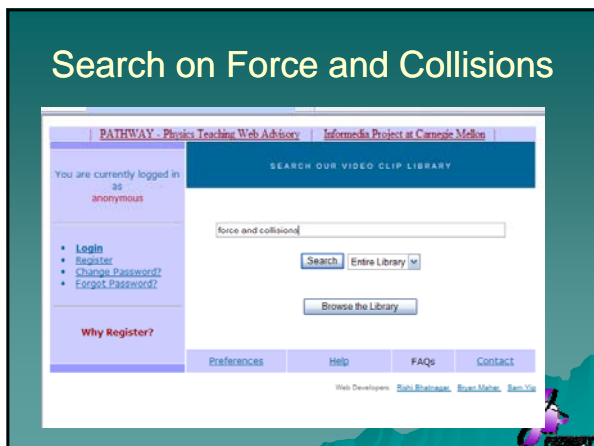
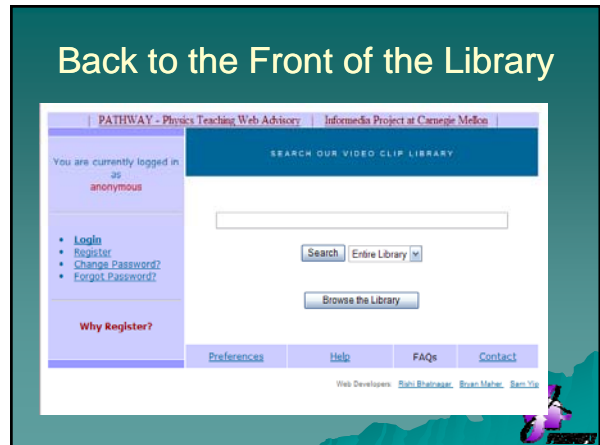
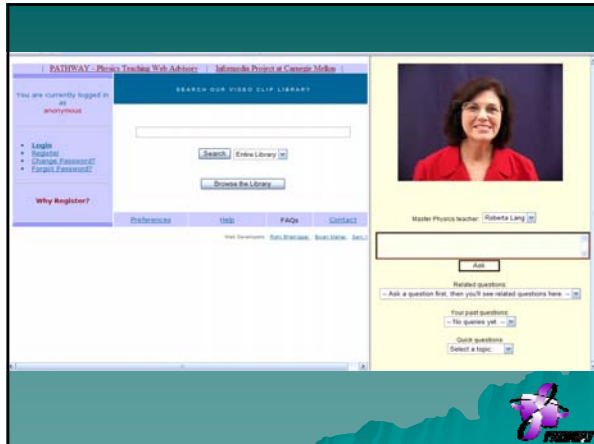


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PATHWAY Components

- ◆ Synthetic Interviews
- ◆ Informedia Digital Video Library
- ◆ Connections to
 - National Science Education Standards
 - Research in Physics Education
 - Helpful Web sites





Results

PATHWAY - Physics Teaching Web Advisory | Infomedica Project at Carnegie Mellon

Search | Entire Library | Browse the Library

Results 1 to 10 of 49: "force and collisions."

Page Options

Prev Page | Next Page | Go to Page

Display Format: Image Grid

Ordering Criteria: Images with Text Description | Descending

Image Rich storyboard

Collision Test and Car Damage, 1/27, 1994

Results

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Display Format: Image Grid

Ordering Criteria: By Relevance Score | Descending

By Date | By Video length

Collision Test and Car Damage, 1/27, 1994

Play the Video

Collision Test and Car Damage

Automobile damage in low-speed collisions can be controlled by application of physics concepts. For example, the damage to the car as it strikes the barrier is rather large, even though its speed is only eight kilometers per hour. The road for example is also large. This car is almost identical to the previous one and is traveling at the same speed, yet the damage to the car's front is significantly less. When the rear of the car strikes the barrier, it sustains about the same damage as the first car. This rear-end collision involves a car which is almost as identical to the first one, yet the damage to it is almost zero. How can cars which are almost identical and traveling at the same speed receive vastly different damages in low-speed collisions? Newton's laws hold the answer. Newton's Second Law states that the force applied to an object is the change in momentum divided by the time required to make that change. Either decreasing the momentum change or decreasing the interaction time will cause a decrease in the applied force. Using this idea, car engineers have designed ways to decrease the force on cars. The shock absorbing bumpers which have been required by federal standards since 1973 give a buffer as they collide with another object. As the bumper moves, the interaction time increases, and the force decreases. Smaller forces on the car result in less damage. Using still frames and slow motion, you can take measurements from which you can calculate the force on each car shown.

We WANT Hewitt's workshop!

Obstacles to IDVL success

- ◆ Transcripts
 - How to generate?
- ◆ Segmenting
- ◆ Processing
 - Cannot go back to old style

A Synthetic Interview

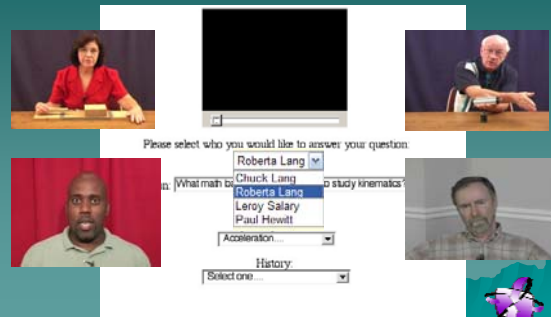
Question:

Ask

Synthetic Interviews

- ◆ Internet chat rooms are quite popular
- ◆ Get a response from a real person
- ◆ But experts do not scale and don't want to spend all their time answering questions
- ◆ And/Or/But ...
- ◆ anthropomorphic interfaces can have a strong motivational impact compared to text or traditional multimedia, with users perceiving the persona as being helpful, entertaining, and creating a more positive learning experience (Lester, 1997; van Mulken, 1998)

We Offer Multiple Personalities



Today



Features that work

- ◆ Video controls
- ◆ Cast your vote
- ◆ Question being answered
- ◆ "Not Answered" option
- ◆ Bibliographic citations
- ◆ Asked question does not disappear
- ◆ Related Questions
- ◆ Past Questions
- ◆ Quick Questions

It is even in KSU Purple



To be added

- ◆ Education Standards
- ◆ Alternate Media
- ◆ IDVL links?
- ◆ Web sites?
- ◆ More experts per topic

Topics on now

- ◆ Basic information
 - History
 - Laws and theories
 - measurement (length, time, mass)
 - units
 - significant figures
 - scientific notation



Topics on now

- ◆ Tools
 - coordinate systems
 - graphs
 - vectors
 - vector components
 - vector algebra
 - delta notation
 - rate of change
 - free-body diagrams



Topics on now

- ◆ Kinematics
 - distance
 - displacement vector
 - motion (uniform motion)
 - relative motion
 - speed (average, instantaneous, constant)
 - velocity vector (average, instantaneous, constant)
 - acceleration vector (avg, inst, const, uniform)
 - kinematic equations
 - acceleration due to gravity
 - one-dimensional motion
 - nonlinear motion
 - projectile motion



Topics on now

- ◆ Dynamics
 - Newton's Laws
 - Newton's First Law
 - Newton's Second Law
 - Newton's Third Law
 - inertia
 - fundamental forces
 - force
 - net force
 - weight
 - friction
 - air drag
 - terminal velocity
 - equilibrium (static)
 - inclined planes



Topics on now

- ◆ Gravity
 - free fall
 - Newton's Law of Gravitation
 - planetary motion
 - satellites
 - weightlessness
 - gravitational field
 - Kepler's Laws



Topics on now

- ◆ Uniform Circular Motion
 - centripetal (radial) force
 - centripetal (radial) acceleration
 - centrifugal force
 - tangential velocity, speed
- ◆ Rotational motion
 - torque
 - moment of inertia (rotational inertia)
 - angular momentum



Topics on now

- ◆ Momentum (chapter and concept)
 - impulse
 - collisions
 - ◆ 1-dimensional
 - ◆ 2-dimensional
 - ◆ 3-dimensional
 - conservation of momentum



Topics coming soon

- ◆ Pressure
- ◆ Bouyancy
- ◆ Archimedes' Principle

- ◆ Followed by Energy topics
- ◆ Others will follow swiftly



We would like your help

- ◆ Suggest questions to ask the experienced teachers

- ◆ Try the system
 - When the survey works

- ◆ Give us feedback any time



Questions or Comments?

- ◆ Brian Adrian
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- ◆ www.physicspathway.org

THANK YOU!

