Workshop Physics

Exploring and Modeling the Physical World Through Direct Investigation

Workshop Physics

- **Funding since 1986:**
  - **FIPSE**
  - **NSF**
- **Developers:**
  - **Dickinson College**: *Priscilla Laws, Robert Boyle, Kenneth Laws, Hans Pfister & John Luetzelschwab*
  - **Tufts University**: *Ronald Thornton*
  - **University of Oregon**: *David Sokoloff*
  - **Millersville University**: *Patrick Cooney*

Workshop Physics

- *Calculus-based course w/ no formal lectures*
- *Collaborative, activity-based classroom*
- *Three 2-hour classes each week*
- *Use of a student Activity Guide*
- *Computer tools for data collection & analysis*
- *~15% content reduction*
- *Retention of exams*
- *Textbook optional*

Workshop Physics Learning Goals

- Enable students to master concepts and skills needed for further study in the natural science and engineering
- Develop an understanding of the processes of doing physics needed for learning without formal instruction
- Became familiar with computers and other contemporary research tools for data collection, analysis and modeling
- Motivate students to learn more science

Learning Sequence*

- ***Prediction***
- ***Observation***
- ***Reflection***
- ***Formal Theory***
  - —theory building
  - —equation derivation
  - —mathematical modeling
- ***Application***
  - – equation verification experiments
  - – holistic problem solving

* Adapted from D. Kolb, **Experiential Learning**

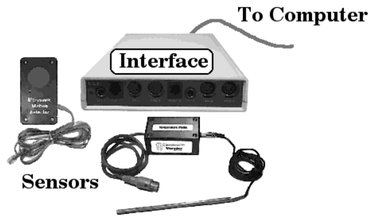
Philosophy of Computer Use

- *Flexible tools to explore and model the real world through direct investigation*
- *Transferable computer skills*
- *Not used as a tutorial device*
- *Simulations only used if real experience is inaccessible*

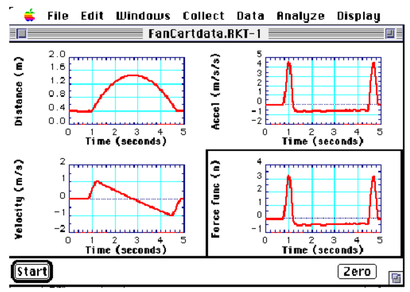
Computer Tools for Data Acquisition and Modeling

- *Computer-based Lab Tools*
- *Video Analysis*
- *Spreadsheets*

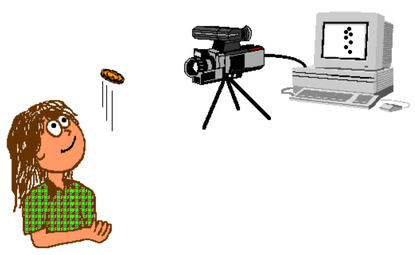
Computer Based Laboratory Tools



Data Logging w/ Real Time Graphs

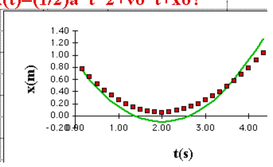


Video Capture & Analysis



Using a Spreadsheet for Analytic Modeling

	A	B	C	D	E
1	Accelerating Cart			a=	0.50
2				vo=	-1.00
3	x(m)			xo=	0.90
4	t(s)		Does x(t)=(1/2)a*t^2+vo*t+xo?		
5	t(s)	exp	model		
6	0.17	0.77	0.74		
7	0.33	0.64	0.59		
8	0.50	0.52	0.46		
9	0.67	0.42	0.34		
10	0.83	0.34	0.24		
11	1.00	0.26	0.15		



Analytic Mathematical Models

- *Common functions describing a phenomenon that can be predicted based on direct observation or a hypothesis based on previous experience*

Web address: http:// physics.dickinson.edu

Dickinson College
Department of Physics and Astronomy

New Science Building

WORKSHOP PHYSICS Activity Based Learning

Workshop Physics/Activity Based Physics
An introduction to Workshop Physics with sample activities and evidence supporting its effectiveness. An instructor's resource guide that contains a wealth of information for first time or veteran instructors of Workshop Physics. A library of computer software, WWW development tools and Java class libraries developed by the Workshop Physics team.