

**The evolving classroom
response system at
Kansas State University:
Classtalk, PRS, & PDAs.**

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Physics Education Research Group

Kansas State University

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**Office of the
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Response System in Physics at KSU: The Last 10 Years

- Primarily in introductory courses
- Variety of class sizes
 - 15 to 180 students
- Mostly for in-class feedback on conceptual understanding
 - Essentially no testing with systems
- Some (not all) faculty provide credit for use
- About $\frac{1}{2}$ faculty have used system at least once

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Classtalk (1995 – 2000) Hardware

- Designed & Built by Better Education Inc.
 - <http://www.bedu.com/>
- Hard wired proprietary network
- Macintosh Server
- Hewlett-Packard Hand-held *DOS* computers
 - Full QWERTY keyboard

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Classtalk Software

Designed & Written by Fred Hartline

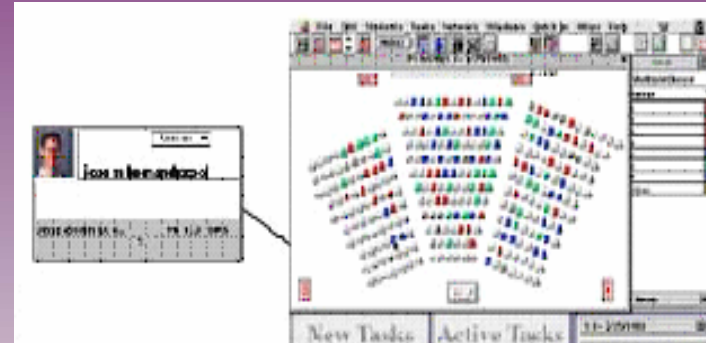
- Mac server
 - Sends questions to handhelds
 - All types of questions possible
 - *Not* limited to multiple choice
 - Provides analysis & individual responses for instructor
 - Could send different messages to handhelds depending on the student's response
- Handhelds
 - Full questions appear on screen
 - Alphabetic & numeric responses possible

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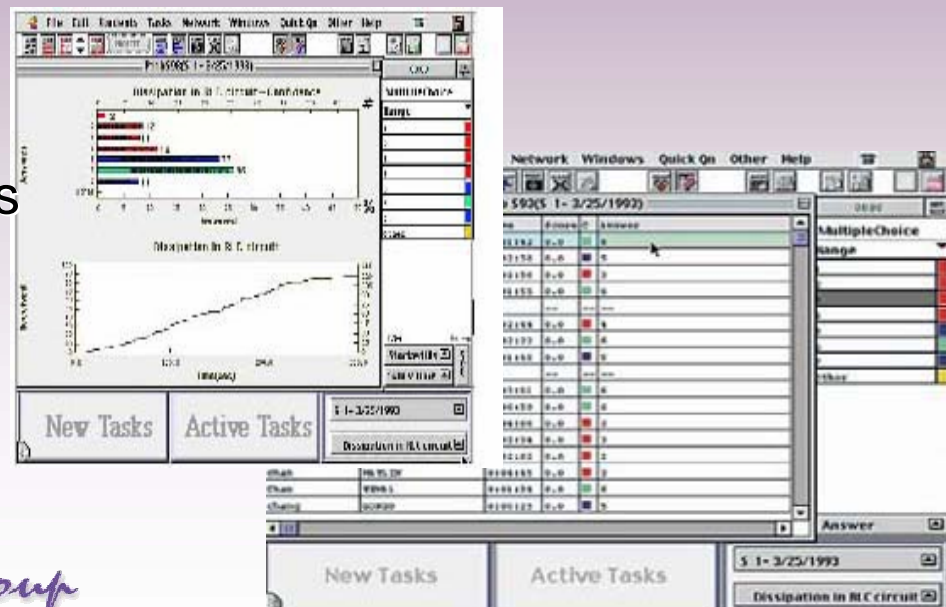
Classtalk Software

Includes seating chart with ability to click on a seat and see the student's name, picture and response.



Analyses include

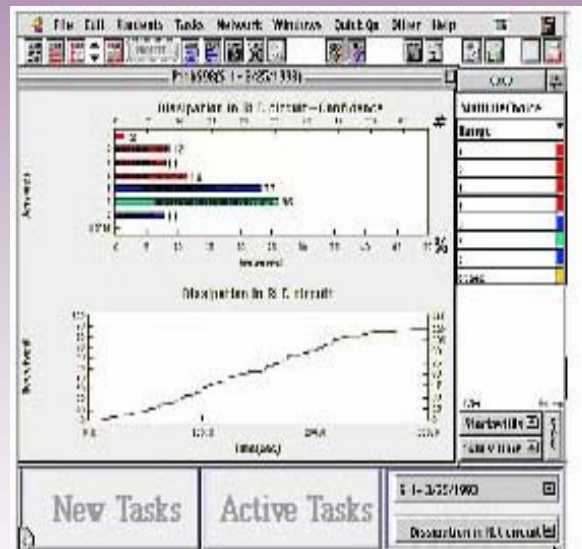
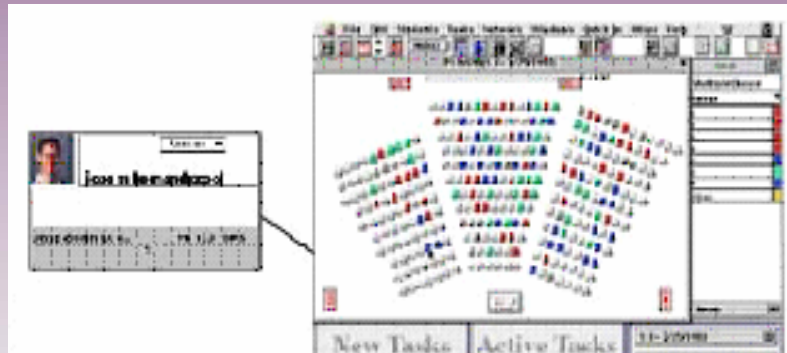
- Parsing for short answer questions
- Binning for numerical responses
- Histograms for multiple choice



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Better than any software for later systems



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Assessment of Student Learning*

- Completed in conceptual physics course for elementary education majors
- Three classes
 - Before Classtalk was installed
 - Classtalk installed about mid semester
 - Used Classtalk entire class
- Common final exam
- Attitude surveys
- Results show positive effects in both learning & attitudes

Personal Response System (PRS) 2001 Onwards

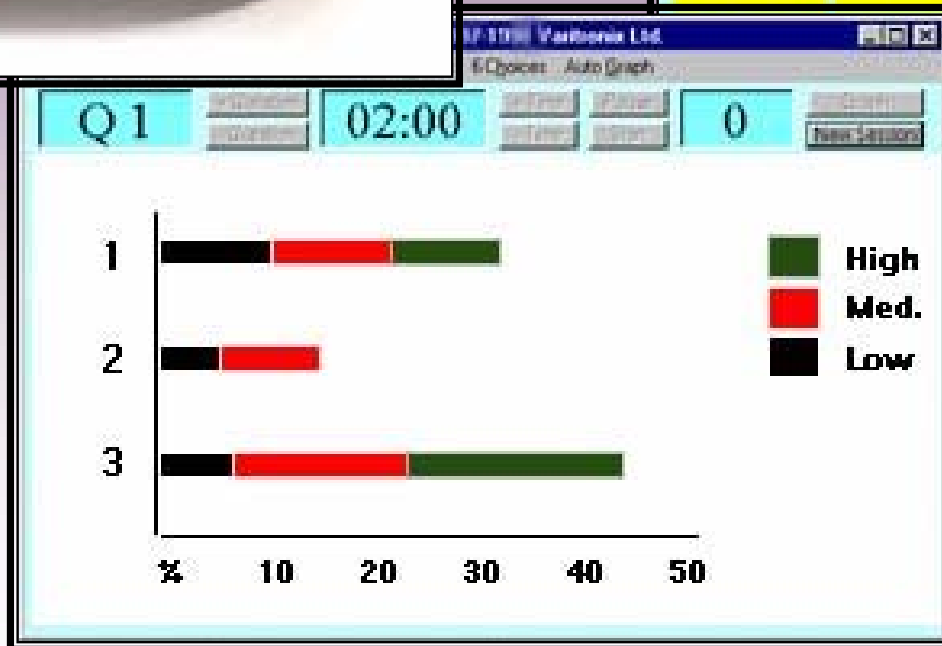
- Infrared (wireless)
- Remote clickers
- One way communication
 - No “server” just a receiver
- Multiple choice only
- Relatively inexpensive
- Many other similar systems

PRS



Personal Response System - Copyright © 1997-1999 Veritronix Ltd.
Elm: Audience: Fin: 30 Choices: Screen: 20 Lines: 6 Choices: Auto Graph

Q 1	02:00	0	New Session		
Aaron 1110	Fred 1122	Bill 1108	Eric 1144	Diem 1125	
---	---	---	---	---	
---	---	---	Pat 1144	---	
---	---	Louis 1115	Darcy 1199	---	



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Personal Data Assistants (PDA) 2004 Onwards

- Wireless Internet
- Full “keyboard” available
 - No limits on types of responses
- Web-based software
 - Can run in browser
 - Not all functions of desktop browsers
 - Any Web-based question-response system can work
- Expensive ~\$500-600 (Cheaper models available)

– Thanks



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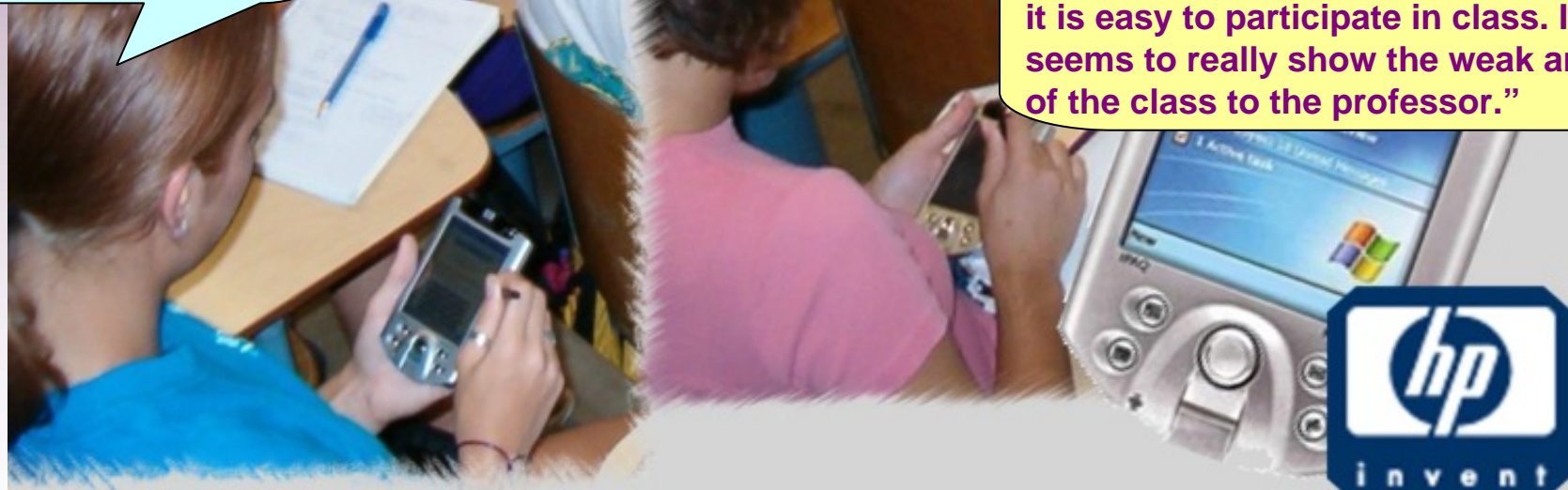
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K-State

"I love using these hand-held computers. I really like how it provides feedback directly to the teacher. I plan on getting one of these, for my own personal use."

"The best thing about the hand-held computers is that they provide useful feedback to the instructor about whether or not we understand"

"They are really easy to use and with the questions and response method it is easy to participate in class. It seems to really show the weak areas of the class to the professor."



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PDA's

- Explored several options for software & responses
- Used in only one class
 - Elementary ed majors
 - Attempted to develop uses beyond previous systems
 - Instructor (DZ) experienced with Classtalk & PRS

Beyond Question

<http://www.erskine.edu/bq/>

- Server at Erskine College
- Multiple choice and open ended Questions
- Can be used with simple “clickers” as well as PDAs and computers.
- Creation of question set relatively easy.
 - Can include graphics
- Free for non-commercial use

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1000 Q 2.

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
<u>Yes</u>	<u>No</u>		
<u>Maybe</u>	<u>????</u>		

Click if submitting text

Prior answer was 1
Next question:

What will happen to the wire when I put a current through it?

A. It will move up or down
B. It will move left or right
C. It will not move
D. I don' know

Beyond Question

Examples of instructor response screens

Anonymous **Spreadsheet** **Histogram** **Responses** **Utilities**

49 out of 52 participants have answered question 2

1 2 3 4 5

A?answr=90 J
C?answr=90 JOULES
A?answr=90
A?answr=90J
A?answr=90 J
A?answr=90 J
D?answr=90 j
A?answr=90J
A?answr=90 J
A?answr=90
A?answr=90j
E?answr=90j
A?answr=90 J
A?answr=90 J
A?answr=90j
A?answr=90J
C?answr=90 J
A?answr=90 j

Kevin pushes on a bookcase with a force of 30 Newtons. He moves the bookcase a distance of 3 meters. How much work has he done on the bookcase?

Anonymous **Spreadsheet** **Histogram** **Responses** **Utilities**

52 out of 52 participants have answered question 1

1 2 3 4 5

Response	Percent of Responses
A	73%
B	1%
C	15%
D	1%
E	3%

For the interaction when the cart struck the can, what is the energy source?

A. Cart
B. Can
C. Gravity
D. None of the above
E. I don't know

KSU Survey System

<http://survey.ksu.edu>

- Created for social science research
- Variety of questions types
 - Multiple choice
 - Ranking
 - Scaling
 - Open-ended
 - Can include graphics
- Branching based on previous answer
- Grouping of questions
- At present use limited to KSU faculty

Page 2

Question 2 **** required ****

For the circuit at the front of the room will the lamp turn on when the switch is closed?

- Yes
- No
- I don't know.

Question 3

1 - Just guessing | 2 - Not quite a guess | 3 - Moderately sure
4 - Almost certain | 5 - Certain that it is right

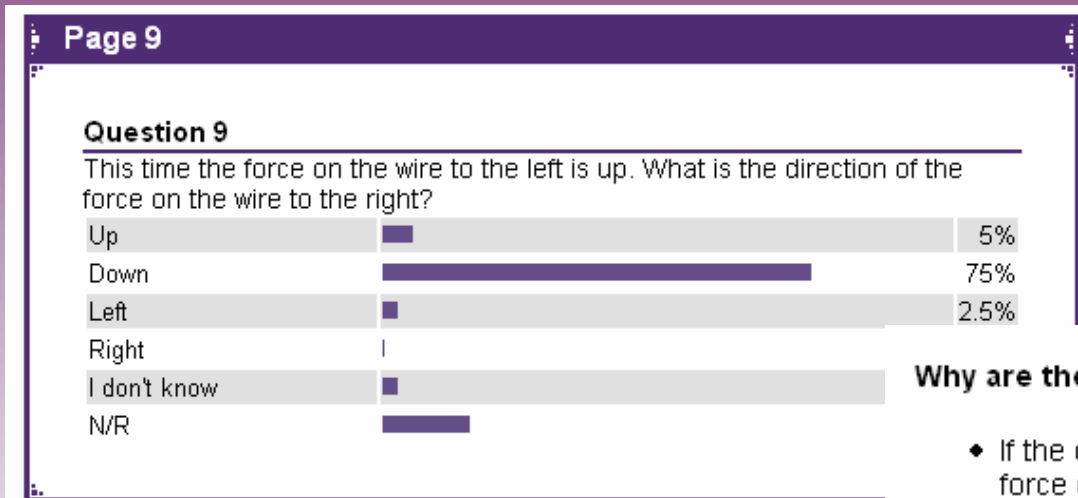
	1	2	3	4	5
3.1 Rank your confidence in your answer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Survey System

Examples of Instructor Screen



Close

Why are the two situations different?

- ◆ If the direction of the current changes, then the direction of the force changes.
- ◆ different current
- ◆ depends on direction of current
- ◆ current is in opposite direction
- ◆ current is in opposite direction
- ◆ different current
- ◆ Not sure
- ◆ because the current is in a different direction.
- ◆ because of the direction of the currents.
- ◆ b/c the currents are going in different directions
- ◆ the currents are going in different directions
- ◆ because the current changed direction
- ◆ based on the magnetic pull.

Ideas for PDAs Classroom use

- Neighboring students receive slightly different questions
 - Same topic
 - Required to discuss with each other after answer
 - Consider similarities and differences in situation and responses
- Graphical questions
 - Point to a place on the picture that ...
- Students use PDAs as measuring tools
 - E.g. stop watches
- Web as a reference source

Different Questions with Graphical response

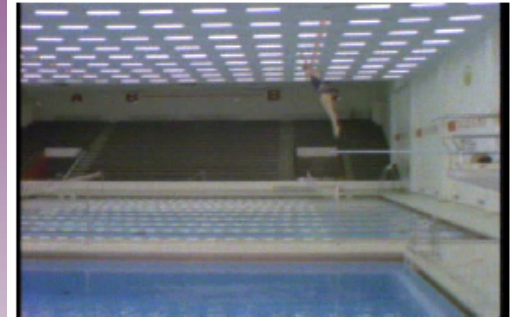
- Each student sees a picture of a diver after she has left the board
- Three students sitting next to each other will have different pictures
 - On the way up
 - At the peak
 - On the way down
- They select vectors to indicate each force acting on the diver.
- Subsequent peer-to-peer discussion addresses the “force in the direction of motion” issue.

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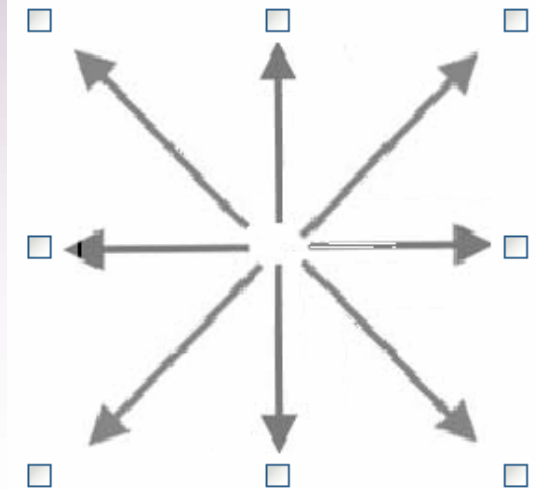
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What are directions of the forces acting on the diver at this position?

Consider all forces individually, not the net force.



Select as many different directions as needed to describe all of the forces. Then tap the SUBMIT button.



Issues

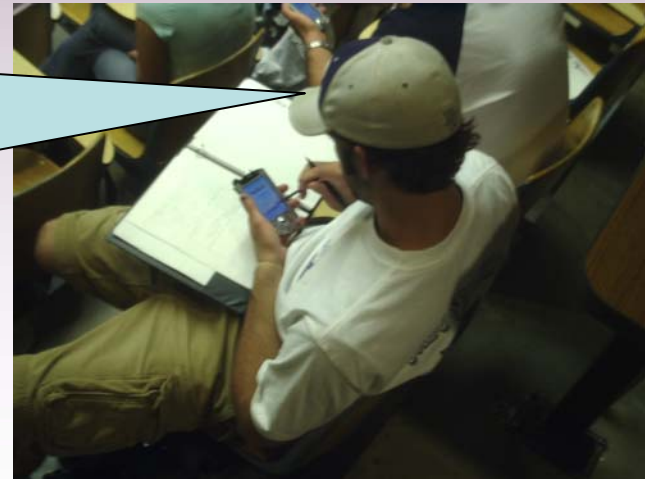
- Internet Explorer on PDAs is limited
 - Only one window open at a time
 - Java not implemented well
 - Macromedia Flash is but we have not used it yet
- Installing new software is done one machine at a time
- During class students will
 - Read e-mail
 - Play games
 - Check bank accounts

And they can check up on the instructor



I fixed the problem
with the online
grade book.

No, you didn't.
I am looking
at it right now.



For more information

http://web.phys.ksu.edu/HP_project

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