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How Do You Get Student Buy-In to A "Wonderful (to You)" Teaching Innovation?

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QUESTION....

How Do You Get Student Buy-In
to a “WONDERFUL (to you)”
Teaching Innovation??

By

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Introduction

- As we convert teacher-centered courses to learner-centered courses, we can run into problems.
 - Students must play active responsible roles
 - Many students may resist change in role
 - Students experience anxiety, disorientation – they are out of their comfort zone.
- Student attitudes and expectations affect performance and learning outcomes
- These are especially important when the innovative tool is technology-based.

Introduction

- Our innovative tool is Calibrated Peer Review (CPR™) used in my introductory chemistry class
- This was a mixed methods study using both quantitative and qualitative student data over 7 semesters with 3 questions in mind:
 - 1) What do students think about CPR as a learning tool?
 - 2) What do student comments reveal about the reasons for their accepting or resisting CPR?
 - 3) How and why did the instructor (me) persist, particularly in the face of initial intense student resistance?

The research was published in the International Journal of the Scholarship of Teaching and Learning (Jan. 2008):

“Overcoming Student Resistance to a Teaching Innovation”

http://www.georgiasouthern.edu/ijsotl/issue_v2n1.htm



What is CPR™?

(cpr.tamu.edu)

- A free web-based instructional writing and peer assessment tool
- Originated in the Molecular Science Project, an NSF-sponsored chemistry reform project (DUE 95-55605) at UCLA
- Enables students to learn by writing about significant topics in a course, then going through a critiquing process 7 times



- Faculty create assignments with
 - instructions,
 - suggested resources,
 - questions to guide student thinking,
 - a “writing prompt” including topic, format, audience,
 - calibration questions (grading rubric) and
 - 3 sample essays (high, average, low quality) with feedback for calibration questions



➤ Students work in 3 phases:

- Text entry – students write/submit essays
- Calibration phase – students
 - Are presented with 3 calibration essays,
 - Answer calibration questions,
 - Assign ratings,
 - Receive reviewing competency score
- Review phase – students
 - Are presented with 3 of their peers' essays (randomly selected and anonymous) and their own
 - Review and rate using calibration questions

Writing as a Teaching/Learning Tool

“Writing-Across-the-Discipline”

Writing

- Promotes critical thinking skills
- Helps extend knowledge
- Helps to structure rough ideas into coherence
- Helps prepare students for future careers by writing in the discipline

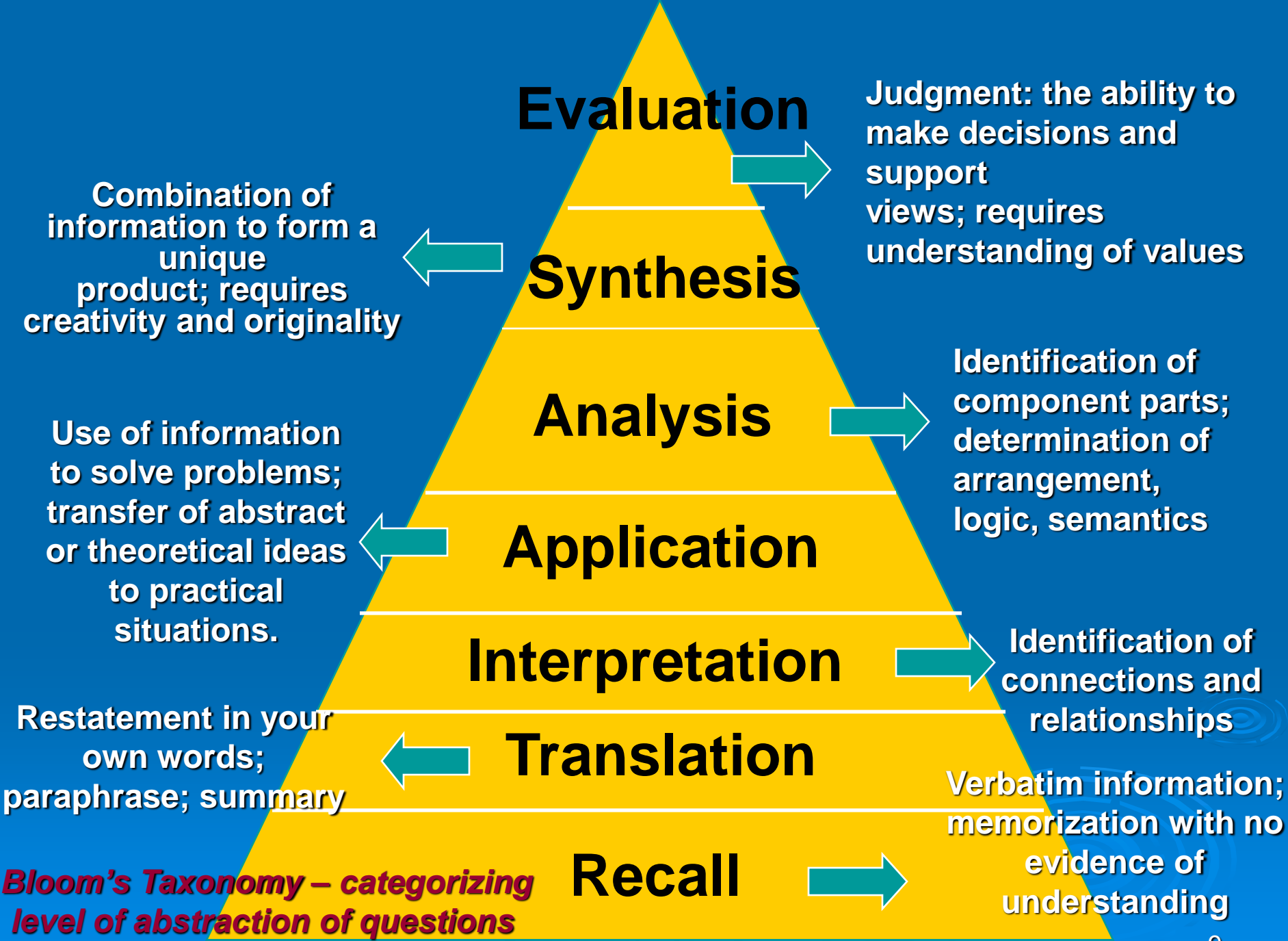
Peer Review as a Teaching/Learning Tool

Peer Review

- Has students working at the highest levels of Bloom's Taxonomy (next slide)
- Gives practice in developing performance criteria
- Encourages self-reflection, responsibility

Issues

- Students do not like criticizing friends
- Students perceive the grades are arbitrary and should only be done by instructors



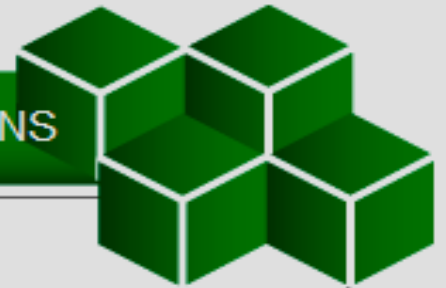
Background

- In Fall 2002 and Spring 2003, we introduced CPR™ into all the Chem 101/102 classes at TAMU to promote writing without additional graders.
- Our first-year general chemistry is a two-semester sequence involving ~3000 students each semester. Students attend 3 hrs of lecture in 300-student classes and 1 3-hr lab per week.
- This study involves only my classes, since after 1 year, the CPR™ experiment in FYP ended (badly!).
- Feedback was collected with Student Assessment of Learning Gains (SALG), a free customizable web-based program.

Student Assessment of Learning Gains

www.salgsite.org

STUDENT ASSESSMENT OF THEIR LEARNING GAINS



Instructors, Welcome to the SALG Website!

The *Student Assessment of their Learning Gains* (SALG) website allows instructors to gather **learning-focused** feedback from students. The SALG survey asks students to rate how each component of a course (e.g., textbook, collaborative work, labs) helped them to learn, and to rate their gains toward achieving the course goals. The SALG survey can be customized to fit any college-level course, and can be administered multiple times per course. A baseline instrument allows faculty to compare gains relative to incoming student characteristics.

Once registered on the SALG site, you can:

- customize the SALG survey to fit your course goals and methods;
- search for an existing SALG survey in your discipline;
- have students complete the survey on-line; and,
- download and review analyses of the students' responses.

- Students log into the site with their name so credit can be given
- SALG dissociates names from responses to ensure anonymity

Methodology

➤ Research team:

- Wendy Keeney-Kennicutt, instructor
- Adalet Baris Gunersel, Ph.D. graduate student in Educational Psychology
- Nancy J. Simpson, faculty developer and Director of Center for Teaching Excellence

➤ Study group:

- 1515 students in my classes from Fall 2002 – Spring 2006, excluding Fall 2003
- Students asked to complete SALG survey for 5pts on final exam (completion rate: 94-98%).

➤ Items on SALG pertaining to CPR™

Yes/No

- 1) Do you think that future classes should do CPR?
Please explain.

5 pt Likert Scale (1=strongly disagree to 5=strongly agree)

- 2) I enjoyed doing CPR.
- 3) The CPR assignments helped me learn some chemistry.
- 4) The CPR assignments helped me improve my writing skills.
- 5) The CPR assignments helped me learn to critique my own writing and that of others.

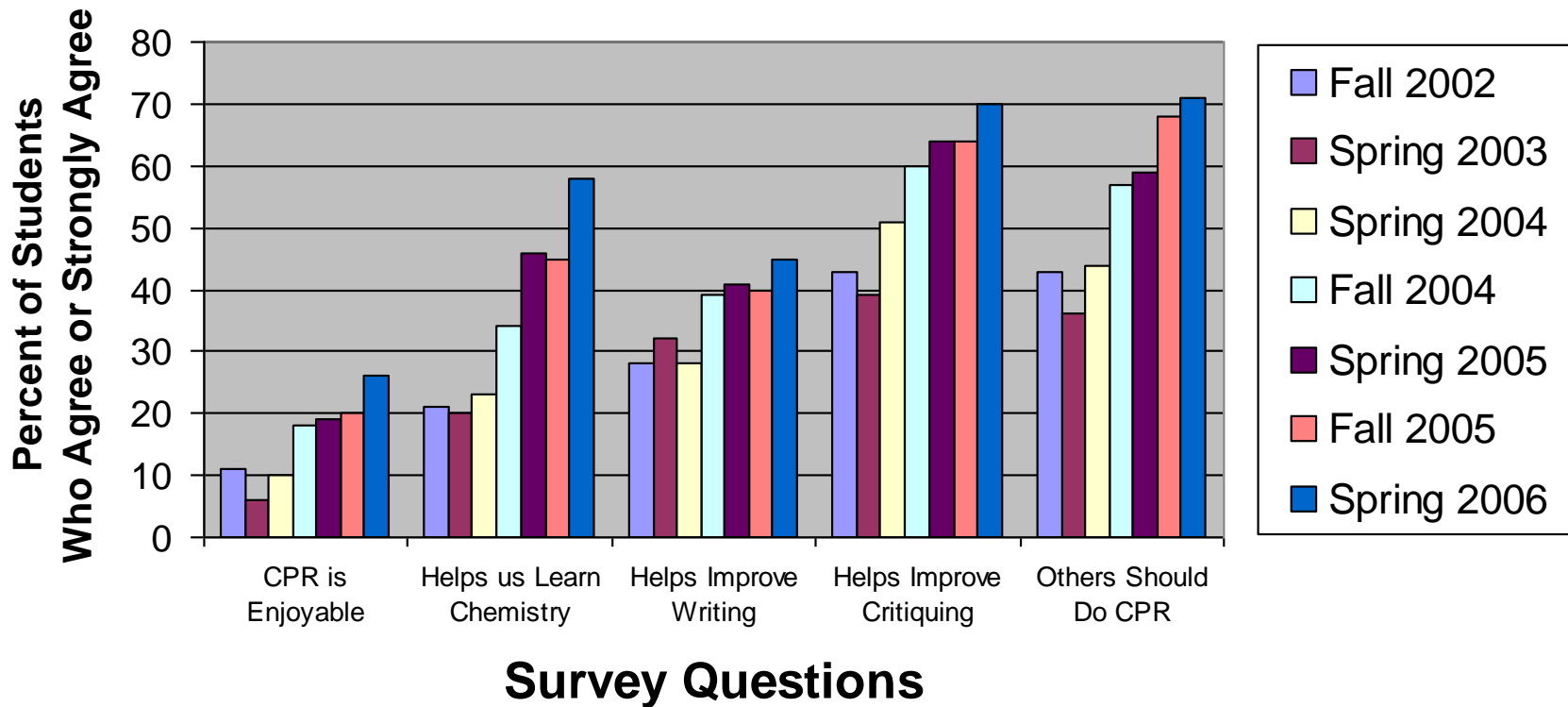
➤ Quantitative Data

- Correlational analysis among responses to items 1-5
- Analysis of responses from items 2-5 to item 1
- Chi-square analysis on pairs of items 2-5 for S '06 data

➤ Qualitative Data

- Explanations to Item 1:
 - “Do you think that future classes should do CPR™? Please explain.”
- We looked for patterns and themes to address our second question:
What are the reasons for students accepting or resisting CPR?
- Coding was critical – our team needed my input to put the comments into context

Findings – Quantitative Results



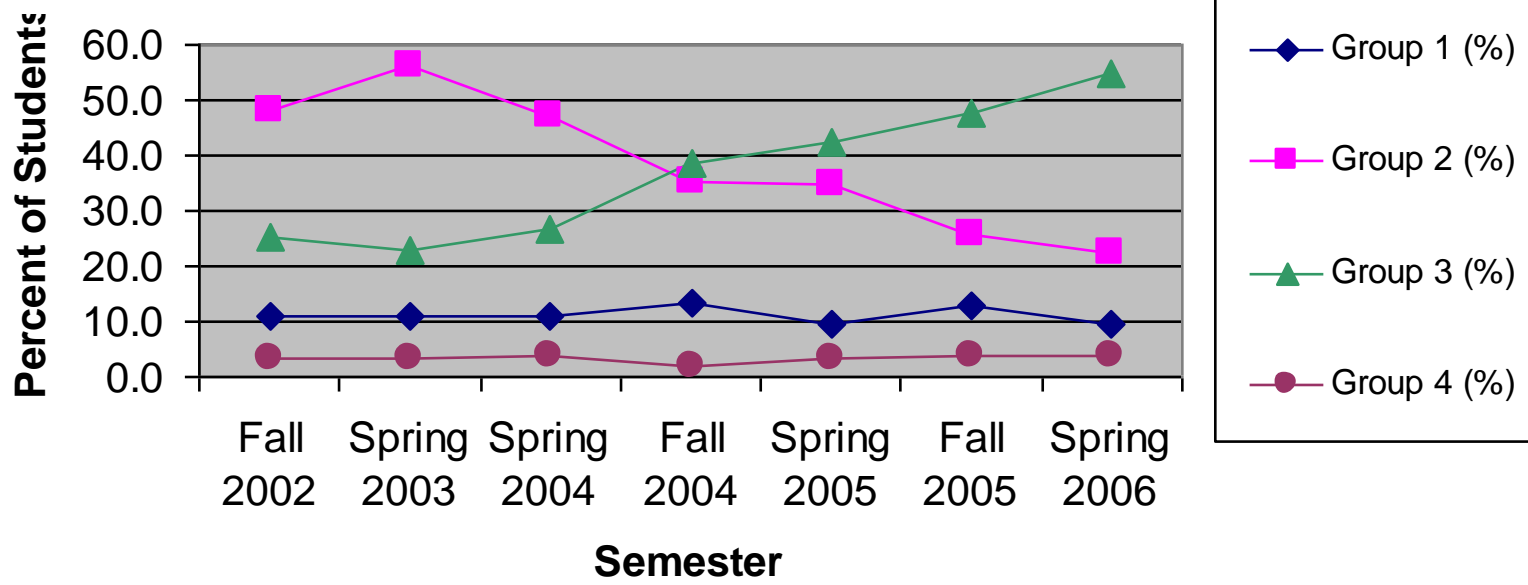
We saw a significant increase in student acceptance and understanding of CPR over time.

Findings – Quantitative Results

- **We occasionally saw the comment:**
 - “If we had to do it, future classes have to do it.”
 - A negative experience might give a supposed positive outcome (yes, I think future classes should do CPR™)
- **We averaged the Likert responses to all items (1=strongly disagree → 5=strongly agree)**
 - If >3 , student had overall positive experience
 - If <3 , student had overall negative experience

Findings – Quantitative Results

Relationship Over Time between Student Experience with CPR and Their Promotion of CPR for Future Classes



- Group 1: Students with negative CPR experience, wanted future classes to do CPR
- Group 2: Students with negative CPR experience, did not want others to do CPR
- Group 3: Students with positive CPR experience, wanted others to do CPR
- Group 4: Students with positive CPR experience, did not want others to do CPR

Findings – Quantitative Results

- We used Spring 2006 data (N=235) to investigate relationships between Likert scale items 2-5
 - 2) Do they enjoy CPR?
 - 3) Do they think CPR helps them learn chemistry?
 - 4) Do they think CPR helps them improve their writing?
 - 5) Do they think CPR helps them improve their critiquing skills?
- Spearman correlation coefficient rho values:
 - 0.53-0.63 significant at 0.01 (2-tailed; $p = 0.000$)

Findings – Quantitative Results

- **Chi-square 2x2 contingency tables were made**
 - **Students were divided into two groups:**
 - those that agreed/strongly agreed with an item, and
 - those that were neutral/disagreed/strongly disagreed
 - **Of the students who enjoyed CPR,**
 - 90% said it helped them learn chemistry
 - 78% said it improved their writing
 - 95% said it improved critiquing skills
 - **Of the students who did not enjoy CPR,**
 - 47% said it helped them learn chemistry
 - 33% said it improved their writing
 - 62% said it improved critiquing skills
 - **$X^2(1)$ between all pairs ranged 23.7-52.0**
 - Conclusion: data were interdependent at $p < 0.001$.

Findings – Quantitative Results

- **A fun way of looking at contingency tables is calculating odds ratios**
 - Students who enjoyed CPR were
 - 10 times more likely to think they learned more chemistry than those who didn't enjoy CPR
 - 7 times more likely to think CPR improved writing skills, and
 - 12 times more likely to think CPR improved critiquing skills
 - Odds and odds ratios are very simple to calculate:
 - Create a 2x2 table:

	CPR did not help learn chemistry	CPR did help learn chemistry	Total
Students who did not enjoy CPR	93	81	174
Students who did enjoy CPR	6	54	60
Total	99	135	234

Findings – Quantitative Results

	CPR did not help learn chemistry	CPR did help learn chemistry	Total
Students who did not enjoy CPR	93	81	174
Students who did enjoy CPR	6	54	60
Total	99	135	234

- **First, calculate odds, then divide to find the odds ratio:**
- If a student enjoyed CPR, the odds that she would think it helped her learn chemistry = $54/6 = 9.0$
 - If a student did not enjoy CPR, the odds that he would think it helped him learn chemistry = $81/93 = 0.87$
 - So, the odds ratio is $9.0/0.87 = 10$, so we can say:
 - A student who enjoyed CPR is 10 times more likely to think they learned more chemistry than those who didn't enjoy CPR

Findings – Quantitative Results

- While it is not necessary for students to “like” a particular learning tool in order to benefit from it, this analysis demonstrated



If students
enjoyed CPR

They reported they received
7-12 times more benefit
with regard to their
learning,
writing skills and
critiquing skills

Qualitative Results

“Do you think that future classes should do CPR? Explain.”

- Over 7 semesters, there were
 - 550 totally positive responses
 - 515 totally negative responses
 - 174 mixed responses
 - 25 neutral responses
 - Total: 1264 responses
- The qualitative part of this study gave invaluable insight into student attitudes about CPR and how it changed as I made changes in presentation, student support and grade intervention.

Qualitative Results

“Do you think that future classes should do CPR? Explain.”

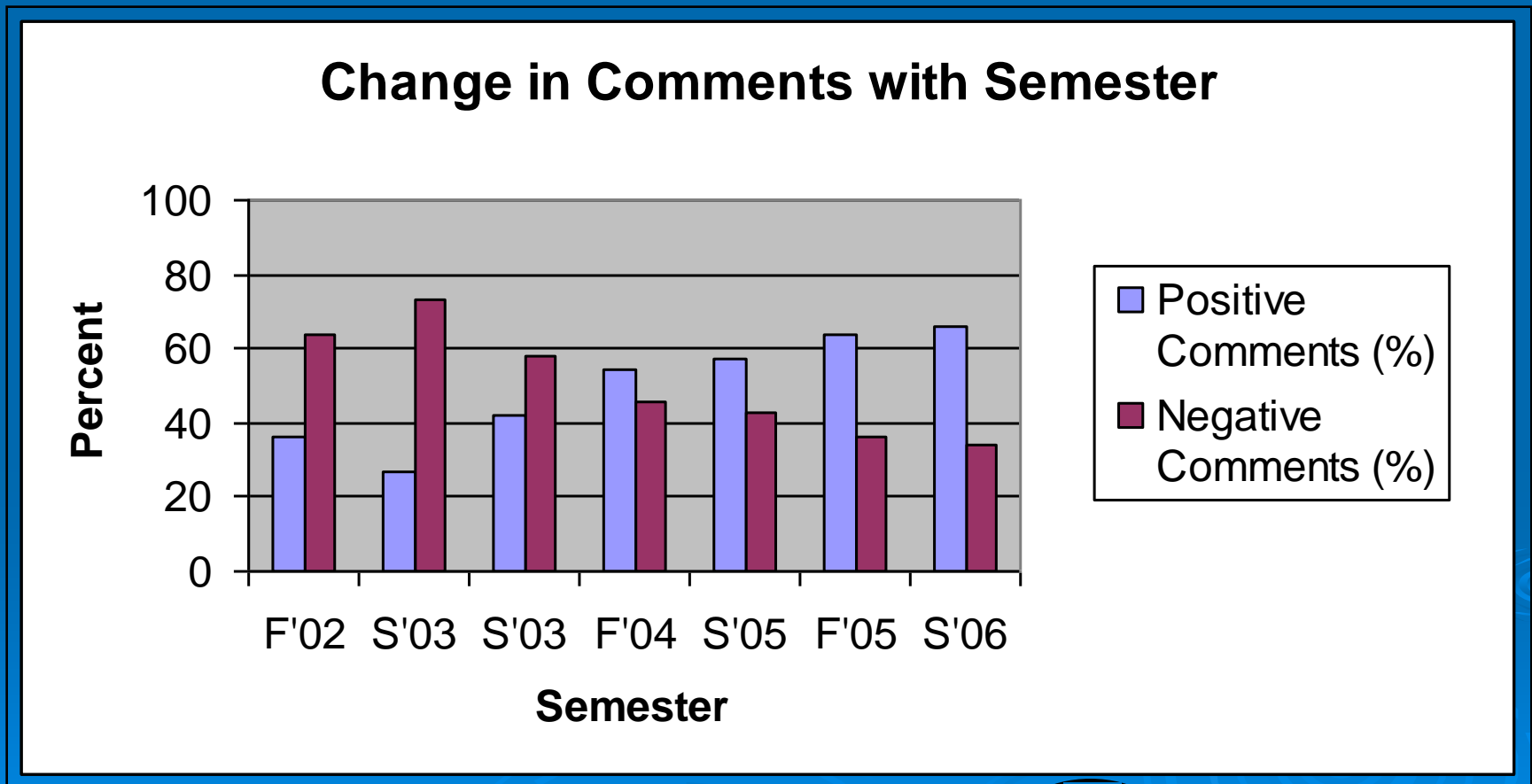
The numbers and percentages of positive statements (P) and negative statements (N)

Semester	Total	#P	%P	#N	%N
Fall 2002	251	90	36	161	64
Spring 2003	207	55	27	152	73
Spring 2004	226	95	42	131	58
Fall 2004	227	123	54	104	46
Spring 2005	266	151	57	115	43
Fall 2005	225	145	64	80	36
Spring 2006	265	174	66	91	34

Qualitative Results

“Do you think that future classes should do CPR? Explain.”

➤ A more visual representation is:



Negative Comments

➤ On writing in a chemistry class:

- “I have never viewed chemistry as being a subject where you write things;” “We could take English to learn how to write correctly;” “I didn’t understand why writing a paper and grading other students papers had anything to do with chemistry.”

➤ On the peer review process:

- “They ask you to grade the essays, but then your opinion of how that person did would be wrong. I just don’t see how your opinion could be wrong.”

➤ Other:

- Too time consuming, waste of time, not related to the subject; it harmed their grade; was worse than lab; their peers lacked motivation to grade properly; added to stress

Positive Comments

➤ On writing in a chemistry class:

- “Calibrated Peer Review forces the student to look into the topic way more than what he or she would do out of a textbook. I know the CPR has tremendously helped me understand each topic better although I didn’t exactly enjoy it.”
- “The CPR really helped me understand the topics. It reinforced the material by forcing me to teach myself and explain it to others through writing. It was very helpful.”
- “I think the first one is bad because you don’t really know what you’re doing and how to approach the whole thing, but after doing it you realize that you are learning the subject because you had to write a paragraph on it. It was a big help whether people will admit it or not.”

More Positive Comments

➤ Overall:

- “Although CPR was one of my least favorite things to do in this class, I think the good in it outweighs the bad. I think that especially in the science fields, students don’t have to do a lot of writing and so they don’t develop communication skills that they will need later on in life. I think communication is very important and it is something that you just have to work on. I think students will look back and wish they would have done more stuff like CPR.”
- “It seems like a pain at the time, but I can already see how much I learned from it. Please continue to do it, it helps more than people realize.”

➤ Other positives:

- Helped link chemistry to real life and their professional future, developed time management and research skills

Research Question 3:

Why and how did the instructor persist?

- I was initially motivated to use CPR because
 - I believe that writing promotes learning
 - Peer review helps develop critical thinking skills
- Initially student resistance was intense and unexpected
- Why did I persist in using CPR?
- What changes did I make as I slowly discovered the reasons for student resistance?

PAIR/SHARE BREAK

- Take a few minutes to discuss with your neighbor a teaching innovation that YOU used in your classroom where you didn't get the desired result.....
- Then we'll share.....

How/Why did the Instructor Persist? Improvements Made Over Time by Instructor

- **S03** Prepared more thorough instructions
- **S04** Began to write most of the assignments
- **S04** Became more proactive at listening to students & adjusting grades when appropriate
- **F04** Told students upfront in the syllabus that the class was a writing-intensive class
- **F04** Gave a “CPR lab holiday” so the students would remember they did 7 labs rather than 10 because of CPR

Improvements Made Over Time by Instructor

- **F04** Invited students to let me review their essays before submission
- **F04** Increased importance of the text entry from 20% to 30%
- **F04** Increased CPR's worth from 3-5% to 12% of class grade
- **S05** Included "teaching philosophy" in syllabus, emphasized CPR was its own grade, students were novice reviewers
- **F05** Took classroom time to demonstrate CPR
- **F05** Used Bloom's Taxonomy pyramid to show importance of critiquing

Discussion and Conclusions

- **Answers to research questions are connected**
 - 1) What do students think about CPR as a learning tool?
 - 2) What do student comments reveal about the reasons for their accepting or resisting CPR?
 - 3) How and why did the I persist, particularly in the face of initial student resistance?

When CPR was introduced

➤ Quantitative Results:

- the majority of students did not like CPR and did not believe it helped their learning

➤ Qualitative Results:

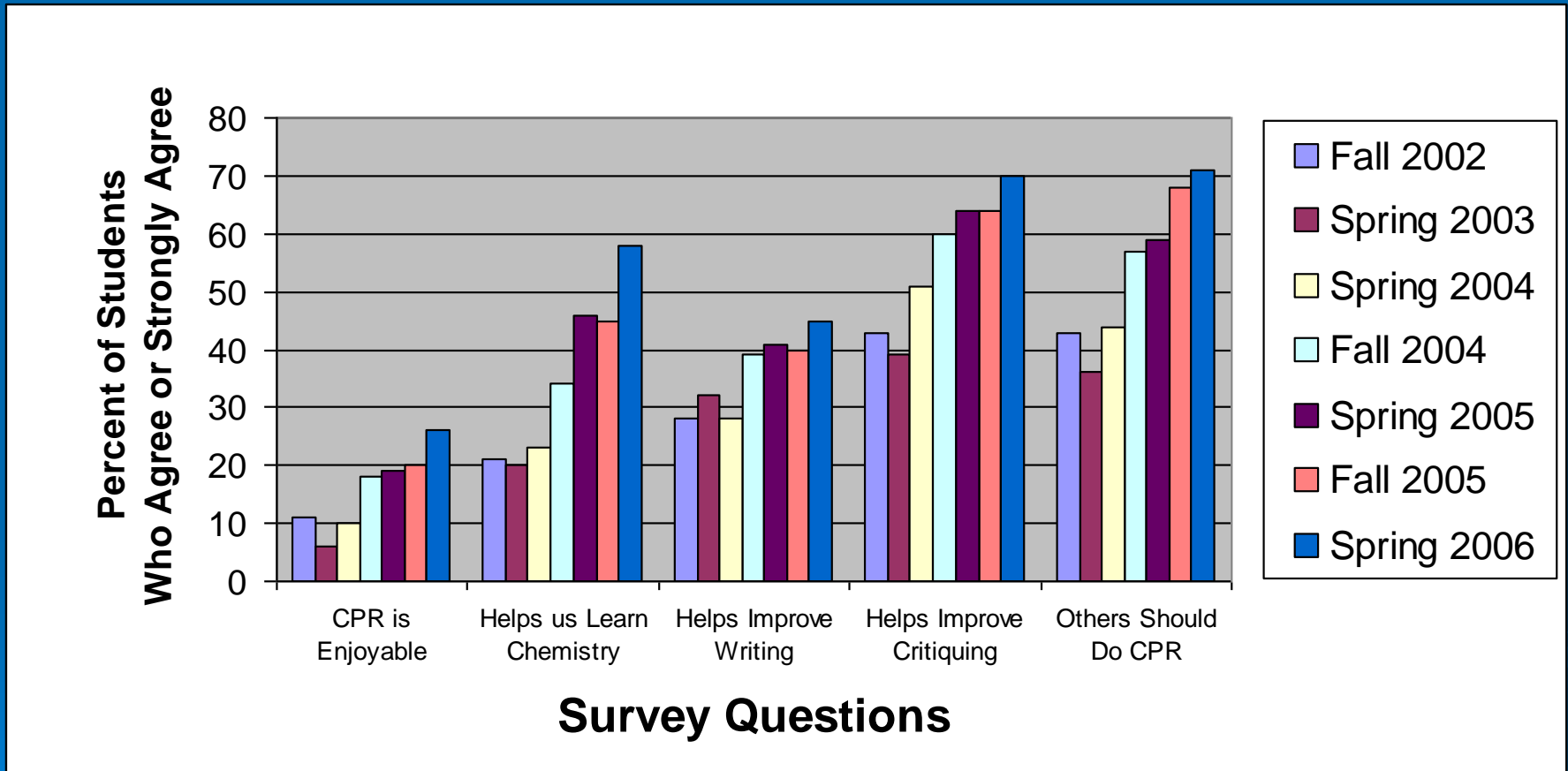
- student resistance was accompanied by a strong sense that writing and reviewing have no place in a chemistry class
- there was student distrust of peer review process

When CPR was introduced

- I read SALG results making changes to the implementation of CPR
- My belief in CPR's value kept me from giving up; I knew it ran counter to student expectations.
- I just needed to help students see its value and provide support to relieve anxiety about peer grading
- I became more explicit about its value and actively helped students be successful as the semesters passed.

Discussion and Conclusions

Quantitative Results:

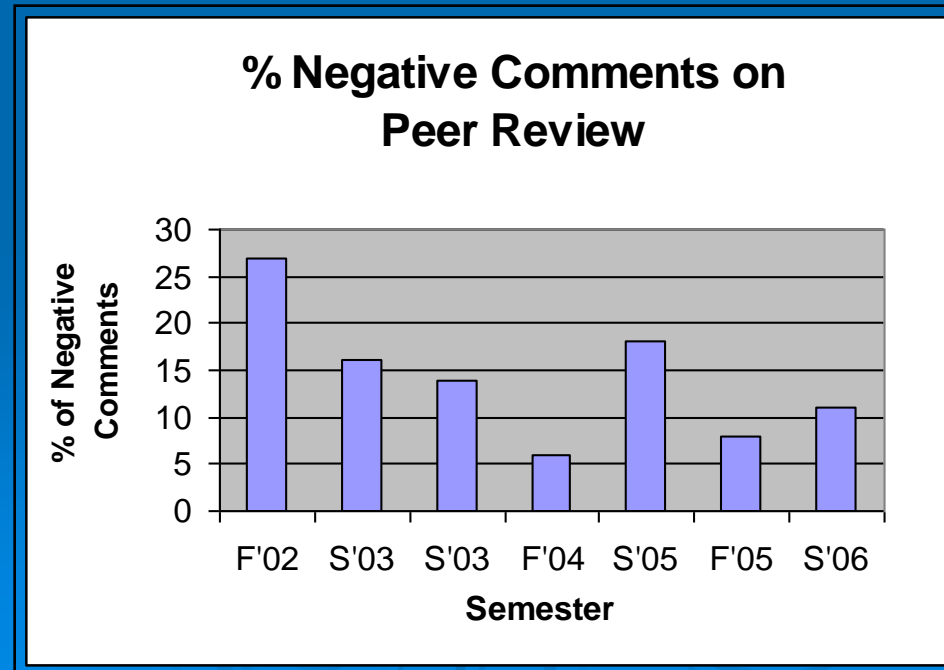


We saw a significant increase in student acceptance and understanding of CPR over time.

Discussion and Conclusions

Qualitative Results:

- Percentage of positive statements rose from 31% to 65%
- Connected to my efforts to teach and support the students through writing and reviewing.
- The belief that “my peers should not be grading me” remained a significant, but decreasing, source of discomfort



Discussion and Conclusions

➤ How can we explain the Spring 2005 increase in negative comments on peer review?

- What did the instructor do differently in Spring 2005?
- Looking back at the timeline, we see:

S05 Included “teaching philosophy” in syllabus, emphasized CPR was its own grade, students were novice reviewers

➤ In Spring 2005, I began to address the issues with peer review head-on:

- Students are novice reviewers
- Students will make mistakes even with a good grading rubric
- I again invited students who were “victims” of a bad reviewer to send me an email requesting a regrade
- I emphasized that I was still overall in charge of the grade
- I brought the issues of “Peer Review” to the forefront of student minds

Analysis of student explanations through SALG

- Gave me insight into why students liked and disliked CPR.
- SALG kept me informed about student resistance and anxiety, allowing me to make improvements.
 - I didn't assume that students recognize the power of reviewing;
 - I used class time to connect it with career choices

Analysis of student explanations through SALG

- Students who liked CPR were 7-12 times more likely to think they received benefits (learning chemistry, improving writing and critiquing skills) from Spring 2006 data. This held true for other semesters.
- Although only 26% admitted they enjoyed CPR, we can surmise that as students understand its value, the more likely it is they can recognize how it can help them improve learning, writing and critiquing skills.

Implications for Introduction of Any Teaching Innovation

➤ When the instructor

- Explicitly promotes the value of the innovation,
- Make the assignments worth a significant part of their grade, and
- Supports students in the process,

➤ **students reported a significantly more positive experience.**

Implications for Introduction of any Teaching Innovation

- Students are willing to take a more active, responsible role when they perceive
 - The value of such engagement and
 - They are supported in their efforts.

**EVEN WHEN THE INNOVATION
RUNS COUNTER TO THEIR
EXPECTATIONS!**



POSTSCRIPT

- In 2007, I had to make CPR optional
- HOW?
- “Exam 4” – average of best 3 scores of 3 exams and 3 CPR assignments – 100 pts
 - Good students don’t have to do CPR
 - Poor students can show they know chemistry in a different way
 - 91% of students recommended CPR to fellow students

# Done	N	CPR Avg	Exam Avg
0	188 (45%)	-	70.2
1	142 (34%)	83.6	70.2
2	56 (13%)	84.7	59.4
3	36 (9%)	86.6	62.6



Results

Who appreciated the opportunity to do CPR?

- 91% of all students recommended the CPR opportunity to fellow students
- Comments by students
 - 379 positive statements vs. 57 negative statements
 - Positive statements about CPR:
 - 51% - boosts grades/insures against a bad exam grade
 - 13% - helped learn writing/scientific writing
 - 13% - helped learn chemistry
 - 9% - optional assignment
 - 5% - different way to show chemical knowledge
 - 5% - helped learn critiquing



Results

Examples of Positive Statements:

- They were a great help to my grade. It gives students another way to express what they learn in class.
- I like it because it's not like a test and you can show that you somewhat are good at chemistry.... Just a different type.
- CPR gives the student a chance to balance bad grades that they may get in chemistry. For me I have a little test anxiety and knowing that my chemistry grade isn't only based on tests is a great comfort.
- It is another dimension in understanding the concepts of chemistry that I greatly needed.
- CPRs are good opportunity for students who are not the best test takers to improve their grade with a little extra effort in the class.
- Options are great. They let a student be more flexible.
- Allowed the individual to decide how much they want to work for a good grade.



Results

Negative statements about CPR:

44% - time-consuming

21% - didn't like grading/peer review

19% - not useful

7% - not appropriate for
chemistry class

7% - difficult to use

Examples of Negative Statements:

- I personally know from high school experience that I can write. Chemistry is not supposed be writing intensive.
- I just didn't have time to do the CPR's this semester but most people found them useful.
- There's plenty of work already assigned. CPR is just unnecessary and takes up too much time when this class already demands enough of your time
- I feel like it is a long drawn out process that doesn't help anything.
- I really didn't find it useful... I think that you should do well on the exams!



Postscript Conclusions

This way of making CPR optional is useful on many levels.

- It encourages students to take responsibility for their own learning and their own grade
- Students appreciate the opportunity to control how they are being assessed in the class. They like options.
- CPR gives students who aren't good test-takers another avenue to demonstrate their chemistry knowledge.
- Student grades can only be helped by doing CPR, not hurt. Typical "A" students cannot be hurt by CPR.