

**PERSONAL RESPONSE SYSTEM AND ITS EFFECTS
ON STUDENT LEARNING**

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A personal response system (PRS) was implemented during a summer session of introductory accounting. A PRS uses hand-held wireless transmitters, receivers, and computer software to obtain immediate feedback from students. The technique is similar to “asking the audience” on the game show *Who Wants to be a Millionaire?* The potential effectiveness of a PRS to increase learning is shown through a significant increase in exam scores, results of a student evaluation, and the instructor’s observations.

HOW DOES A PRS AFFECT LEARNING?

Students appear to enjoy the interactive class. Previous studies show an increase in student learning through the use of PRS (EduCue, 2003; Madill, 2003; Birdsall, 2002). EduCue reports increases of as much as 50% in student learning. Madill reports the use of a PRS with undergraduate Building Surveying/Architectural students and finds that the correct responses for the 913 responses on exams increased 26%. Birdsall (2002) notes that the physics students’ performance on written exams and their ability to answer considerably more sophisticated questions increased than previous courses.

Wines and Bianchi conclude dramatic increases in students’ learning in the PRS classroom is explained by how the PRS fulfills Chickering’s and Gamson’s Seven Best Principles of Undergraduate Education (Chickering and Gamson, 1987). These principles are clearly applicable to the use of PRS:

1. **Encouraging contact between students and faculty:** PRS devices provide direct participation by the students. Instructors can immediately identify and correct student problems and misconceptions as the lecture is given.
2. **Developing reciprocity and cooperation among students:** Interchange among students is stimulated through the discussions that follow the posting of correct answer. Students teach each other and learn from others.
3. **Encourage active learning:** An active environment exists with students selecting answers on their hand-held devices, carefully listening to the instructor for directions and information, watching and studying histograms and other instructional materials presented on the projection screen, talking and debating with other students. This active type of environment is easy to promote in large classes with the use of PRS.
4. **Give prompt feedback:** The instructor sees how each student answers as well as the class as a whole. Depending on the responses, instructors can formulate questions as the lecture progresses to eliminate misconceptions and retest for comprehension.
5. **Emphasizing time on task:** PRS focuses the student’s attention on the main objectives of the class. Activation of PRS at the beginning of the class gains the

student's attention and helps the student stay more on task as the instructor skillfully and strategically uses the PRS during the class.

6. **Communicating high expectations:** PRS promotes competition and a gaming environment that encourages students to prepare before class to improve their number of correct answers. The instructor sets the standards bar through the difficulty of questions and demonstrates the level of mastery required for the course.

7. **Respecting diverse talents and ways of learning:** PRS addresses visual, aural, and tactile learning styles. Students read the material, hear the material, and respond verbally through side discussions with other students and physically by pressing the keys. Responses are anonymous and students are more willing to participate. The system increases participation from quiet students and assist students with learning disabilities.

IMPLEMENTATION OF PRS IN INTRODUCTORY ACCOUNTING

At this university, the teaching and learning department purchased PRS for faculty to experiment with its use in the classroom. During a summer session, the PRS was available for fulltime use in an introductory accounting course that met four days a week for five weeks. As key concepts and examples of calculations were presented, the students' mastery was assessed through their responses to questions displayed with the PRS. These questions were used as daily activities and as a review before exams.

The course content, assignments, PowerPoint presentations, overhead transparencies, and classroom activities were very similar to a course delivered in the fall. Two major differences in the course existed: (1) the implementation of PRS and (2) the implementation of online quizzes through WebCt rather than in class quizzes. Also, one less chapter was covered on the final exam.

Thirty-one students were enrolled in the summer course and approximately forty students were enrolled in the fall course. As presented in Table 1, a comparison of exam scores increased 11.9% in the overall average. The differences in the average exam score were all significant at 10% level of confidence. After observing a large increase in scores on the first summer exam, the second exam administered in the fall was used in the summer course. A significant increased in the second exam scores occurred.

**Table 1
Exam Results**

Exam	Fall '02 w/o PRS		Summer '03 w PRS		F Test Results	
	Average	# of students	Average	# of students	F	P Value
1	75.3	44	87.2	31	.568008	.0534
2	70.4	42	81.7	31	.301528	.0005
Cumulative Final	68.3	37	75.8	31	.566121	.0570

The students appeared more enthusiastic and attentive with the use of PRS. Obviously the learning environment was more active as each student responded to each question. Not one

student could sit back and wait for someone else to answer the questions and students appeared to try to answer the questions correctly.

As a previous instructor of large sections of introductory classes of approximately 175 students, I believe my teaching effectiveness, as an instructor would have increased in the PRS environment because the technology allows for an active learning environment that is easily monitored by the instructor. In addition, the preparation time to use this technology is minimal. I found that I was already orally asking these questions and simply needed to document the questions in a Word document that I could periodically access throughout the class period.

STUDENT EVALUATION OF PRS

Twenty-six students in the summer class evaluated the use of PRS in introductory accounting course. Table 2 provides their responses to seven questions. Students appeared motivated to use the PRS as they tried to pick the correct answer to questions and did participate more in class. The PRS allowed students sufficient time to think through their individual answer before responding. The students did indicate a slight preference to taking a course with PRS.

**Table 2
Results of Student Evaluation**

Question	Mean	Std. Dev
I try my best to pick the correct answer to PRS questions	4.35	.49
When the PRS is used, I have sufficient time to think through my answer before responding	4.23	.76
I participate more in class because the PRS is used	4.15	.83
Compared to other courses I have taken, I prefer those courses that use the PRS	3.77	.99
Given the opportunity of taking a PRS course or a non-PRS course, I prefer the PRS course	3.65	.98
I learn course material better when the instructor uses a PRS	3.62	.8
I have difficulty understanding the PRS questions	1.92	.48

Likert Scale: 1 = strongly disagree; 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

CONCLUSION

Overall, students positively respond to the use of the technology and tried their best to select correct responses. An increase in exam scores appears to occur with the use of PRS. I prefer the use of PRS and feel that students are more interested and motivated to learn. Not only is the technology easy and fun to use, but also the students actively engage in learning the concepts. As budget constraints occur within institutions and larger class sizes occur, the adoption of this technology allows an active learning environment, provides an easy way to grade students on daily class participation or take attendance.

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