

LINC Activity: Competency Performance Recording for Learning(CPRL)

Bottom Line:

- CPRL aims to "resuscitate" students' learning of the analytical process of problem solving, thus enhancing their problem solving skills as well as their understanding of core course concepts.
- CPRL utilizes a system of "learning by teaching" that helps students identify and apply core course concepts to problem solving in an iterative way.

How Students Use CPRL

- Word problems that encompass core course concepts are assigned to students as homework
- Rubrics provided by the instructor guide students' approach to solving problem
- Students work through the problem until a solution can be presented succinctly in under 3 minutes
- Students use tablet PC with audio/video recording software to record final solution

How Students Use CPRL

Step I - Articulation

- In a quiet environment, student begins Step I: articulating the problem. This is the process of sketching it out, talking it out, putting ideas and concepts down on paper.

5 rubrics that guide Step I

- Articulates thorough understanding of the application of the problem
- Includes a complete sketch for articulation

How Students Use CPRL

- Includes all of the pertinent data points on the sketch
- Clearly delineates all of the data that is given (known) in the problem on the sketch
- Clearly delineates the unknown entity that is requested from the problem on the sketch

When done at target level, it is clear that the student has a thorough understanding of how to read with comprehension and can interpret what is read.

How Students Use CPRL

- Thoroughly identifies all parameters that are needed to solve for the unknown entity
- Thorough understanding of how each parameter for solving the “unknown entity” can be correlated with a datum point found within the problem set
- Thoroughly demonstrates how each parameter can be obtained, and can indicate whether it is obtained directly, indirectly, or is implied

When done at target level, it is clear that the student has a thorough understanding of all concepts and equations, known's and unknown's, how each parameter is obtained, and how all elements are correlated.

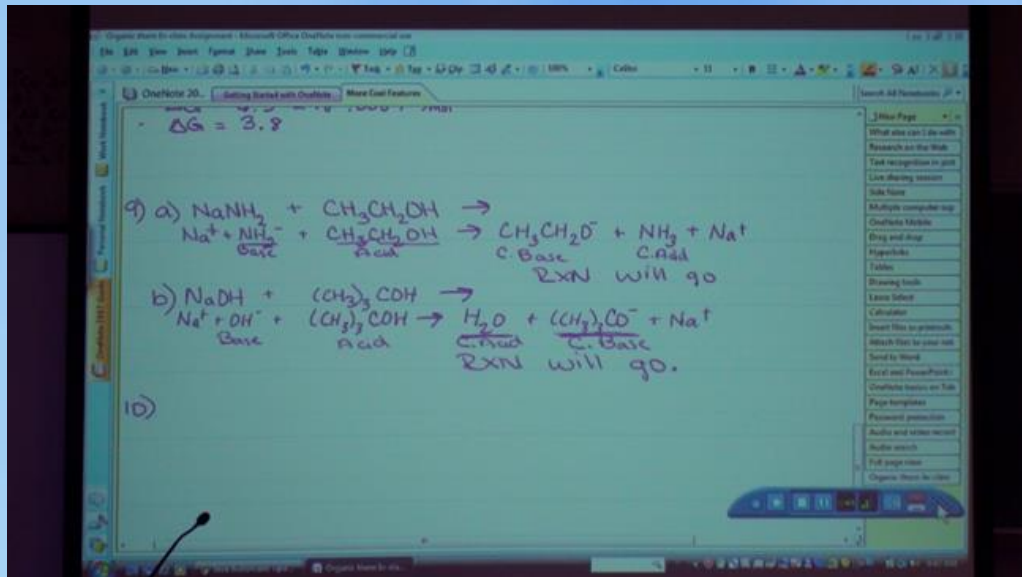
How Students Use CPRL

Step III – Ascertain Solution

- All desired parameters from the problem set data are obtained, compatibility of units and dimensions are ensured, and the solution derived.
- This may require solving all mathematical or chemical equations or, assessing and correlating data to derive a conclusion.

How Students Use CPRL

- Student is now ready to record conclusions of each of the 3 steps onto a tablet PC



How Students Use CPRL

3 rubrics that guide Step III

- Can thoroughly identify each dimension of measurement addressed in the problem
- Can thoroughly demonstrate that identical dimensions have been converted into identical units
- Can thoroughly solve equation (math or chemical) or assess and correlate data to indicate a conclusion

How Students Use CPRL

When done at target level, it is clear that the student has a thorough understanding of how to solve equations (math or chemical), assess and correlate data, dimensions, and units; and draw appropriate conclusions

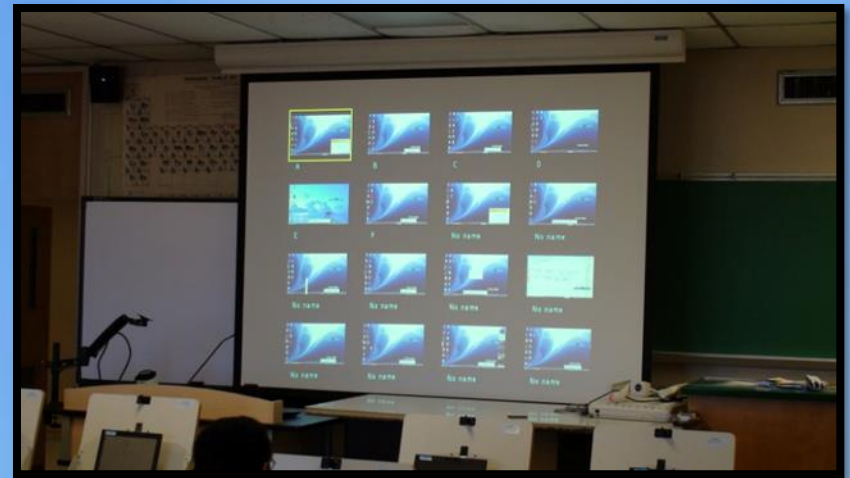
Classroom Discussions and Dissemination of Information Using Students' Homework

Students can simulate Going-to-the-Board electronically in-class.

Any student can be called upon to contribute.

Students can concurrently log onto an invited session anywhere there is internet.

Voice over IP or Yahoo Messenger enables voice communication through laptop while jointly working.



LINC Phase II New Activity: Competency Performance Recording for Learning(CPRL)

Results:

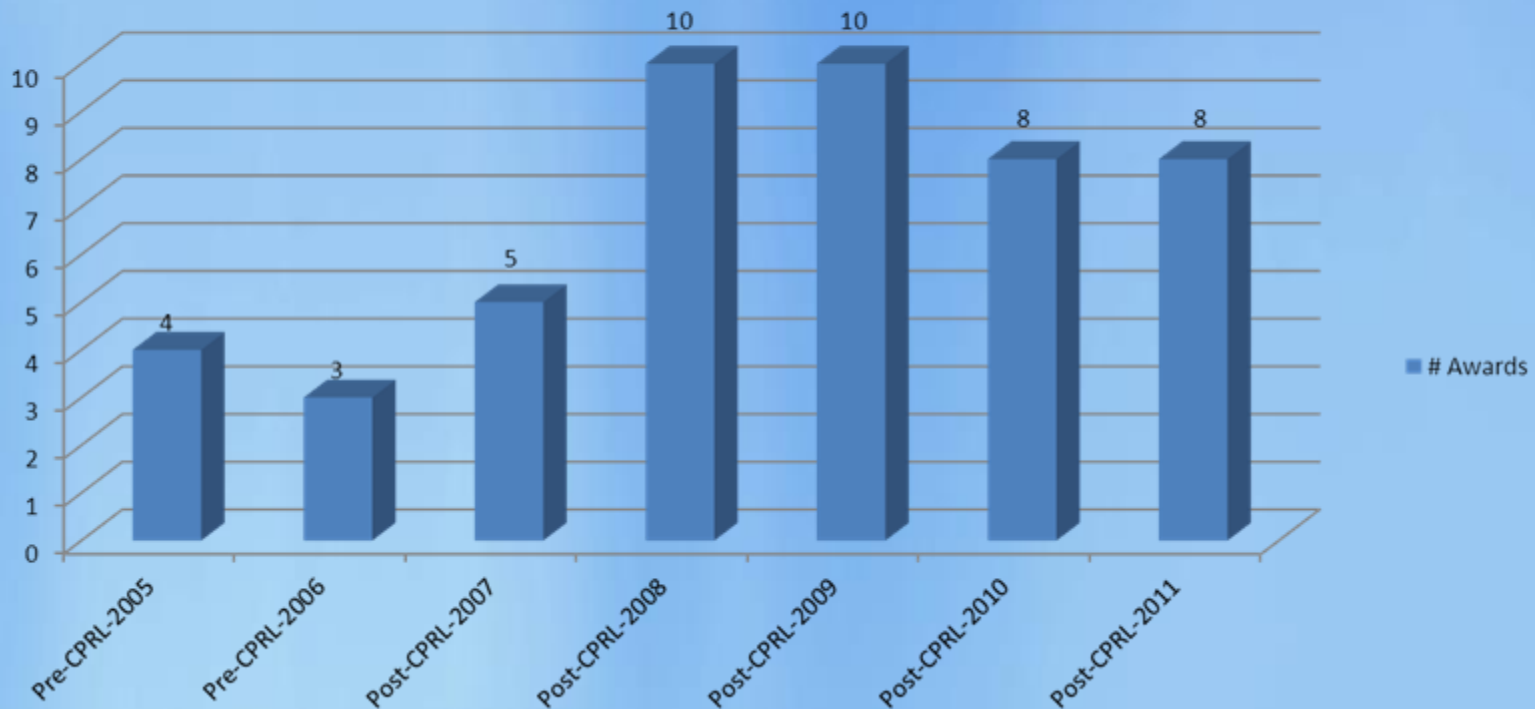
Impact of Trial CPR-L on SABC/STEM Summer Double Bridge
Chemistry Class: 2009-2012



LINC Phase II New Activity: Competency Performance Recording for Learning(CPRL)

Results:

STEM Research Presentation Awards Pre/Post CPRL Methods
(Intro to Chemical Research)



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More Results

By request, the CPRL process has been presented at numerous venues, and received favorable feedback:

- Dr. John K. Coleman & Valerie Harris – National Science Foundation SEIS HBCU-UP Meeting, Las Vegas, NV. 9/4-7, 2007
- Dr. John K. Coleman – National Science Foundation, QEM Workshop; New Orleans, LA 10/25-27, 2007

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- Dr. John K. Coleman – National Science Foundation, Information on Effective STEM Instructional Strategies; Baltimore, MD November 2012
- Dr. John K. Coleman – National Conference on Learner-Centered Teaching. Tulsa, OK. April 12-14, 2010

LINC Phase II New Activity: Competency Performance Recording for Learning(CPRL)

Opportunities

- The CPRL quickly and positively impacts learning
- Process is replicable and can migrate to other disciplines and other locations

SWOT Analysis: CPR-L

STRENGTHS & OPPORTUNITIES - CPRL

STRENGTHS & WEAKNESSES - CPRL

Strong integrated Technology components (tablet PCs, smartboards, interactive white boards, video, audio)

Methodology linked to researched best practices for learning

Strong innovation element in design: 21st century technologies + best practices protocols

Produces results (See performance charts)

Homework completion process generates summative evaluation instruments, promotes good study habits, and process thinking

OPPORTUNITIES & THREATS - CPRL

Process is replicable and can migrate to other disciplines and other locations.

Instructors can be trained on CPRL process through workshops, online support

WEAKNESSES & THREATS: CPRL

Tablet PCs with audio/video recording capability required for homework completion. Represents student or school investment. (Hardware becoming more affordable and readily accessible. Many students already have them)

Requires classroom with projection capability

Instructors without strong course content knowledge impede process

Instruction tools must include Course Concept Rubrics and problems aligned with course concepts to guide targeted learning

Funding for technology support

Process for ensuring that instructors have adequate course content knowledge