

Problem Statement:

Don Garthon and Susan Harper were asked to design professional development materials to instruct remote educators with limited internet connections as to how to begin and continue the usage of a math-based performance support tool. The program is located on a CD-ROM and hard copies of graduated learning activities and assessments were given to the researchers to aid with development.

Objective:

I took the perspective of Susan Harper, an instructional designer working on the project. Since the program and the instructional materials were already produced, it was the team's job to find a way of providing professional development for this program that could also serve as a model for other programs or materials outside mathematics. Because *321 Countdown* was a team-based learning tool that scaffolded learning on skills students had previously mastered, the team decided to construct the professional development materials in a similar fashion. Teachers would understand the learning framework and potential effectiveness of the program by following the steps the students would while using different content (tutorials rather than math). This tactic, we hope, will encourage them to use the program for both teaching and assessment. Also, since the program is housed on a CD-ROM and teachers would not be able to actively use the internet for instruction or support, the remaining materials were placed on the CD as well to conveniently locate all the information in one place.

Team-Based Learning:

The team-based learning approach was taken when *321 Countdown* was designed. The program will assign students to groups (I used animals rather than numbers or letters to avoid diminishing self-esteem should students not progress at the same pace as their peers) to complete math subskills together. They will work at computer stations in those groups to discuss and complete the tasks assigned. When they master each subskill, the computer will then reassign them to a different group, so progress is not the same for every student. Originally, the program was designed for teachers to enter students' scores after each subskill was completed and new lists would be generated. However, because my background is in computer science (according to the C.S.), I was able to have the program input students' scores at the completion of each subskill and dump the data into the teachers' version through the intranet, or network of computers based on one server. So even if no internet connection is available, the program can still function on all computers connected to the school's server.

The professional development materials were designed in the same way. The teachers would work together to develop their skills related to using the program but would submit their work separately and master the skills at different times based on time spent, effort, and knowledge acquisition.

Scaffolded Learning:

"Scaffolded inquiry and problem-based environments present learners with opportunities to engage in complex tasks that would otherwise be beyond their current abilities...[and] makes the learning more tractable for students by changing complex and difficult tasks in ways that make these tasks accessible, manageable, and within student's zone of proximal development".¹ When partnered with other students and placed at computer stations, students have to solve problems that are just a bit out of their immediate knowledge base. They are able to progress at their own speed, using their partners' knowledge and the computer program to help scaffold instruction.

The same framework was used for designing the professional development materials. Teachers will use the computers and other teachers to complete tasks that progressively get more difficult once they master those at lower levels. Learners are made more responsible for their own learning and instruction as they advance through the program.

¹ Hmelo-Silver, C., Golan Duncan, R., & Chinn, C. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, 42(2), 99-107.
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