Chapter 5
Developing Performance-Based Instruction

There are numerous excellent texts and manuals available on the subject of developing curriculum. There would be no added value in us addressing that subject in general. Therefore, we have limited the contents of this chapter primarily to how PCAL data can be utilized to enhance the development of instruction.

Performance-Based Instruction

The term, *performance-based instruction,* may not be recognized by all. There are several other terms that have been used to mean essentially the same thing; for example, *Criterion Referenced Instruction* (CRI), *Outcome Based Education* (OBE), *Competency Based Education* (CBE), and *Competency Based Instruction* (CBI). So what do these similar terms really mean?

They all focus on behavioral statements that describe something that an educator can observe and measure to verify success of the student. Student progress is based on mastery of specified objectives rather than class attendance and passing tests. These objectives may be referred to by a variety of names, such as outcomes, competencies, or performance criteria. All of them contain, as a minimum, a behavioral statement with an active voice, present tense verb and object.

The Performance Criteria Statements (PCSs) in the PCAL are written in the same way. See the Sample Draft PCAL in Appendix D for examples of PCSs.

Steps in Curriculum Development

1. The instructional designers have been doing most of the work prior to this step in the process. At this point the faculty SMEs should take on most of the responsibility and rely on the instructional designers for advice and assistance only. The faculty SMEs develop a list of proposed courses or modules. This should be based on a careful review of the PCAL data along with a review of existing programs that are successful. In colleges there are certain requirements of accreditation and state agencies that must also be considered.

2. Develop a validation crosswalk form (see instructions and sample Curriculum Crosswalk - Appendix E). List all the PCAL skills that were validated by the focus group on the vertical axis of the matrix. List the potential or actual courses on the horizontal axis of the matrix.

3. Conduct the validation crosswalk. This is one of the most critical parts of the development process. The validation crosswalk is an effective method that will automatically reveal if there are certain problems in the curriculum design. Faculty SMEs should place Xs (or numbers for proficiency level) in appropriate boxes to indicate in which courses each

performance criteria statement (PCS) will be covered. You may use numbers to represent the level to which each PCS is taught in different courses, which would be more difficult to do but would provide more valuable information. Remember that by the end of every instructional program, every PCS must be taught to the level of proficiency identified in the PCAL.

When all the Xs or numbers have been placed appropriately, it becomes very obvious if some courses have too few or too many PCSs to accomplish in the allotted time. If too many PCSs are listed for one course or module, a choice must be made. The three possible choices are: to increase the length of the course or module, to move some of the PCSs to other courses or modules, or to eliminate some of them. Conversely if a proposed course or module has too few PCSs listed, the choices are: to move them to other courses or modules, to combine two similar courses or modules with only a few PCSs, to make a very short course or module, or to eliminate that course or module.

The decisions mentioned above are not often easy to make. The data that was obtained in the PCAL validation can help you make those difficult decisions about what to do with performance criteria statements.

4. Write course descriptions. Course descriptions should be based on the PCSs assigned to each course in the Curriculum Validation Crosswalk

5. Develop Objectives. This is a topic that could take an entire book. Since there are many excellent texts on the subject, we will focus only on how the PCAL data can be used in constructing objectives. Remember, behavioral objectives contain three elements: a statement of behavior (something observable and measurable), a standard of how good is good enough to demonstrate mastery, and a condition in which the behavior is performed. Each PCAL performance criteria statement (PCS) provides the first two elements. Each PCS is written as a behavior statement and can be the root of a behavioral objective, as is. The standard is easily interpreted from the Proficiency Level column for each PCS. Using the average proficiency level rating identified in the validation meeting and the PCAL Rating Scale you can easily determine what the standard should be for the objective. The only thing that is not in the PCAL data is the condition element of the objective. It takes a faculty subject matter expert to determine in what conditions to observe and measure each behavior in a learning environment. Condition statements may be things like:
   - "Given a calculator . . . ."
   - "Without reference material . . . ."
   - "Given an equipment trainer with appropriate malfunctions programmed in . . . ."
   - "Given a realistic scenario . . . ."
   - "Given a schematic . . . ."

6. Prepare and submit documentation for program approval. This will involve different forms and bureaucratic procedures depending on the college/corporate state requirements. The

P-BID Checklist in the Appendix A lists steps Richland College follows to get new programs approved by our college district and state agencies.

7. File program documentation. Training divisions should have as much of the data as they want and will use, but should not be relied on for future reference. It is surprising how many requests for information we receive years after a new program has been approved and implemented. We suggest maintaining archive records of all P-BID projects for at least five years in a central location.

How To Use All That Validation Data

Remember that for every performance criteria statement (PCS) the SMEs validate, they make four important ratings. They rate the importance, proficiency level, frequency, and difficulty for each PCS. If you had 150 PCSs and 10 participants in the Validation Meeting, you will now have 6,000 data items (150 PCSs * 4 criteria * 10 participants = 6,000).

That much data can be overwhelming; therefore, we average the ratings and create a summary column. The detail data is available but is only utilized when the summary data raises a question. Anyone who knows anything about statistics will undoubtedly point out that an average without other data can be misleading. That is true but we have found that most faculty prefer not to get too complex. Since the college target audience for this data is faculty SMEs who will use it for curriculum decisions, we usually do not calculate things like the standard deviation, mean, mode, and range.

We summarize all the ratings for each PCS and average them. For example, consider the PCS below. For sake of simplicity let's assume there were only four SMEs participating in the validation.

Performance Criteria	Group Participants				Average
	1	2	3	4	
Maintain safety shields on equipment	Ratings				
Importance	4	4	4	4	4.0
Proficiency Level	2	2	2	3	2.3
Frequency	1	1	2	2	1.5
Difficulty	1	2	1	1	1.3

Importance Rating: In the above real world example the SMEs agree that this task is very important because they gave it a rating of 4 on a scale of 1 to 4. To interpret the meaning of the ratings you need to refer to the Rating Scale in Appendix D. The average rating (4.0) means that the SMEs consider it much higher in importance than other PCSs on the list. Perhaps an individual's failure to do the task correctly would lead to dangerous work conditions. So what can curriculum developers learn from the importance rating on this PCS? They can see that SMEs

who participated in the validation believe this is a very important skill for entry level workers, so the curriculum developers will ensure that it is adequately covered in the class.

Proficiency Level Rating: Notice that the average SME rating for the proficiency level on this PCS is only 2.3. In fact, 75% of the validation group participants only gave it a rating of 2, which is a low proficiency rating. That means they expect an entry level worker to be able to do many elements of the PCS and may require help. What difference does this make in training decisions? Obviously this information determines to what level of competence a curriculum needs to develop students.

Frequency/Time Spent: The average rating is 1.5 on this PCS. In other words, the SMEs have indicated that this is something that is done infrequently. What difference does that make in training decisions? By itself the frequency rating is almost meaningless; however, when it is coupled with the other data, it becomes more meaningful. This is true of all of this data. It is not meant to be used in isolation. It is meant to provide a broad perspective for making training decisions. See discussion that follows.

Difficulty: The average SME rating concerning how difficult it is to learn this PCS is 1.3. They are in agreement that this PC is not difficult to learn. In fact, 75% of the validation participants rate it as "Much easier to learn and perform than other PCSs on the list." How should a curriculum developer use this information? This indicates that it will not be difficult or time consuming to teach students this PCS in class; however, as mentioned earlier, this data should not be used in isolation. It should be considered along with the other data. See the discussion that follows.

Should the curriculum include this PCS? Let's look at the entire data picture for the PCS. There is no doubt that this PCS is very important for entry level workers to perform because of safety implications. However, it is very easy to learn, and it may be on equipment that a college would not have for training purposes. Therefore, a decision would have to be made by the faculty SMEs concerning whether or not this should be taught in the college classroom/lab or left up to an employer to provide training. If this PCS is taught in a college class, it may have to be taught on something that is not the same equipment as the employee would use on the job, but would be representative of such equipment in the workplace. Other information would have to be considered in this case. Is the curriculum already so full that it is nearly impossible to accomplish everything in a two year period? If so, something may have to be omitted. This might be a likely candidate for deletion from the college curriculum; however, a better candidate for deletion may be a PCS that is rated low in importance, proficiency, and difficulty. On the other hand, if there is plenty of time to include all the PCs, than the only question is whether it can be accomplished to a high enough level of proficiency on equipment the college has available. If the college does not have appropriate equipment, than maybe it can be taught through simulation, slides, or video. These are all decisions the faculty SMEs can make more wisely if they utilize all the PCAL data available.

Sometimes we use an algorithm to calculate a rank ordering of skills based on weighted factors. With this algorithm we are able to sort the skills with the ones that should receive highest priority for curriculum decisions on top. We do this by giving Importance a weighting factor of four and Difficulty a weighting factor of 2. The reasons may not be obvious and the formula certainly is not fool-proof, but it helps organize the data to some extent. The algorithm we use is ((#of respondents to a skill/total # of respondents)/0.25 +(Importance x 4) +Proficiency +Frequency +(Difficulty x2))/8.

Making It All Work

The most important components of any process or model are the competence and professionalism of the practitioners using it. The PCAL Process, like any other, can be misapplied and result in erroneous and misleading data. However, we have experienced many successes using this process and we are hearing from a growing body of practitioners who are using it successfully. We wish the best to all who choose to use it and want to make it clear that the only reason the process is copyrighted is to protect ourselves and the reputation of the process.

CROSSWALK INSTRUCTIONS

1. Using the vertical column on the left, fill in with knowledge/skill statements from the Performance Criteria Analysis.

2. Fill-in the course/module identifications in the boxes across the top.

3. Place X's (or proficiency levels) in appropriate boxes to indicate in which course/module the knowledge/skill will be taught.

4. Consider whether any tasks should be omitted because:

   a) There is insufficient time in the program, and task is rated low in importance, difficulty, proficiency, or frequency.

   b) Targeted students should enter the program with this skill/knowledge.

5. Are there gaps in the curriculum because a task has not been:

   a) Included in any course/module?

   b) Taught to the expected exit proficiency level?

6. Are new courses/modules required?

7. Are there redundancies in knowledge/skills that are:

   a) Taught in more than one course/module?

   b) Taught to the same level of proficiency in more than one course/module?

8. Are there courses/modules that don't have enough competencies?

   a) Need to delete them?

   b) Need to combine courses/modules?