

Use of Learner Data in Selecting Instructional Content for Continuing Education

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Abstract. In order to use the rich data available about the knowledge and professional practice of Physician Assistants (PA's), it was necessary to develop a methodology to organize and relate information about patients seen in practice, perceived needs, and prior knowledge both in terms of the PA role and the content to be taught. Such a process may be useful to consider in the design of instructional materials for other populations and other settings.

Most instructional development models stipulate analyzing the learners as one step in the development process. Instructional developers in actual practice often use few learner data. The Physician Assistant Self Assessment Project was unique in this regard. An extensive self assessment instrument was administered nationally to Physician Assistants (PAs). This assessment provided the following types of data about Physician Assistants: body system knowledge, number and type of patients seen in the PA practice, PA perceived need for continuing education, and professional role performance (D'Costa, 1982). All of these data were considered in suggesting topics for continuing education materials. The means by which these data were used in the Instructional Systems Design (ISD) process of developing continuing education materials can be adopted easily by other instructional designers working in a variety of settings.

Physician Assistants constitute a new profession, one evolving from medical care shortages, particularly in rural areas. Some of the first PAs were trained by their employing physician and received little or no formal education. Today, PAs can enter the profession through a two-year post-secondary training program. However, many PAs have had military medic experience, obtained baccalaureate and graduate degrees, or achieved a variety of other relevant education and experience to add to formal training. PAs are state certified under a variety of regulations, but all are required to be supervised by a licensed physician. They must pass a PA certifying examination every six years in order to practice.

The goal of this instructional systems development project was to design and produce 18 self-paced learning modules that would assist the individual PA in remediating the deficiencies identified by the self-assessment examination. No single set of data resulting from the PA Self Assessment test was considered adequate for developing continuing education modules. For example, while PAs as a group may have received low scores in a body systems category, the designer must ask the question, "Is it necessary to develop training in a particular disease if PAs do not encounter that disease in their practice?" Thus, five data sets were studied to determine the content areas for module development. Those were: (a) practice profile, (b) need profile, (c) role perception, (d) body systems knowledge, and (e) question distribution in the examination. The data which measures each criterion will be discussed below. Then, the way these data were applied to the content specifications for the Instructional Systems Design (ISD) process will be described.

Self-Assessment Examination

The Self-Assessment Examination for Physician Assistants is an extensive and intensive set of measures which takes an

average of six hours to complete. It is scored objectively and normally is used to provide feedback to PAs on their professional strengths and weaknesses.

The examination questions were developed by an item writing committee of health professionals utilizing a critical incident technique (D'Costa & Watson, 1983). Critical incidents in a PA practice were identified by a team of practicing PAs, PA educators and physicians. The distribution of the resultant examination items was approved by this team of health professionals in order to produce an examination that was a valid representation of typical PA practice. The self-assessment examination was sent to 2200 physician assistants. Three months later, 891 PAs had returned their completed exams. The availability of these data provided a unique opportunity to identify normative performance patterns for the PA profession and to use these data in designing a continuing education system.

PA performance on the Self-Assessment Examination defined competency at two levels—entry and advanced. Data to describe these competency standards were provided by an advisory committee using a modified Nedelsky Technique¹ (Nedelsky, 1954). The entry level was interpreted as the expected level of competence for a generalist PA. The entry level standard and reliability for the 17 role scales are reported in Table 1. (D'Costa, 1982). Those PAs who achieved the entry level standard were identified as having "passed" that scale. Ideally, all PAs could be expected to demonstrate entry level standards on all scales. However, most PAs focus their practice in a specific specialty which, over time, weakens their competency in other areas. The PAs in this sample were competent in approximately three-fourths of the scales.

¹Nedelsky Technique was modified to include competency on an advanced as well as entry level.

Table 1

ENTRY LEVEL STANDARD AND RELIABILITY INDEX FOR ROLE SCALES

SCALE #	# ITEMS	MAX SCORE	ENTRY LEVEL STANDARD	r _{kr20}	CA	SEM
1	5	20	17.00	15	91	1.08
2	14	56	45.33	23	92	1.65
3	18	72	58.83	42	73	2.03
4	15	60	45.17	21	95	1.79
5	29	116	98.33	33	59	2.68
6	18	72	59.92	30	61	1.99
7	30	120	94.83	50	67	2.75
8	13	52	40.33	31	75	1.91
9	23	92	73.50	31	69	2.35
10	17	68	54.33	30	52	1.98
11	23	92	76.33	43	62	2.41
12	18	72	55.17	33	80	2.21
13	30	120	94.75	37	69	2.64
14	16	64	52.75	22	78	1.87
15	5	20	18.33	28	77	0.99
16	10	40	32.75	8	79	1.42
17	20	80	62.33	26	57	2.18

Codes Used : r_{kr20} = Kuder-Richardson reliability index

CA = Coefficient of Acceptance (a more appropriate reliability index for competency tests)

SEM = Standard error of measurement

Figure 1

Sample Test Items

Item 175 - In a typical month, approximately how many patients do you see for the following types of acute care (defined as having onset of minutes to hours)?

Respiratory (e.g., pulmonary embolism, pneumonia)

- A. 0 to 3
- B. 4 to 6
- C. 7 to 10
- D. 11 to 15
- E. More than 15

Body Systems + Context of Care

Item 161 - How comfortable do you feel about your performance with patients requiring the following types of emergency care (defined as being life threatening)?

Cardiovascular (e.g., myocardial infarction, arrhythmia)

- A. Very uncomfortable
- B. Slightly uncomfortable
- C. Comfortable
- D. Quite comfortable
- E. Very comfortable

In order to focus attention on the content of the continuing education system, it was necessary to focus on the scales (role and body systems) in which the PA sample scored the poorest. The scales in which fewer than 70 percent of the PA sample showed competence were identified as indicating a need for remediation; and those scales in which fewer than 50 percent of the PAs showed competence were considered to indicate a more severe need for remediation.

Practice Profile

The practice profile was based on the number of patients seen by the physician assistant. The self-assessment examination included 30 questions designed to obtain these data. For example, Item 175 refers to acute care practice (Figure 1). The questions were categorized by body system (cardiovascular, respiratory, musculoskeletal) as well as context of care (emergency, acute, chronic). A few health care problems were listed as examples of each category.

The practice profile for this sample is presented in rank order in Table 2. Some of the more common practice areas are: chronic cardiovascular, acute musculoskeletal, chronic musculoskeletal, chronic respiratory, chronic endocrinology.

Need Profile

The perceived educational need profile of this sample was generated by physician assistants' responses to 30 questions. The questions were intended to ascertain how comfortable the physician assistants felt about their performance with patients in the categories of body systems and context of care (Figure 1, Item 161). The perceived need of the physician assistants in this sample is presented in rank order in Table 3.

Role Perception Scale

Fisher and Faulman (1979) in their role delineation study of the PA profession identified 11 major responsibilities of the physician assistant. These responsibilities are:

1. Recognize interdependent relationship with supervising physician.
2. Demonstrate professional behavior.
3. Promote preventive health care.
4. Establish health status data base.
5. Analyze data base.

Table 2
PRACTICE PROFILE

	Mean Number of Patients Seen
Chronic Cardiovascular	11-40
Acute Musculoskeletal	11-15
Chronic Musculoskeletal	9-12
Chronic Respiratory	9-12
Chronic Endocrine	9-12
Chronic Genitourinary	9-12
Acute Gastrointestinal	9-12
Acute Genitourinary	9-12
Acute Respiratory	7-10
Acute Cardiovascular	7-10
Chronic Neurology	7-10
Acute Eyes & ENT	10
Chronic Gastrointestinal	4-8
Chronic Eyes & ENT	5-7
Acute Dermatology	4-8
Acute Neurology	5-7
Chronic Psychosocial	5-7
Chronic Dermatology	4-6
Other (Economics, Diet)	3-4
Acute Reproductive	3-4
Emergency Respiratory	3-4
Emergency Gastrointestinal	3-4
Emergency Cardiovascular	2-3
Emergency Neurology	2-3
Chronic Reproductive	2-3
Acute Psychosocial	2-3
Chronic Hematology	2
Acute Endocrine	2
Acute Hematology	2
	0-1
	0-1

6. Formulate health management plan.
7. Implement health management plan.
8. Monitor health management plan.
9. Establish effective interpersonal relationship with patients, professionals, and others.
10. Promote acceptance of the role.
11. Maintain competency.

In order to develop specific knowledge test items from which meaningful feedback could be derived, the 11 broad areas of performance were combined with body systems to form 17 role scales. Role delineation is described as a process by which an occupational group declares to the public its responsibilities for services (D'Costa, 1982, March). The scores of the 891 physician assistants on the self-assessment examination were reported in the scales that resulted from a previous role delineation study. These role scale needs were identified using two arbitrary criteria: fewer than 70 percent of PAs passed or fewer than 50 percent passed.

Body Systems Knowledge Scales

The 28 body systems knowledge scales were derived from 12 body systems and three types of medical intervention identified in a previous PA role delineation study (Fisher & Faulman, 1979). These resulting 28 body systems scales are listed in Table 4. At least six examination items were assigned to each of the 28 body systems scales. The body system scale needs for continuing education also were categorized by degree: fewer than 70 percent of the sample passed and fewer than 50 percent of the sample passed.

Question Distribution in the Examination

The last criterion used to determine module development was the extensiveness of questions on a particular subject within the examination. The number of questions on each body systems scale was based on the role delineation of the profession, which was based on what physician assistants actually do in their daily practice. The 320 examination items were divided between the scales according to PA practice. The intent was to have the Self Assessment Examination resemble the physician assistant practice as closely as possible. Therefore, if a small percentage of PAs passed a scale heavily weighted with questions, a

Table 3
PERCEIVED CME NEEDS

Acute Hematology
Acute Endocrine
Emergency Cardiovascular
Emergency Neurology
Emergency Respiratory
Chronic Hematology
Acute Cardiovascular
Acute Psychosocial
Chronic Reproductive
Acute Neurology
Chronic Gastrointestinal
Chronic Neurology
Chronic Endocrine
Chronic Psychosocial
Other (Economics, Diet)
Emergency Gastrointestinal
Acute Respiratory
Acute Reproductive
Chronic Dermatology
Chronic Respiratory
Acute Gastrointestinal
Chronic Cardiovascular
Acute Eyes & ENT
Acute Dermatology
Chronic Genitourinary
Acute Genitourinary
Chronic Eyes & ENT
Chronic Musculoskeletal
Acute Musculoskeletal

Table 4

MODULE DATA ANALYSIS

Body System Scale	Practice Profile X=Common	Need Profile X=Uncomfortable	Role Scale Needs X=<70% Competent XX=<50% Competent	System Scale Needs X=<70% Competent XX=<50% Competent	Number of Questions On test	Module Priority Needs 1=Greatest Need	Number of Modules Proposed
1 Cardiovascular		X			12		
2 Respiratory		X			10		
3 Gastrointestinal			X		8		
4 Neurology		X	XX	X	8	3	
ACUTE							
5 Cardiovascular	X	X			16		
6 Musculoskeletal	X		X	X	14	1	3
7 Respiratory	X	X		XX	16	1	4
8 Gastrointestinal	X		X		16	3	
9 Genitourinary	X		X	XX	12	2	1
10 Neurology	X	X	XX		12	2	1
11 Endocrine		X	X		10		
12 Dermatology	X			X	12	3	
13 Eyes & ENT	X				12		
14 Hematology		X	X		8		
15 Reproductive			X	XX	12	2	1
16 Psychosocial		X	XX			3	
CHRONIC							
17 Cardiovascular	X				12		
18 Musculoskeletal	X		X	X	10	2	1
19 Respiratory	X		X	XX	10	1	2
20 Gastrointestinal	X	X	X		12	3	
21 Genitourinary	X		X		8		
22 Neurology	X	X	XX		9	3	
23 Endocrine	X	X	X	X	9	1	2
24 Dermatology					6		
25 Eyes & ENT	X			X	11	2	1
26 Hematology		X	X		7		
27 Reproductive		X		XX	5	3	
28 Psychosocial	X	X	XX	X	12	1	2
29 Other		X	X		16		

critical need for continuing education emerged. However, when a small percentage of PAs passed a scale represented by only a few questions, a less significant need for remediation resulted.

Content Specification in the ISD Process

The ISD model (Belland, 1981) used in this project calls for the instructional content to emerge from the integration of program objectives with learner characteristics. Rarely do instructional designers have the quality or quantity of data required to make content decisions based on such an integration. The areas of greatest need for PA Continuing Education were determined by combining the available data into a two-dimensional matrix (Table 4). Each body system scale was considered individually in light of the five criteria previously discussed. The following tally system was used to rate the priority of these data:

1. One point was assigned to each scale for each mark in the four categories of practice profile, need profile, role

perception, and body systems knowledge.

2. Those scales (body systems knowledge and role) that most PAs passed were assigned a zero rating, even if PA practice and need were indicated. Since the continuing education materials were to be assigned based on deficiency, the scales that most PAs scored well on could be eliminated from the priority rating easily.

3. One point was subtracted from each scale where practice was not indicated as common.

4. Since the number of test items per scale was based on actual PA practice, one point was added to each scale consisting of more than 12 items.

5. One point was added to scales where need was indicated in all of the four categories.

The scales were then assigned a first, second or third priority based upon the total points assigned. The priorities were then adjusted according to the diversity of critical incidents represented in the scale, national data indicating common PA practice, and the quality of instructional materials currently known to be

available to PAs. For example, body system acute respiratory received an initial rating of 4. One point was added because the scale was comprised of more than 12 test items, for a total of 5 points and a first priority rating. The body system acute genitourinary also received on initial rating of 4 but was reduced to 3 due to fewer items on the examination. Acute genitourinary was assigned a second priority rating.

The project contract provided for development of 18 instructional modules. In an attempt to provide the most thorough continuing education in the areas of greatest deficiency, these 18 modules were apportioned across only that content which was rated first or second priority. The greatest number of modules was assigned to content rated first level priority. Each content area rated second priority was assigned only one module. Each first priority area was assigned a number of modules based on the diversity of content represented by the scales, and the instructional materials currently available in that content area. These priorities and apportionment of instructional modules were

presented for approval to an advisory committee consisting of PAs, PA educators and physicians.

Conclusion

Too often, instructional developers are expected to produce materials without access to data which adequately describe learner characteristics. In other situations, the instructional developer does not know how to use those learner data that are available. While most ISD models include consideration of learner characteristics in designing instructional materials, the method by which this can be accomplished is obscure. In the ISD project presented, learner data were available and were used to identify the content for 18 continuing education instructional modules for PAs. This method can be applied to a wide variety of health related and non-health related instructional design projects where similar learner data can be obtained. Utilization of learner data in this manner provides the instructional designer with precise criteria required to select content for instruction.

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