

Abilities-Based Assessment Within Pharmacy Education: Preparing Students for Practice of Pharmaceutical Care

Thomas D. Zlatic

SUMMARY. Ability-based education has the potential to transform pharmacy education. What distinguishes ability-based education from some other evaluation strategies are its focus on development of student abilities and its assessment-as-learning philosophy which makes assessment part of the learning process, not simply an after-the-fact measurement of what learning has taken place. If an institution creates a coherent curriculum by implementing ability-based education at both the course and curricular levels, students can iteratively practice and improve upon those abilities which are essential for their practice of pharmaceutical care. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworthpressinc.com <Website: <http://www.haworthpressinc.com>>]

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INTRODUCTION

National demands for educational accountability have sparked interest in a variety of assessment techniques through which colleges can demonstrate effectiveness and responsibility. Ability-based education is one such approach that has attracted the attention of pharmacy education. However, ability-based education is not a recent response to politico-pedagogical alarms. Nor is it simply an evaluation tool for demonstrating the efficacy of an educational institution or curriculum. Ability-based education is an educational strategy that makes assessment part of the learning process. Across the country over the past several years, many successful outcomes assessment programs have been implemented (1). The defining difference from some other evaluation programs is that in ability-based education, assessment is built into the educational process from the beginning; it is not simply a measurement of what learning has occurred, but a tool for facilitating learning.

Simply, ability-based education establishes educational goals and then designs a pedagogy, a curriculum, and assessment strategies that support those goals. Ability outcomes differ from some other educational outcomes goals by focusing on what students should be able to do as a result of instruction. What students can do, their abilities, does not refer to discreet, atomistic “competencies” but to complex integrations of knowledge, skills, attitudes, habits, and values. These outcome abilities drive the instructional and assessment processes, and they shape both the structure of the curriculum and the institution’s organization, policies, and practices.

The first and most successful proponent of ability-based education is Alverno College, a women’s liberal arts college in Milwaukee. Since the 1960s, Alverno has created much of the vocabulary and many of the processes associated with ability-based education and now is nationally recognized for its achievement in pedagogical innovation (2, 3). Beginning in the early 1990s, the Alverno principles and processes have been adapted in a variety of ways into pharmacy education, and the ability-based approach has been promoted by the American Association of Colleges of Pharmacy (4-8).¹ Although a number of pharmacy schools continue to explore ability-based education and although some have developed successful, innovative initiatives, no college of pharmacy has yet implemented a comprehensive

ability-based approach throughout a pharmacy curriculum (9-14). There are, of course, a number of administrative, practical, and philosophical hurdles that challenge the institutionalization of ability-based education, and it is not unreasonable to expect the institutionalization process to take from five to ten years. But perhaps two other impediments are an insufficient appreciation of the differences between an ability-based approach and other outcome assessment strategies and an underestimation of the potential which ability-based education has for giving coherence to a pharmacy curriculum.

This article examines ability-based education in two dimensions: at the course level and at the curriculum level. Ability-based education entails the redesigning of individual courses and the teaching strategies by which they are taught, but it also involves the creation of a curricular plan which interconnects those courses and gives the curriculum coherence by structuring it around the attainment of specific ability outcomes. When ability-based processes are implemented at both the course and curricular levels, students can progress through a curriculum in which the development of their abilities is the organizing principle. Effectively implemented, ability-based education has the possibility of transforming pharmacy education so it better prepares students for the mission of rendering pharmaceutical care.

ABILITY-BASED EDUCATION AT THE COURSE LEVEL

Since ability-based education requires transformations at both the course and curriculum levels, it is sometimes difficult to know where to begin. The implementation of ability-based education can be begun as a rational, “top-down” process that works deductively from curricular principles and outcomes or as a “bottom-up” approach that works empirically from the course level and builds toward curricular principles and outcomes. Because of the interdependency of the two, it is probably best to begin in both directions, moving back and forth to escape the vicious circle of not being able to understand the parts (the courses) until you grasp the whole (the curriculum) and not being able to grasp the whole until you understand the parts. For the sake of clarity we will discuss them separately, beginning with individual courses, but recognize that ability-based education at the course level implies a set of college ability outcomes and a curricular framework that give direction to course development.

Although there are various approaches, the method presented here for creating a course structured around ability-based principles involves four steps: identifying ability outcomes, creating opportunities for students to practice the abilities, establishing clear criteria so students can determine strengths and weaknesses in their performance of the abilities, and providing assessment feedback from self, peers, and experts.

Ability Outcomes

An ability outcome states what the students will be able to do as a result of instruction. The underlying philosophy is that whereas knowledge is an extremely important and necessary goal of the instructional process, knowledge alone is not sufficient; what students are able to do with their knowledge becomes the basis for evaluation of their success. Such a focus on abilities, on what students can do, does not undervalue content or knowledge, as some faculty sometimes fear. One cannot, for instance, think critically or monitor pharmacotherapy without a solid knowledge base. But an ability-based approach does require students eventually to move beyond the lower levels of Bloom's Taxonomy (recall, comprehension) as they use their knowledge base to perform complex disciplinary tasks.

However, not everything that students do is classified as an ability. An ability is different from objectives or competencies in that it is more complex and holistic. Unlike objectives and competencies, which are usually more specific, atomistic, and discrete, an ability is an integration of knowledge, skills, and attitudes/habits/values.² For instance, two objectives might be, "at the end of this lecture the student will be able to identify three causes of pneumonia," and "at the end of this lecture the student will be able to calculate creatinine clearance." The first objective is useful knowledge, and the second is an important skill, but neither would be classified, under this system, as an ability; if one were to ask "why" the student should know about the causes of pneumonia or how to calculate creatinine clearance, it would be clear that these objectives are components of more comprehensive abilities, such as "educating patients and health care professionals" or "recommending drug therapy." Thus objectives often are one of the three components (knowledge, skills, attitudes) that together make up an outcome ability (Table 1).

Ability outcomes can be written to specify what the student must

achieve at the end of a course (course ability outcomes) or at the end of a curriculum (college ability outcomes). College ability outcomes define the knowledge, skills, and attitudes that a graduate must demonstrate, as determined by the faculty at that institution. Course ability outcomes derive from and make more specific the college outcomes. A course ability outcome specifies how this course will attempt to help achieve a part of the college outcome ability and designates the level of the ability expected to be demonstrated in this course (Table 2).

In a professional program, college ability outcomes sometimes are categorized as general ability outcomes or professional ability outcomes (Table 3). General ability outcomes refer to those goals that are part of a general or liberal arts education, such as thinking, communicating, and ethical decision making. Professional outcomes normally are integrations of the general outcomes within professional contexts (e.g., “recommending drug therapy” integrates thinking, communi-

TABLE 1. Outcome Ability Components.

Ability Outcome	I. Counsel patients on antimicrobial drug therapies	
Objectives	A. Acquire antimicrobial knowledge base, etc.	(Knowledge)
	B. Adapt communication to audience, etc.	(Skills)
	C. Exhibit empathy, etc.	(Attitudes)

TABLE 2. College Outcome and Course Outcome Example.

College Outcome	Evaluate the appropriateness of patient-specific therapies
Course Outcome	Evaluate at an intermediate level the appropriateness of uncomplicated patient-specific antimicrobial therapies

TABLE 3. General Outcome and Professional Outcome Example.

General Outcome	The student shall find, understand, analyze, evaluate, and synthesize information and make informed, rational, and responsible decisions.
Professional Outcome	The student shall interpret and evaluate pharmaceutical data and related information needed to prevent or resolve medication-related problems or to respond to information requests.

cating, and ethical decision making within the context of pharmacy practice).

No one course can enable students to achieve either a college general outcome or a professional outcome. Abilities are developed gradually, in incremental fashion, over the years of a curriculum. The course outcome above limits the college outcome by concentrating only on antimicrobial therapy and by focusing on uncomplicated cases. Other courses in the curriculum would adopt course outcomes covering other types of therapy and would pitch their instruction at different levels: courses that come earlier in the curriculum would operate at a more basic level whereas later courses would require students to perform at a professional entry level. All the course outcomes in this series, when taken together, would equal the college outcome.

Course ability outcomes should be written so that they describe what the student will be able to do as a result of the course—not what the course will do or what the instructor hopes to do. For instance, not, “introduce students to principles of therapeutics,” but “apply therapeutic principles in the monitoring of therapies.” Outcomes also are different from course activities. What the students do in the course (i.e., practice opportunities) are methods for achieving outcomes, not the outcomes themselves. For example, “the student will gather materials for a report on chemical dependency,” or “students will work in groups to create a presentation on AIDS” are course activities, not ability outcomes.

Once again, faculty as a group can create college ability outcomes deductively or inductively, or by some combination of the two, but what is important, at both the course and curricular levels, is for the faculty themselves to create ability outcomes, not simply to import them. The professional and general ability outcomes created by the AACP Center for Advancement of Pharmaceutical Education (CAPE) in 1994 and updated in 1998 provide a template for general and professional abilities required to practice pharmaceutical care, but these are meant to be adapted by faculty at their own institutions, according to their institution’s philosophy and educational values. Also, the CAPE outcomes are terminal outcomes—what is to be expected upon graduation. They do not provide levels of performance to be achieved during specific intervals within the curriculum, i.e., they do not provide course outcomes. In particular, it would be unlikely that any course outcome would be identical to any CAPE outcome (or any

college outcome) unless it is true that within that course students will demonstrate that ability outcome to a degree indicative of an entry-level practitioner.

An ability-based approach is most effective when faculty review their courses, determine what they want their students to be able to do as a result of instruction, and integrate the desired knowledge, attitudes, and skills into course ability outcomes that are clearly stated on a syllabus. Often this process is transformative and heuristic. Rethinking one's goals—for instance, asking “Which attitudes or values are needed for this ability?”—may lead to the inclusion of material that might not otherwise have been covered (e.g, ethical dimensions embedded within one's discipline). In this way an ability-based approach leads to an integration of professional and general educational goals and to the development of a more liberally educated practitioner.

Practice Opportunities

A premise of ability-based education is that abilities must be practiced to be achieved. In other words, active learning is built into the logic of ability-based education. It is highly unlikely that students who are exposed only to traditional didactic forms of instruction will develop abilities such as critical thinking as a result of that instruction (15-17). (Peter Hurd covers active learning more completely elsewhere in this issue.) In an ability-based approach, the course outcomes determine the teaching strategies that are employed. Lecture is a powerful tool for communicating knowledge to a large number of students, but it is much less effective for developing skills, attitudes, and values. Thus ability-based education requires multiple teaching strategies (including lecture), for unless students are given frequent opportunities to practice course ability outcomes—whether the abilities are thinking, communication, or implementation of a drug therapy plan—they are unlikely to improve much.

The practice of abilities can take place in homework, in classroom activities, or in experiential settings. A practice of the course outcome could be an essay, presentation, project, role-play, simulation, debate, case study, exam, clinical activity, creation of a peripheral brain, service learning activity, laboratory experiment, directed reading, etc. Again, such practices are not to replace acquisition of knowledge, but to reinforce knowledge through the use of it. Some assignments can be created to help students learn specific knowledge, skills, or attitudes

that make up an ability outcome. Other assignments can require students to practice the integration of the appropriate knowledge, skills, and attitudes. What is important is that students are given practice at the level appropriate to their level in the curriculum and that they are given ample opportunities to practice.

If students see the connection between course ability outcomes and practice opportunities, they are more likely to improve; therefore, the syllabus should clearly relate the practice opportunities (assignments, projects, course activities, etc.), to the appropriate course outcomes. Also, the practice opportunities and the assessments should overlap. If the students practice abilities during the course but are graded upon other criteria such as acquisition of data (or vice versa-if they are presented with information but are required to demonstrate abilities at testing time), they may lose confidence in the approach. More productive would be weighting the practice activities such that the grade attached to the activity is proportionate to the importance of the outcome. Frequent practice opportunities can present challenges to instructors of large classes, but note that not all practice activities must be graded. In fact, assessment-as-learning should involve some risk-free practice. Individual or group feedback on such practice will likely result in better performance at the time of summative testing or “validation,” at which point students are required to demonstrate they can meet the expected outcome.

Performance Criteria

In ability outcomes education, the basis for assessment is performance criteria, that is, descriptions of the behaviors or actions the students must demonstrate if they are to be determined to be capable of performing the course outcomes. The criteria clearly describe for the student (1) what he or she must do to successfully practice the ability and (2) the guidelines by which it will be determined how well he or she performs. Performance criteria allow the instructor to gather observable, documented evidence regarding outcome attainment.

Performance criteria are related to a “performance”-i.e., a practice of the course ability outcome, such as an essay, homework assignment, presentation, project, role-play, laboratory experiment, clinical activity, etc. (Table 4). Criteria are not the directions for the assignment; they are not algorithms for the performance of the task. Criteria are the measurements by which instructors and students can assess

TABLE 4. Performance Criteria Example.

<p>Outcome: Find, analyze, evaluate, and communicate drug information</p> <p>Practice Opportunity</p> <p>Find and read an article in a popular journal that discusses Rogaine. In a three to five page essay written for a lay audience, summarize, analyze, and evaluate the article so that your readers can make informed decisions about the drug.</p> <p>Performance Criteria:</p> <ol style="list-style-type: none"> 1. Accurately summarizes reading <ul style="list-style-type: none"> Clearly states the main idea/argument States major supporting ideas/arguments accurately 2. Analyzes facts, ideas, and issues <ul style="list-style-type: none"> Provides necessary background Determines accuracy, significance, fairness, logic 3. Evaluates facts, ideas, and issues <ul style="list-style-type: none"> Clearly articulates a judgment about value or correctness Provides basis or criteria for the judgment Provides evidence for the judgment 4. Communicates information effectively <ul style="list-style-type: none"> Adapts communication to audience Presents information in a clear, organized manner
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how well students are doing in the practice of the course outcomes, but more importantly, criteria are another tool with which students can learn to improve their performance.

Performance criteria are often difficult to construct, for instructors may never have been required to make explicit their assumptions about what constitutes good performance in their disciplines; they can recognize it but not easily verbalize it. But novices, the students, lack that background, that tacit recognition of competent performance, and so they sometimes become frustrated when they receive a “C” on what they had thought had been an excellent performance. It is not that they were unable to do what was expected of them but that they did not know what the expectations were. By knowing explicitly and up

front what constitutes good performance, students can better prepare to meet the course outcomes.

It is also important for faculty to determine at what level of performance (e.g., beginning, intermediate, advanced) students must perform in this course and to write criteria to reflect that appropriate level of performance. Given the place of the course within the curriculum, faculty may decide to emphasize or ignore specific performance criteria, knowing that deeper or more complete coverage of the ability will occur later in the curriculum.

Stating the criteria often is not sufficient. Students must understand them. Until they have direct experience with the criteria, until they have applied the criteria in their own work and have seen concrete examples of successful and unsuccessful practice plotted against the criteria, the criteria may not be as helpful. Assessment feedback provides this clarification, but it is also helpful to devise exercises so that students better comprehend the basis for what constitutes good performance. For instance, students can empirically “discover” criteria if they are given examples of performances at various levels of proficiency and are asked, as individuals and in groups, to rank them and then to determine the basis for their rankings. Such exercises allow students to understand and internalize the criteria, rather than simply depending upon them as checklists or algorithms.

Assessment Feedback

After students (1) have been told what abilities they must demonstrate to pass the course, (2) have been given opportunities to practice the abilities, and (3) have been told what constitutes good practice, they need to receive assessment feedback regarding how well or poorly they have performed.

Ability-based education employs the concept of assessment-as-learning (18). (See also, Michael Maddux’s article in this issue on ability-based assessment.) That is, assessment in ability-based education is a continuous, formative part of the learning process. Assessment feedback after each performance enables students to improve their abilities in the next performance. Assessment thus is an important teaching tool, not merely a method by which to demonstrate to accrediting agencies and other external constituencies that the academic program is sound—although ability-based processes can perform that function also.

Feedback can come from three sources: self, peer, and expert (instructors or external assessors). This feedback, though, is not simply a response of “nice job” or “needs work.” The feedback gives explicit, concrete descriptions of (1) what was successful and why and (2) what behaviors need to be improved and how. Checklists or Likert-scale ratings are not as effective as explicit comments, for either the assessor or the evaluatee. The assessor should cite examples or behaviors from the performance that justify the assessment made and should provide suggestions on how to improve.

Self-assessment promotes self-learning and growth within the ability. With a list of criteria in hand, students can self-assess as they prepare their performance or afterwards, for instance while reviewing a tape of their performance, a portfolio, or a written assignment. If self-assessment sheets are distributed when an assignment is made, students are likely to improve their performance, for they then must acknowledge what the components of successful performance are and must provide evidence that they have addressed each component.

When peers assess one another’s work according to criteria, both the assessors and the students assessed can improve their understanding of what constitutes good performance of the outcome ability. Peer assessments serve two functions. First, obviously the evaluatees receive objective feedback regarding their performance from a perspective that is closer to their own. Often, though, the peer assessors benefit even more from the assessment, for by analyzing the performance of their fellow students, they themselves understand more clearly what constitutes successful performance of the ability. They begin to comprehend more fully what the criteria mean, and by providing suggestions to others for improvement, they can improve their own abilities.

Effective peer assessment does not happen automatically. Faculty should build some time into the course to explain the advantages, difficulties, and methods of self- and peer assessments. Students must be taught how and why to assess. Those evaluated must learn to recognize that the feedback they are given is constructive, that is, meant to help them improve. Otherwise the temptation will be for the peer assessors to evaluate too highly, not to point out deficiencies, not to provide evidence for the assessment, not to provide suggestions for improvement. If students recognize that peer and self-assessment are opportunities for them to improve their performance (and their

grades), they will more likely assess one another honestly and productively.

The value of assessment feedback can be lost if students are not given an opportunity to repeat the performance or to perform similar practice opportunities. Ability development requires iterative and recursive practice. An instructor may spend 45 minutes writing comments on a student's drug monograph and then assign a summative grade and not give the student an opportunity to rewrite the essay. It is not uncommon for a student to look at the grade and not even read the comments, much less try to benefit from them. If, on the other hand, the student must rewrite the monograph using the feedback as a guide, the student more likely will try to understand and apply the comments to enhance his or her abilities. So, after assessment feedback is given, the four-step loop is repeated: a better understanding of the ability outcome, repeated practice, clarification of criteria, and additional suggestions for improvement.

ABILITY-BASED PRINCIPLES IN CURRICULAR DEVELOPMENT

It should be clear that ability-based education at the course level presupposes a preexisting, overarching curricular structure built upon the college outcomes. The power of ability-based education does not reside as much at the course level as in its potential to give structure and coherence to a curriculum. A curriculum here is not a set of courses but a plan that includes goals, content, teaching strategies, assignments, assessment techniques, and curricular design. Ability outcomes provide coherence by indicating what should be taught and when and where it should be taught, how it should be taught, what students should do, and how they should be assessed.

Curricular Planning

In response to accrediting agencies, most schools of pharmacy have developed program outcomes, "public competencies" or expectations of what changes their programs should produce in students (19). Those colleges that adapted the schema reflected in the CAPE Outcomes and the Focus Group for Liberalization of the Professional

Curriculum are likely to have created college ability outcomes, usually 8-16 statements of expectations of what students should be able to do upon graduation. At some institutions the college ability outcomes have been fleshed out with detailed performance criteria; at fewer institutions the divisions/departments have enunciated their role in developing the college outcomes by creating program or divisional outcomes which state what students should be able to do, for instance, as a result of instruction within the pharmaceutical sciences or pharmacy practice. (An example of divisional outcomes can be found in Ref. 12.) These college and divisional outcomes become the basis for the course ability outcomes.

If a college faculty agrees upon general and professional ability outcomes expected of all its graduates, then it can design a curriculum in which the abilities are practiced and assessed across the curriculum, with students being expected to perform at higher or more proficient levels as they progress through the curriculum. For instance, in one model, at the initial level, students are expected to be able to understand and apply basic concepts and to identify issues; at the second level, they are expected to perform the ability in practice situations; and at the third level students must perform the ability with the proficiency of an entry-level professional.³

Curricular mapping is one method of setting up a program for the instruction and assessment of ability outcomes. (See Ref. 6 for an explanation of curricular mapping.) For each ability outcome, the faculty can be surveyed to determine in what courses the ability outcome is addressed, at what level it is addressed, what criteria are used to assess the ability, and what opportunities there are to practice the ability outcome. Then, by charting the results on a spreadsheet to create a curricular map, faculty can determine if the curriculum supports the outcome or if there is a disjuncture between the ability outcome and what is actually taught. If there is a discrepancy, faculty can then rewrite the ability outcomes or change the curriculum to ensure that the ability outcomes can be met.

For example, if written communication is selected as a college ability outcome, faculty, through a combination of inductive and deductive reasoning processes, can agree upon working criteria at three levels of performance. Each faculty member can then indicate on a grid or curricular map what outcomes and criteria are addressed in his or her course. Once the data are charted, it is easy to see evidence

whether any criteria are given inadequate coverage or if unproductive duplication exists across courses. If gaps appear to exist between expected writing outcomes and course work, it will be necessary to make them congruent by one or more of the following solutions: (1) suggest curricular/course changes so the criteria are covered, (2) modify the criteria to conform to what is now being taught in the courses, and/or (3) facilitate discussion of criteria among faculty to ensure agreement regarding the meaning of the criteria—it may be that because of varying terminology and definitions of what the criteria mean to faculty, there may be fewer gaps than first appear.

The possibility is very strong that, just as with students, until faculty actually apply the criteria in concrete situations against test cases, they may not really agree about the criteria, even though they agree to the words on the page. Thus coming to consensus regarding criteria is difficult, especially when it involves faculty from multiple disciplines, each having different paradigms, vocabularies, and values. What it means to “analyze” in biology, management, or English literature may be very different, for instance. But as difficult and time-consuming as it may be, consensus and understanding regarding outcomes and criteria are extremely important if the goal is to produce a curriculum in which courses are linked by ability outcomes, so that the students enhance their abilities as they progress through the curriculum.

Curricular/Student Assessment

In a well-structured ability-based approach in which assessment rather than evaluation is the goal, student assessment leads directly to program assessment. The attempt is not simply to determine whether competency has been reached, but to determine what interventions can be made to ensure that competency is reached.

What is distinctive and perhaps most critical about ability-based education is validation of students’ abilities. Validation warrants that a student can perform the specific ability at the appropriate level for his or her stage in the curriculum. In a course in which two abilities are outcome goals, conceivably a student could perform superbly in one (“A” work) and could be completely incompetent in the other (“F” work). In some systems, the course grade would translate into a “C,” allowing the student to progress through the curriculum although he or she lacks an ability deemed essential by the faculty at that institution.

Ability-based education attempts to provide mechanisms to ensure all ability outcomes are achieved.

Student achievement of ability outcomes can be assessed not only within courses but also by external assessments. For instance, at some schools, including Alverno College, faculty establish periodic proficiency testing or other methods of validation to determine whether students are practicing the abilities at a level appropriate to their place in the curriculum. In some cases, external assessments involve professionals from the community who are not faculty members but who have the willingness and expertise to provide assessment feedback to students (10).

Within pharmacy education, some schools are exploring the use of external performance-based assessments to determine whether their students can demonstrate the abilities they will need to render pharmaceutical care (20). Through these “milestone” tests, faculty try to evaluate whether students are able to integrate abilities during the performance of pharmacy-related tasks. Often these performance-based tests are simulations involving “out-basket” assignments or clinical situations. One strategy adapted from medical education is the objective-structured clinical examination (OSCE), in which students are assessed as they move from station to station, performing clinical activities involving standardized patients (21). Such testing shows promise of providing a reliable and valid means for assessing clinical skills (i.e., abilities) within pharmacy practice. A high degree of reliability and validity is particularly important if milestone tests are used as “high stakes” assessments—testing which will determine if students are allowed to progress to the next academic year or to graduate from the program.

Since the essence of an ability-based model is assessment-as-learning, it tends to de-emphasize the gatekeeping role of evaluation; the primary goal is not to weed out unprepared students but to identify early what the weaknesses are so they can be remediated. An implication is the possibility that milestone exams should not significantly differ from what has been occurring within classrooms and clinical experiences. Lecturing to students for 16 weeks and then requiring them to pass a rigorous test that requires application, analysis, and synthesis, for instance, would not be fair. Secondly, a process should be established so that by the time the students take the milestone tests, their weaknesses should already be known to them and mechanisms

be made available for them to remediate. Obviously at some point, a summative or high-stakes assessment must be made, but unless students recognize that milestone exams are meant to help their performance, it is not intuitively clear that the tests will support or promote ability-based learning.

Another approach that ensures continuing formative feedback within the clinical setting is a portfolio system. The Electronic Student Portfolio (ESP), developed as part of a Grant Award to Pharmacy Schools (GAPS) by Sheldon Holstad at the St. Louis College of Pharmacy, is an example.⁴ Tied directly to the seven divisional ability outcomes created by the clinical faculty at that institution, the ESP allows preceptors from multiple locations to assess and provide feedback on student performance in clinical settings according to specific criteria, to chart the progress of student improvement, to scan in evidence that is the basis for student assessment, and to review students' work on previous rotations so that subsequent preceptors can design a personalized clinical rotation that allows students to practice the abilities that need improvement. Rather than a summative, snap-shot picture of a student's abilities, the ESP provides on-going, formative pictures of student improvement over time, based upon specific criteria for each ability. Tying the portfolio system of remediation with milestone testing could result in a reliable, valid assessment process which encourages not only the measurement but also the development of outcome abilities. (See Ref. 22 for a discussion of the differences between course-based and institutional-based assessment.)

Although directed primarily at improvement of student learning, both course and external assessments also can be used for longitudinal assessment. The results of performance testing should identify changes that need to be made to the content, sequencing, or teaching strategies of courses within the curriculum. If a majority of students habitually under-perform in patient counseling, for instance, a faculty, in conjunction with its curriculum committee or assessment council, can recommend curricular modifications regarding when, where, and how patient counseling should be taught. This perhaps is what is meant by Georgine Loacker of Alverno College, when she says, "Assessment-when faculty take hold of it and forge it into a process-can undergird, guard, and guide the coherence of a curriculum" (23). What students can do and what students are required to do are the questions that shape curricular planning.

Institutional Structure and Support

The degree to which ability-based principles have penetrated a college can be measured by the resultant changes in its institutional structure and systems. At Alverno College, the emphasis on outcomes development and assessment is so strong that each of the college's eight ability outcomes is assigned to a free-standing college department headed by a department chair. All faculty belong to at least two departments: a traditional disciplinary department and one of the eight ability departments, with the disciplinary and ability outcomes departments having equal importance in the college structure. The values of evidence, criteria, and assessment feedback permeate the college environment.

For ability-based education to be successful, it is crucial for faculty to have ownership of the process and to take responsibility for creation of outcomes, criteria, practice opportunities, assessment feedback, and curricular design. Without such voluntary faculty participation, the effort will be moribund. While the process must be faculty owned, it requires strong leadership to guide the process and to inspire, encourage, and reward faculty. Faculty must control the process, but administrators must demonstrate they are insightful regarding the goals and methods of ability-based education and must provide whole-hearted unequivocal support (24-26). Those responsible for implementation must be provided resources, authority, and a support structure that enables them to avoid the too-common curse of responsibility without power.

Probably, if a firm commitment is made to an ability-outcomes approach, administrative roles and structures will change to accommodate the new goals. Perhaps an office of assessment or a center for teaching and learning would be instituted. Perhaps divisions would be realigned to place more emphasis on collaboration and interdisciplinary work. Committee structures, memberships, and processes might evolve, particularly the curriculum committee, which would adopt policies and processes to ensure that the identified college ability outcomes would be met. Faculty development might be enhanced as faculty experiment with new models and techniques. The college might modify its evaluation instruments accordingly rather than continue to use traditional course evaluation tools which ignore ability outcomes, lest faculty come to recognize "what really counts" in the

evaluation process is not achievement of outcome abilities. Promotion and tenure committees might acknowledge a “scholarship of teaching” as a criterion and might seek coherency between what is espoused and what is practiced by the institution by adopting an ability-based approach: publication of clear promotion/tenure criteria, a mentoring program for faculty to receive feedback regarding their performance, and a compulsion about seeking supporting evidence. College publications might replace lists of competencies or objectives with explanations of ability outcomes; accreditation documents might center on student achievement of outcome abilities. If an ability-based approach is over-laid upon a traditional program rather than integrated into the philosophy and structure of the college, it probably will not develop deep roots.

Students should not be forgotten during the planning and implementation of ability-based education. Without input into the process and without effective programs to explain the purpose, processes, and expected results of ability-based education, students are more likely to resent changes in educational goals and practices. Even with such preparation, administrators and faculty should recognize that students who have been accustomed to passive learning or who have not been challenged with self-learning may initially complain about this new approach. Insight, courage, and understanding on the part of college leadership can assure faculty and students that the efforts they put forth will be supported.

CONCERNS AND CONCLUSIONS

Both philosophical and practical objections can be raised regarding ability-based education. One of the more persuasive philosophical objections is that ability-based education can be reductive. In the late nineteenth century, Herman Melville observed, “Truth uncompromisingly told will always have its ragged edges.” When knowledge is too compartmentalized, when it is packaged too neatly, immediate suspicions of distortion and over-simplicity arise. Some instructors object similarly that an ability-based approach involves a naive hubris in trying to lay out in linear fashion what students should achieve at the end of their college educations. Education should be exploratory, not preordained or predesigned, they maintain. What is most valuable in a college education often is something not measurable, such as altruism

or appreciation of the arts; particularly disturbing is the fear that what cannot be measured will not have a place in the curriculum.

Some instructors are wary of ability-based education because they perceive threats to faculty autonomy and academic freedom. Where course ownership is jealously claimed by individual instructors, it is unlikely that ability-based education will take root, since corporate or community ownership of all courses is required if faculty are to work together to help their students achieve common ability outcomes. Also, in introductory courses, often particularly in the sciences, instructors recognize the need to provide students with a firm foundation in their discipline by imparting a solid knowledge base. Some fear that an emphasis on abilities at that point in the curriculum will undermine their efforts to teach content. For those who associate ability-based education with the controversial outcomes-based education (OBE), there is apprehension that this approach will lead to an environment of “teaching toward tests” in a limiting, confining, and restrictive fashion. For those satisfied with instruction and student performance, there may be no strong internal motivation for assessment in general, and for those apprehensive about the effectiveness of their teaching and the inability of their students to meet course goals, there actually may be disincentives to invest in ability-based education. If faculty correctly or incorrectly perceive that faculty rewards are based upon satisfying the wishes of the student/customer, they may be tempted to relax the rigor required to ensure that all graduates can demonstrate proficiency in ability outcomes. For some skeptical faculty, there is insufficient empirical data to warrant a switch from more traditional teaching methods, and for others ability-based education is just too much work. Administrators may be concerned about the cost of ability-based education, including the implications it has for class sizes, facilities, faculty development efforts, etc. Some faculty can appreciate the effectiveness of implementing ability-based education within classrooms of 15 to 30 students but wonder about its effectiveness in classes of 100 or more.

Proponents of ability-based education counter that the approach is not restrictive and conforming but promotes individuality and liberates learning. They concede that not all educational goals must be ability outcomes and that some worthy goals are not empirically measurable, but they claim nonetheless that accountability demands assessment of those outcomes that are measurable. Proponents also ar-

gue that ability-based education leads to stronger faculty governance and ownership of the curriculum, although they admit the ownership is collective rather than private. Once teaching and learning become communal rather than private enterprises, synergy often produces better outcomes. Proponents reject the notion that ability-based education undervalues knowledge, claiming instead that knowledge is enhanced when students must learn to think, communicate, and act responsibly within their disciplines, not just memorize isolated facts and theories. For those concerned about empirical evidence of efficacy, proponents counter with requests for empirical data demonstrating the effectiveness of their own pedagogies but also point to increasing reliable evidence that ability-based education can improve student abilities (18, 27).

Ability-based education is not appropriate for every college in the country. The mission and values of the institutions vary significantly and so should their pedagogical approaches and assessment techniques. Nor is there just one orthodox model of ability-based education that adopting schools should try to graft onto their institutions. Diversity in purposes, values, goals, and methods must be preserved. Ability-based education is a method, not a goal. The goal is student learning. Obviously student learning has and will continue to take place in a variety of educational systems and environments. But within the current environment's urgent emphasis on accountability in the face of rapid change within the health professions and in the nature of pharmacy practice, it is essential for pharmacy schools to review their programs to determine if they are instilling in their students the abilities they will need to practice pharmacy within the next century. Those pharmacy institutions for whom student learning is the top priority might investigate whether they can better prepare students for the practice of pharmaceutical care through a method in which assessment and accountability are inherent in the learning process rather than posterior to it.

NOTES

1. Georgine Loacker, Chair of the Assessment Council at Alverno, served as a consultant for the AACP Focus Group on Liberalization of the Professional Curriculum, created by the Commission to Implement Change in Pharmacy Education for the purpose of developing "outcome measures in designing curriculums and assessing student learning." Grants by the Fund for the Improvement of Post-Secondary

Education (FIPSE) enabled pharmacy educators to apply ability-based methods to pharmacy education and to disseminate results. The AACP Center for the Advancement of Pharmaceutical Education (CAPE), in conjunction with the AACP Focus Group, developed general and professional ability outcomes that could be used as a template for pharmacy schools wishing to create college ability outcomes; the outcomes were updated in 1998. For the past three years (1996-98), the AACP Institutes included substantial programming on ability-based education for teams of faculty from a majority of the U.S. schools of pharmacy. Most recently, the 1997 AACP Council of Faculties charged its Teaching and Outcomes Assessment Committee to develop assessment strategies based upon an ability outcomes curricular model.

For an example of the incorporation of an ability-based approach into medical education, see: Stone H. University of Wisconsin at Madison: an ability-based assessment program at the medical school. Lessons learned from FIPSE projects III. U.S. Department of Education. Fund for the Improvement of Postsecondary Education, 1996.

2. Alverno College characterizes abilities as being integrated (“multiple components including skills, behaviors, knowledge, values, attitudes, motives or dispositions, and self-perceptions”), developmental (“pedagogical, cumulative levels that describe increasingly complex elements or processes”), and transferable (“they prepare students for many roles and settings”). Alverno College. Student assessment-as-learning at Alverno College. Milwaukee, WI: Alverno College Institute, 1994: 9.

3. At Alverno college, abilities are divided into six levels, with the last two levels being developed as part of the academic major; the AACP Focus Group constructed three levels of performance for general ability outcomes. For examples, see: Ability-based learning program. Rev. ed. Milwaukee, WI: Alverno Institute, 1994. Liberal learning at Alverno College. Rev. ed. Milwaukee, WI: Alverno Productions, 1992. Loacker G, Cromwell L, Fey J, Rutherford D. Analysis and communication at Alverno: an approach to critical thinking. Milwaukee, WI: Alverno Productions, 1984.

4. A demo of the Electronic Student Portfolio is available on the Internet at <http://esp.stlcp.edu>.

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