

# Curricular Evaluation Using Self-Efficacy Measurements

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Self-efficacy measurements have been used in other health-related professions such as nursing and occupational therapy to assess proficiency in disciplinary areas but have not been used extensively in pharmacy education as a method of curricular evaluation. Self-efficacy is a measurement of an individual's confidence in his or her ability to perform a specific task to successful completion. The purpose of this study was to propose a methodology using self-efficacy measurements in curricular evaluation and assessment as well as to provide specific recommendations for potential uses in pharmacy education. The suggested methodology includes item generation, validation, administration, and correlation with behavior. A specific example is provided demonstrating the suggested methodology. Self-efficacy measurement could provide a potentially valuable methodologic framework for assessment and evaluation within pharmacy curricula. Self-efficacy measurements could be used in a wide range of applications.

## INTRODUCTION

The Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree states that, "Evaluation measures focusing on the efficacy of the curricular structure, content, process, and outcomes should be systematically and sequentially applied throughout the curriculum in pharmacy."<sup>(1)</sup> Self-efficacy measurements have been used in other health-related professions

such as nursing and occupational therapy to assess proficiency in disciplinary areas but have not been used extensively in pharmacy education as a method of curricular evaluation. Self-efficacy is a measurement of an individual's confidence in his or her ability to perform a specific task or behavior to achieve

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a successful completion of a desired outcome(2-4). Perceived self-efficacy is based primarily on four sources of information. The first source of information is from performance attainment, having actual experiences with the said task. The second source is that of vicarious experiences of observing the performances of others. Verbal persuasion or trying to talk people into believing they possess the capabilities to accomplish a task and physiological states, also referred to as emotional arousal, form the basis for the other sources of information comprising self-efficacy. Bandura found that regardless of which sources of information a person uses, there is a close relationship between perceived self-efficacy and actual performance of individual tasks(4). He also found that knowledge and skills alone were insufficient to accomplish a desired outcome and that self-efficacy mediates the relationship between knowledge and action(4). Since formative and summative assessments can be used effectively in helping students meet the stated goals of the curriculum, self-efficacy measurement has the potential to provide an objective measure of curricular revision(5).

While self-efficacy has not been used extensively in pharmaceutical education, Farris and Schopflocher used self-efficacy to examine the relationship between intention to engage in a certain behavior (in this case provision of pharmaceutical care) and the behavior itself in a group of community pharmacists in Alberta, Canada(6). Over a period of two weeks they sought to quantify the constructs of intention, self-efficacy, and behavior with regard to providing pharmaceutical care in the community pharmacy setting. Between self-efficacy and intention, the authors found that self-efficacy was the only direct predictor of behavior. While behavior in this study was self-reported and potentially subject to social desirability bias, it does appear to support that there is a close relationship between self-efficacy and behavior.

The vast amount of research using self-efficacy in health-related professions has been in nursing education. In a study examining the use of self-efficacy measurements in predicting practice outcomes in continuing education, Murdock and Neafsey proposed that since self-efficacy deals with perceptions related to actions, that it could be used as an outcome measure for educational interventions(7). They developed their self-efficacy instrument by translating each course objective into a corresponding self-efficacy item based on the methodology employed by Froman and Owen in the construction of a self-efficacy instrument for infant care(8). Both pre- and post-knowledge and self-efficacy were assessed, with both measures increasing significantly after the educational intervention. The study found a low correlation between knowledge and self-efficacy, suggesting that each measures a different construct of learning.

Neafsey used this same methodology in another study to evaluate the use of computer-assisted instruction for home study for continuing education programs in nursing(9). Neafsey found similar results to the Murdock and Neafsey study, in that there were significant increases in both knowledge and self-efficacy but a low correlation between the two. This finding was further supported by another nursing study that examined the relationship between performance on computer-based clinical simulations and measured knowledge and self-efficacy. Henry and Holzemer found that clinical simulation performance was related to knowledge and self-efficacy measurements but that the constructs were not synonymous(10).

Along with the work of Bandura these studies seem to

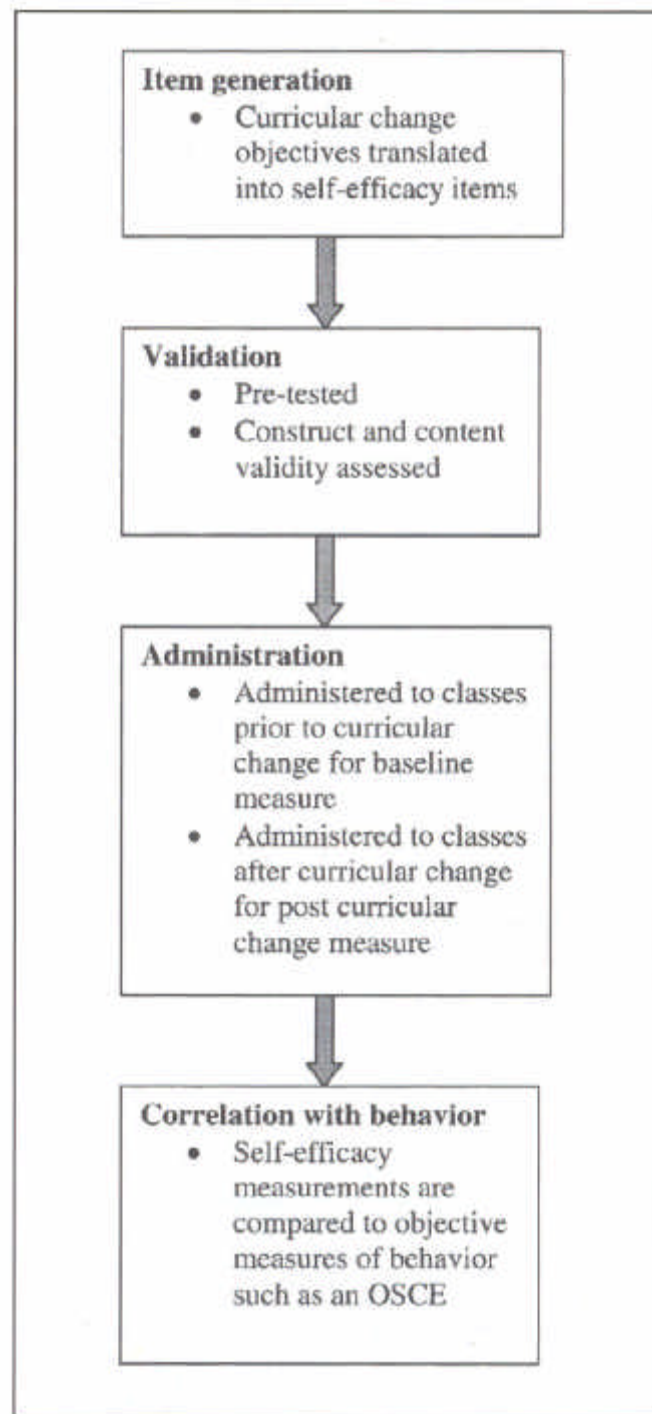


Fig. 1. Proposed methodology using self-efficacy measurement.

suggest that the measurement of knowledge captures only one of the constructs needed to accomplish a desired outcome. In addition to the measurement of knowledge, the use of self-efficacy measurement has the potential to be used as another assessment tool to evaluate curricular revision and other forms of educational interventions. The objectives of this paper are to: (i) bring self-efficacy literature to curricular evaluation in pharmacy; (ii) propose a methodology for using self-efficacy in curricular evaluation and assessment in pharmacy education; and (iii) provide specific recommendations for the potential uses of self-efficacy measurement in pharmacy education.

**Table I. Objectives of the curricular changes**

- Introduce more pharmacy related material into the first professional year
- Teach communication skills in the first professional year rather than in the third professional year
- Add a patient assessment class to the first professional year
- Combine pharmacology and medicinal chemistry courses for the introductory class in both subjects
- Establish small case discussions throughout the entire didactic curriculum to integrate basic science skills in clinical practice, introduce problem identification, and problem solving skills.

### PROPOSED METHODOLOGY

The proposed methodology, diagrammed in Figure 1, contains the four major components of item generation, validation, administration, and finally correlation with behavior. Items for instrument construction are generated by translating each curricular objective into a corresponding self-efficacy item(7-9). Content validity is addressed by using curricular objectives. The instrument is pre-tested to assess construct validity. All students should be included in the administration, striving for a census rather than a sample, to avoid sampling error. Pertinent demographic information, such as pharmacy work experience, is collected from each to assure equivalent groups. This proposed methodology employs a non-randomized, equivalent group research study design, measuring self-efficacy changes both pre- and post-curricular change. The results of the self-efficacy measurements are then to be correlated with an objective measure of ability such as an Objective Structured Clinical Examination (OSCE).

### EXAMPLE OF SUGGESTED METHODOLOGY

As part of a capstone PharmD research project at the University of Arizona College of Pharmacy, an exploratory study was conducted to examine the use of self-efficacy measurement in evaluating curricular change. While this example does not demonstrate the final portion of the proposed methodology of correlating the measured level of self-efficacy with actual behavior, it does provide an example of how self-efficacy measurement can be used for objective evaluation. Selected data and results are presented for illustrative purposes to demonstrate the methodology employed in this exploratory study.

### METHODS

This exploratory study sought to evaluate the impact of major curricular changes instituted at the University of Arizona College of Pharmacy beginning with the class of 1999. The objectives of the curricular changes are summarized in Table I. Self-efficacy items were developed from the American Association of Colleges of Pharmacy (AACP) and American Pharmaceutical Association (APhA) standards of practice competency statements along with the goals and behavioral objectives used to develop the curricular changes at the University of Arizona College of Pharmacy. The instrument took the form of two case study scenarios, one dealing with a hypertensive patient with asthma and the other dealing with a gastrointestinal complaint in an arthritic hypertensive patient. Each case study scenario was followed by corresponding self-efficacy items. The self-efficacy statements were grouped into the following categories according to the type of information they obtained: subjective, objective, assessment, plan, and counseling. A six-point scale was used to assess student confidence

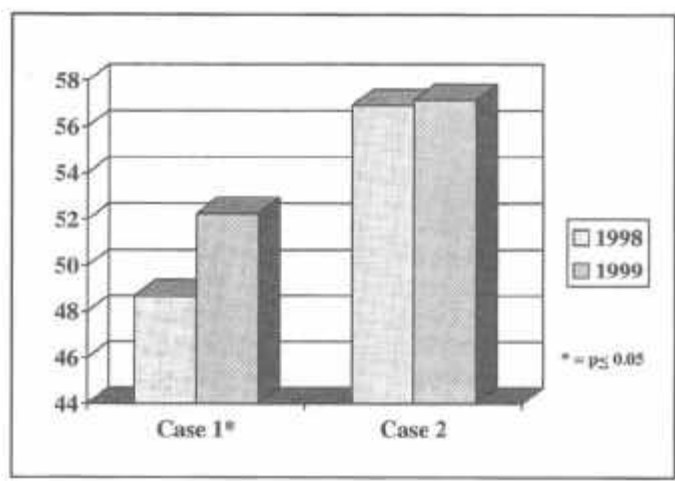


Fig. 2. Composite mean self-efficacy scores.

in responding to the cases, anchored at 1 = very unconfident and 6 = very confident. For illustrative purposes, one of the case studies is shown in Appendix I. A Cronbach's alpha was calculated for each of the two scenarios to assess reliability. Descriptive statistics such as means, standard deviations, and percents were calculated. Student demographic data regarding previous work experience both as technician and as a pharmacy intern were collected as a possible covariate.

The case study scenarios were validated with the class of 1997. The instrument was then administered to the class of 1998 for a baseline measure for pre-curricular changes and finally to the class of 1999 for post-curricular changes. The case study scenarios were administered after the first exam in the first semester of a three-semester sequence of pharmacotherapeutics courses, allowing for the subject material contained in the case studies to be covered.

### RESULTS

Both case scenarios were found to have good internal consistency with a Cronbach's alpha of  $\alpha = 0.87$  and  $\alpha = 0.91$  respectively. The composite mean self-efficacy scores for the two classes are shown in Figure 2. The class of 1998 had significantly more work experience than the class of 1999 ( $P = 0.004$ ). The class of 1999 however had higher self-efficacy scores than the class of 1998 on one of the cases and so it was assumed that work experience did not need to be included as a covariate.

### DISCUSSION

The exploratory study presented above provides an example of how self-efficacy measurement can be used to assess curricular change. This exploratory study did not complete the final step of the proposed methodology of correlating the level of measured self-efficacy with actual behavior. An OSCE with similar case scenarios covering the same skills and disease states could have been used to provide an objective measure of actual behavior. Ideally this exploratory study would have used the data from the class of 1997 in addition to administering the instrument to the class of 2000 to have a larger sample size. The class of 2000 would have also provided a more stable measure since they reflected the second year of the curricular change, allowing the faculty to settle into the new curriculum.

While only a sample of the results of this study was presented to illustrate the methodology, there was a discernable difference in self-efficacy between the two classes. It would be

difficult, however, to quantify how much of the higher self-efficacy seen in the post-curricular change class was due the curricular revision since this study only provided a snapshot.

## CONCLUSIONS

Self-efficacy measurement has been successfully used in nursing education and has potential applications in pharmacy education. Specific recommendations include the use of self-efficacy measurement in evaluating curricular innovations such as computer-based instruction, pharmacy practice experience rotations, in addition to entire curricular changes. Self-efficacy measurement also has the potential to be beneficial in pharmaceutical education as part of continuous quality improvement and evaluating new courses and experiential rotation sites. With the recent increase in the use of technology in the classroom, self-efficacy could be valuable in evaluating and assessing the resulting pedagogical implications. As the University of Arizona College of Pharmacy prepares to embark on another curricular change, this proposed self-efficacy methodology has been suggested as a method for assessment. This methodology provides a means to measure self-efficacy, an important construct mediating the relationship between knowledge and action.

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## APPENDIX. EXAMPLE OF CASE STUDY SCENARIO

**Case 1:** The patient is a 37 year old male with a 14 year history of exercise induced asthma and seasonal (spring and summer) asthma. He is on both inhaled and oral medications. In addition, he has hypertension and was placed on enalapril 10 mg bid four weeks ago. He presents today complaining of a dry hacking cough that is worse at night.

**Directions:** Your responses are confidential. There are no right or wrong answers. Please indicate on the scale how much confidence you have about doing each of the behaviors listed below.

	1	2	3	4	5	6
	very unconfident	unconfident	somewhat unconfident	somewhat confident	confident	very confident
1. Obtain accurate information from the patient using interview techniques to assess the status of the patient's asthma.					1 2 3 4 5 6	
2. Obtain accurate information from the patient using interview techniques to assess the cause of the patient's cough.					1 2 3 4 5 6	
3. Assess the status of respiratory function using observation, laboratory tests and pulmonary function tests.					1 2 3 4 5 6	
4. Assess status of respiratory tract using appropriate physical examination					1 2 3 4 5 6	
5. Assess the patient's compliance with prescribed medication regimen					1 2 3 4 5 6	
6. Distinguish between potential drug related and non-drug related patient problems in this patient.					1 2 3 4 5 6	
7. Initiate treatment for mild asthma.					1 2 3 4 5 6	
8. Adjust dosages and drugs to improve asthma control.					1 2 3 4 5 6	
9. Assess the effectiveness of drug therapy.					1 2 3 4 5 6	
10. Monitor for potential toxicities of the drug therapy.					1 2 3 4 5 6	
11. Counsel patient on appropriate use of asthma medications.					1 2 3 4 5 6	
12. Counsel the patient on appropriate use of self-monitoring techniques.					1 2 3 4 5 6	