Measures of Perceived Self-Efficacy as a Method of Evaluating Educational Outcomes:
An Introduction

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**INTRODUCTION**

Continuing education (CE) providers for the healthcare professions are under increasing pressure to demonstrate that their educational programs have a positive impact on provider behavior and ultimately on the quality of care provided to patients. However, gaining insight into the practice behavior of healthcare providers is both difficult and expensive. This article proposes that measures of perceived self-efficacy may serve as a useful proxy for healthcare provider performance in some situations.

**Discussion:** The construct of self-efficacy has been extensively researched and found to be broadly useful. This article summarizes literature supporting the use of this construct as an accurate predictor of clinician performance, discusses issues related to study design, and provides a few examples from preliminary studies conducted from this perspective.

**Conclusions:** Measures of perceived self-efficacy have been demonstrated to predict performance and can be transformed through mastery experiences. Measures of perceived self-efficacy collected before and after participation in an educational intervention designed to contain sufficient elements of mastery may be useful in assessing the impact of these interventions on the future performance of learners.

**ABSTRACT**

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particular outcome in a specific domain of functioning. Individuals will vary in their self-efficacy beliefs related to different tasks. For example, one would expect that a professional tennis player would have robust efficacy beliefs related to his ability to return the serves of another tennis player, but may have far less vigorous efficacy beliefs related to his ability to play the violin. Bandura points out that efficacy beliefs are not in and of themselves an indication of skill. However, when confronted with the same task, individuals with strong efficacy beliefs are willing to expend far more effort to achieve their goal than those with weaker efficacy beliefs. They are also more willing to attribute failure to achieve that goal to lack of effort compared with those with lower perceived self-efficacy. Finally, people with high efficacy beliefs display more resiliency in managing their anxiety related to task performance.

Bandura proposes several ways of transforming an individual’s efficacy beliefs, including social modeling (observing others succeeding through sustained effort) and social persuasion (being persuaded by others that one has the ability to succeed). An individual’s interpretation of his or her emotional state also influences efficacy beliefs. Individuals often consider tension or anxiety when performing a task an indication of their inability to execute the task properly (Table 1).

The most important influence on self-efficacy beliefs is what Bandura refers to as a mastery experience. Mastery experiences give individuals the information and skills necessary to attain a specific goal and provide them with a realistic assessment of the effort required to perform a specific task. Mastery experiences also provide the individual with enough experience to persevere when faced with difficulties as well as to manage anxiety [3].

Many CE interventions contain adequate elements to transform the efficacy beliefs of participants related to a clinical skill. For example, a general internist who lacks the confidence to manage patients with advanced cardiovascular disease may enroll in a weekend course on cardiovascular disease. During the course, she will receive valuable information concerning the management of patients with cardiovascular disease and gain practical experience in applying the information through case discussion and practice exercises (mastery experiences). She may interact with other general internists who are more confident in managing this type of patient (social influence) and may receive positive encouragement from an instructor (social persuasion) that she will master the skill. She will return to practice with new information and resources and new beliefs about her ability to successfully manage her cardiovascular patients. Although one weekend may not be enough time for her to entirely consolidate the skill set necessary to manage these patients, her transformed efficacy beliefs will have a direct causal relationship with her subsequent behaviors: she will attempt to manage patients that she would have previously referred to a specialist. She will also be far more resilient when faced with difficulty.

**Table 1. Factors Influencing Self-Efficacy Beliefs [2]**

<table>
<thead>
<tr>
<th>Source of Influence</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Social Modeling</td>
<td>Individuals observe others whom they identify as being like themselves succeeding through sustained effort and form the belief that they have the capacity to achieve similar success</td>
</tr>
<tr>
<td>Social Persuasion</td>
<td>Others convey their confidence that the individual can be successful and avoid placing that individual in situations where he or she might fail before experiencing a degree of success</td>
</tr>
<tr>
<td>Mastery Experiences</td>
<td>Experiences that convey a realistic view of what is required for success and practical experience with overcoming obstacles and managing potential failures</td>
</tr>
<tr>
<td>Physical and Emotional States</td>
<td>Individuals often interpret tension and anxiety as indications that they are not capable of performing a task</td>
</tr>
</tbody>
</table>

**WHAT DOES THE LITERATURE SAY?**

The role of perceived self-efficacy has been investigated extensively over a wide range of human functioning and has proven to be broadly useful [4-12]. Specific results relevant to CME include the consistent finding that measures of self-efficacy accurately predict student academic performance [9]. A meta-analysis has also demonstrated that self-efficacy reliably predicts work performance in a variety of settings [12]. Finally, in a study with student physician assistants, measures of self-efficacy proved to accurately predict both academic and clinical performance [13].

If measurement of perceived self-efficacy predicts actual performance, and CE includes many of the factors that can transform self-efficacy beliefs, then measurement of perceived self-efficacy might serve as a useful tool for evaluating CE outcomes. Toward that end, it is helpful to discuss some of the practical implications of using self-efficacy to evaluate educational outcomes and relate some preliminary explorations of the technique.
Practical Considerations

The first important consideration involves selecting an appropriate CE intervention for using the self-efficacy model of outcomes evaluation. It is important to determine if the intervention is designed to teach or facilitate the acquisition of a new clinical skill or simply to disseminate information. Only the former would be appropriate for a self-efficacy measurement. Also, a measure of perceived self-efficacy is appropriate only when an educational intervention provides the learner with sufficient elements of mastery experience, social modeling, or social persuasion to affect the individual’s perception of self-efficacy relative to the new skill.

Measures of self-efficacy should be collected before and after an educational intervention, and the tasks measured should be relevant to the course material. Ideally, the provider would link a specific learner’s pre- and post-test results. To guard against bias in the responses, learners should respond privately. Their pre- and posttest results may be matched through the use of a code that protects the confidentiality of the individual respondents. In less rigorous settings, useful data may be obtained without matching specific pre- and posttest results, as long as the sample is large enough. Providers should also consider additional follow-up surveys at a later date to assess whether or not healthcare providers have incorporated the skill into their practice.

Regarding the construction of scales to measure self-efficacy, Bandura has provided a useful guide that includes many examples [14]. A survey or test item is presented as an affirmative statement, to which respondents reply by assessing their confidence in performing the stated task according to a numerical scale. The scale recommended by Bandura ranges from 0 (cannot do at all) to 100 (highly certain can do) including a midpoint (moderately certain can do), but scales can be reduced to a range from 0 to 10 for convenience. Alternately, an investigation by Pajares and colleagues compared more conventional 6-point Likert scales with 0 to 100 scales and found the responses to be roughly equivalent [15].

When constructing the items, one should consider the domains of function that are to be explored, ensuring that items address efficacy beliefs relevant to those domains. A domain of function refers to a set of related and sometimes dependent skills. An individual’s assessment of her ability to accurately measure blood pressure may not be relevant to her ability to make appropriate treatment decisions for patients with different presentations of hypertension or who have other comorbid conditions. While the ability to obtain the blood pressure value is required before one can acquire more advanced skills such as interpreting the blood pressure data or making treatment decisions, these complex tasks represent separate and distinct tasks within a single domain.

It is also important to include enough items related to a given domain of function to adequately explore the efficacy beliefs related to that domain. Individuals differ in their ability to perform under certain conditions, such as time constraints or a stressful situation. To the extent that it is important to the domain of function, items should reflect gradations of challenge. Figure 1 shows an example of a self-efficacy scale, with 3 items of increasing level of challenge.

![Figure 1. Example of a self-efficacy scale with items of progressive challenge in one domain, the use of spirometry, a diagnostic test measuring lung function.](image)

![Figure 2. Data collected before and after a 2-hour COPD symposium, presented in a 1-5 Likert scale. The percentages at the right indicate the increase in confidence from the prior-to-meeting text to the follow-up survey.](image)
PRELIMINARY EXPLORATIONS

My colleagues and I have performed several pilot studies using self-efficacy as an evaluation measure, with interesting results. These preliminary data have resulted in considerable refinement of our research designs. Figure 2 shows data collected before and after participation in a 2-hour activity addressing the management of patients with chronic obstructive pulmonary disease (COPD). In addition, we collected data approximately 6 to 8 weeks after the activity. The example suffers from imprecision in the framing of the items and in the construction of the scales. However, despite these limitations we were able to measure immediate gains. The long-term follow-up data were limited by low numbers of respondents and showed a modest drop-off after 6 to 8 weeks. Although the low numbers may not allow for strong conclusions, they are generally consistent with what we know about the outcomes of low-intensity interventions.

Figure 3 shows data collected before and after a 4.5-hour case-based, interactive activity also devoted to the diagnosis and management of COPD. This CE intervention was better suited to a self-efficacy outcomes measure because the interactive format provided elements of social modeling and social influence, and the case study format provided a greater degree of mastery of the use of the information in a meaningful context. Furthermore, we paid closer attention to the construction of the items and the scales and subjected the data to more rigorous analysis. We were able to measure statistically significant changes in perceived self-efficacy related to specific, clinically relevant tasks. We have since conducted several more rigorously designed studies and look forward to sharing these data with the CE community in the near future.

Table 2. Levels of Educational Outcome*

<table>
<thead>
<tr>
<th>Level</th>
<th>Outcome</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participation</td>
<td>Number of target audience members who participated</td>
</tr>
<tr>
<td>2</td>
<td>Satisfaction</td>
<td>Degree to which the participant’s expectations were met</td>
</tr>
<tr>
<td>3</td>
<td>Learning</td>
<td>Changes in knowledge, skill, or attitude</td>
</tr>
<tr>
<td>4</td>
<td>Performance</td>
<td>Changes in practice behavior that resulted from learning</td>
</tr>
<tr>
<td>5</td>
<td>Patient Health</td>
<td>Changes in patient health status that result from changes in practice behavior</td>
</tr>
<tr>
<td>6</td>
<td>Population Health</td>
<td>Changes in the health status of a population that result from changes in practice behavior</td>
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</table>


CONCLUSIONS

Because of concerns about the cost and quality of healthcare [16-26], providers are under pressure to demonstrate the effectiveness of CE for physicians and other healthcare professionals in improving patient care. Increasingly, providers, grantors of funds, and the public are looking to healthcare professional performance as a primary measure of the value of educational investments (Table 2). The cost and range of application of traditional measures of physician performance, such as chart reviews and standardization of patient interaction, have led health science researchers to look for convenient and valid proxies for physician performance.

Measures of perceived self-efficacy have been demonstrated to predict performance accurately, and mastery experiences, such as those provided by CE activities, have the ability to considerably transform efficacy beliefs. Therefore, measures of perceived self-efficacy may be very useful in assessing the impact of selected educational interventions. Although the application of this method requires some skill, this method has advantages over other methods in terms of less expense and ease of application.

Preliminary studies using self-efficacy as an outcome measurement have yielded interesting results, along with information helpful in refining study design. The results of subsequent, more rigorous studies will be available soon. Overall, the findings are encouraging, and self-efficacy measures may soon be a useful tool for CE providers to demonstrate the effectiveness of CE interventions for influencing clinician behavior.

ACKNOWLEDGMENTS

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REFERENCES