MEASURING TEACHER EFFICACY FOR USE IN ECONOMIC EDUCATION

Robert F. Hodgin, University of Houston-Clear Lake
Roberto Marchesini, University of Houston-Clear Lake

ABSTRACT

This paper introduces an instrument to assess a newly recognized and important dimension of teacher effectiveness in economic education-personal economics teaching self-efficacy. The psychological theory-based construct measures the extent to which a teacher believes he or she has the capacity to affect student performance. The prime determinant of self-efficacy is content mastery. The national emphasis on K-12 economic education with standards adopted by many states mandate teacher training interventions, often by economic education councils and centers. The instrument can serve as a training assessment device and may serve as an explanatory variable in economic learning model research.

The instrument's construct validity has been established for use in science education and other fields. The authors translated prior developed and tested personal teaching efficacy items from a larger pool. Texas public school teacher data were used to conduct factor analysis showing that the instrument loaded on only one factor-- labeled personal economics teaching self-efficacy. Correlation analysis suggests that the instrument is sensitive to content mastery levels and does indeed measure a teacher's own sense of their economics teaching proficiency. The authors call for additional research to test the instrument's robustness across teacher groups, its training assessment sensitivity and its place in formal economic learning models.

INTRODUCTION

This paper describes the development and prospective applications of an instrument measuring a relatively new aspect of teacher capability-personal teacher self-efficacy. This psychological construct is defined as the extent to which the teacher believes he or she has the capacity to affect student performance. Prior theoretical and empirical work has extended researcher understanding of the construct to a relatively mature level. The instrument presented here is designed for

use both as a professional educator training assessment device and for possible use as a variable in economic education learning models that seek to explain the teaching-learning process. Understanding, then enhancing, the teaching-learning process in economic education poses challenges similar to those in disciplines like mathematics, chemistry and foreign languages that require abstract thinking and reflective learning. Experimental or quasi-experimental assessment of reasons for performance variance holds the interest of many economic education researchers. Characteristics of persons on both sides of the classroom, the means and modes of the teaching process and the influence of environmental factors combine to produce performance results that remain difficult to fully quantify. Should this new dimension prove valuable in replicated studies, perhaps by way of providing significant explanatory power in economic learning models, teacher-training interventions could gain a new meter to measure their impact.

The background section frames the institutional environment in economic education. A short overview of the national economic education infrastructure coupled with economic teaching requirements imposed on Texas teachers show why developing an instrument to measure personal teaching self-efficacy could be beneficial to the discipline. Discussion on self-efficacy theory reviews the current state of thought, known self-efficacy determinants and the factors that limit change in self-efficacy.

The section on instrument construction notes the original source of the items from prior teacher self-efficacy research in science education and the compilation of selected items into the instrument assessed for this paper. The instrument's test-bed venue was the 2002 state conference in San Antonio, Texas, for the Texas Council on Economic Education. Some 228 Texas teachers voluntarily and anonymously completed the instrument for evaluation. Factor analysis revealed only one factor loading of significance that the authors labeled personal economic teacher self-efficacy. Correlation analyses of the efficacy instrument scores to selected variables, such as level of economic preparation, further support the validity of the instrument as presently designed. The authors call for further research using the instrument to test its cross-sample stability, training intervention sensitivity and explanatory power in economic education learning models.

BACKGROUND

Beginning in the 1960s, then contemporary economic educators recognized that traditional teaching approaches in undergraduate economics too often failed to

achieve the desired knowledge comprehension or subject matter interest. A national thrust to redress those deficiencies spawned economic education research, teacher training and materials development at all educational levels throughout the U.S.

In the late 1970s, a roughly contemporaneous research thrust by psychological theorists Rotter and Bandura (Rotter, 1996; Bandura, 1977) began to explore a new aspect of a teacher's own perceived influence on students--whether control of teaching reinforcement lies within them or in the environment. Theorists labeled this new psychological construct self-efficacy. The idea was that teachers with high self-efficacy believed they could strongly influence student achievement and motivation, while those with low self-efficacy perceived the environment to have the greater influence.

Research applications using carefully constructed assessment instruments to test the line of thinking in science education and selected other teaching fields have produced meaningful results over the past twenty years (Riggs and Enochs, 1990). Both the theory and practical testing of the teacher self-efficacy concept have matured to a point where its application to economic education deserves attention. At the least, similar instruments might be beneficially used as a tool to assess K-12 teacher training interventions. At the most, a valid and reliable self-efficacy instrument scale might find its place as a meaningful explanatory variable in economic education learning models.

Teacher Education in Economics

The umbrella economic education institution is the National Council on Economic Education (NCEE). Founded in 1949, the NCEE as a nonprofit partnership of leaders in education, business and labor devotes its efforts to training teachers who then help K-12 school children learn about basic economic concepts. Each of the 50 states has a council on economic education that works through more than 260 university-based centers to deliver economics training services and materials to 120,000 public and private school teachers who then teach basic economics to over 7 million students. The NCEE continues to produce and distribute many excellent economic education materials through its nation-wide network.

Texas is one of several states to legislate educational achievement standards in the K-12 curriculum, including the infusion of economics. The Texas Essential Knowledge and Skills (TEKS) statutory requirements contain explicit economics content by grade level. From a recent survey by the Texas Council on Economic

Education, by sample estimation, half the 266,000 Texas teachers have none to minimal training in the subject of economics. They must prepare 4 million students each year to earn minimum scores on state-level tests used for school-level assessment and teacher evaluation. As a high school graduation requirement, all Texas students must take and pass a one-semester economics course. Beginning 2003, a revised middle school grades test, the Texas Assessment of Knowledge and Skills, (TAKS) will contain social studies items, including economics.

Even if teacher training in economics were broad-based, of consistently high quality and the teachers fully receptive, it is unrealistic to expect any teacher exposed to a few hours of economic concepts then handed a book of grade-appropriate lesson plans to immediately feel competent with the content in front of their students. Sufficient anecdotal information and research-based experiments show that economic workshop training can produce results. However, the extension of those efforts to effectively disseminate economic ideas through teacher training is far from complete.

From studies at the high school level, "The evidence indicates that when attempts are made to infuse economics into other subjects, not much economics gets learned." (Walstad, 2001). Citing evidence from other studies, Walstad further states that increased knowledge of economics was associated with improved teaching of economics. He suggests that additional training, perhaps as many as 6 formal university courses by teachers, would best achieve the student's economic education needs. In other words, mastery of the subject is instrumental to successful economics teaching in the high school (Walstad, 2001).

Formal learning assessment model specification across controlled studies on teacher training varies widely but the common theme is that the models try to capture an intervention's effect on a group of students or teachers, then allocates the effect to a set of variables germane to the methodology and selected demographic measures. A common research design is the pre-post assessment approach-often using an instrument available from the NCEE like the Test of Economic Knowledge, the Test of Economic Literacy and the Test of Understanding in College Economics-to measure the impact of a teaching or leaning intervention either in an experimental or quasi-experimental setting. Research variables of interest might include measures of experience, aptitude, prior economics training, attitude, and student learning styles. Into the mix of variables, researchers often introduce some form of teaching innovation such as computer-based instruction. This article introduces practitioners and researchers to a new variable, personal teacher self-efficacy, as a response measure to teacher training interventions. The next

section provides an overview of psychological efficacy theory on which the construct is based and the approach taken to design this particular instrument for economic education.

Teacher Self-efficacy Theory

Theorists who have studied personal teacher self-efficacy, a type of efficacy falling under social cognitive theory, define it as "the extent to which the teacher believes he or she has the capacity to affect student performance" (Tschannen, 1998). Over the past thirty years, efficacy theory has evolved sufficiently for researchers to recognize its major determinants, conceptual divisions and limits.

Education theorists distinguish between general teaching efficacy-the ability to control or influence external factors, and personal teaching efficacy-the ability to overcome obstacles to student learning, the focus of the instrument developed for this article. One set of researchers (Giskey and Passaro, 1994) pairs two useful dimensions, personal teaching efficacy versus general teaching efficacy with internal versus external locus of control. A key aspect of this psychological construct is that self-efficacy is one of the few concepts that can discern competence-the ability to execute effective actions, from the idea of contingency-the actions will achieve desired outcomes. Efficacy is a self-perception of competence, not a measure of the level of competence.

Most efficacy theorists appear to accept the following four efficacy determinant parameters: a) mastery experiences, b) physiological and emotional states, c) vicarious experiences and d) social persuasion. Quite importantly, theorists broadly agree that mastery experiences are the most powerful source of efficacy. In teaching applications, the perception on the part of the teacher that a performance has been successful also raises efficacy beliefs. Finally, theorists' opinions generally agree that personal teaching efficacy relates to ones own feelings of competence.

Business psychology theorists Gist and Mitchell discuss the bounds to self-efficacy enhancement-the change in self-efficacy-to be limited by the following factors: a) the initial level of self-efficacy and collectively the b) variability, locus and controllability of the determinants of self-efficacy (Gist and Mitchell, 1992). So theoretical development and empirical testing to date support that personal self-efficacy has an operational definition with four identified determinants, of which content mastery is paramount, and recognizes bounds limiting change in the efficacy level.

INSTRUMENT CONSTRUCTION AND TESTING

A team of education researchers constructed a science teaching efficacy instrument for pre-service elementary teachers, showing promise in forming a base of items transferable to economics (Riggs and Enochs, 1990). Their 25-item instrument, with 13 items aimed at personal science teaching efficacy was reviewed by the authors. Twelve of the 13 statements were borrowed and carefully re-worded to relate to "economics education" distinct from "science education."

Our new instrument's 12 personal teaching efficacy statements, six positively worded and six negatively worded statements, incorporated the same standard five point Likert scale from 1 (strongly agree) to 5(strongly disagree) as the Riggs and Enochs survey instrument. In addition, the survey contains items asking for the respondent's years in education, and how they rated themselves in economics preparation, in economics teaching proficiency and in general teaching proficiency. Respondent feedback was then transferred into a data file for factor and correlation analyses. This 17-item instrument appears in the appendix.

At its 2002 annual conference in San Antonio, Texas, the Texas Council on Economic Education (TCEE), asked that the attending K-12 teachers voluntarily and anonymously complete the teaching efficacy survey prior to leaving a plenary session. Of the 312 teachers, representing 182 different Texas schools, attending the conference, 228 completed the survey. The six negatively worded statement responses were re-scaled by subtracting their scale value from the number 6 to generate a scale with a common logical orientation. The lower the score, the more positive the sense of self-efficacy, the higher the score, the more negative or lower, the sense of self-efficacy. The theoretical minimum score would be 12, very high self-efficacy and the theoretical maximum score would be 60, very low self-efficacy.

STATISTICAL RESULTS AND INTERPRETATION

Factor Analysis

Like the Riggs and Enoch approach (Riggs and Enochs, 1990), we incorporated factor analysis to assess the 12-items addressing efficacy aspects. Factor analysis is a commonly employed set of statistical processes to find internal links among large numbers of variables by statistically seeking their common relationships. The principal components method, the one applied here, provides a unique solution by looking at the total variance among the variables, here the 12

survey items. Factor analysis determines an eigenvalue, the portion of all factor's variance accounted for by each factor. As a rule of thumb, factors of interest usually possess eigenvalues greater than 1. All factors, by statistical design, are orthogonal and are uncorrelated with the other factors.

The factor analysis table of most interest in this research is presented below as Table 1. Factor 1 possesses the only eigenvalue greater than one and explains just over 50 percent of the total variance of the 12 factors. This single factor has a communality of 50 percent that is shared with the remaining factors. We could label this factor "personal economic teaching self-efficacy."

Table 1 Factor Analysis Results

Factor	1	2	3	4	5	6
Eigenvalue	6.0966	0.8344	0.7722	0.7284	0.6673	0.5535
Cumulative Variance	0.5081	0.5776	0.6419	0.7026	0.7582	0.8044
Factor	7	8	9	10	11	12
Eigenvalue	0.5213	0.4387	0.3951	0.3644	0.3349	0.2928
Cumulative Variance	0.8478	0.8844	0.9173	0.9477	0.9756	1.0000

Correlation Analysis

The efficacy instrument score, still with the negatively worded items' Likert scale reversed, was correlated with three items in the survey, as shown in Table 2. The efficacy instrument's actual score range was 12, highest possible personal teacher efficacy, to 57, one item value away from the lowest possible personal teacher efficacy. The sample showed an average efficacy score of 30.72 and standard deviation of 9.22.

The efficacy score correlated highly (.82) with reported "economics teaching proficiency." A result one would desire and expect, if the instrument truly captured the economic teaching efficacy dimension. The correlation with "general teaching proficiency" was a very low .06, which further confirms that the instrument is picking up that dimension of personal teaching self-efficacy dealing with the teaching of economics. The correlation of .66 with "economics preparation" appears consistent with the logic that mastery is a significant determinant of self-efficacy and the teachers self-report that half the respondents felt their economics preparation to be adequate or less. On item 27, the average response was 3.26, indicating that

just over half rated their "economics preparation" as "adequate, good or strong" with the remainder rating their subject matter preparation "none, minimal or adequate."

The correlation results provide preliminary evidence that the efficacy instrument designed for K-12 Texas teachers who must teach some economics is consistent with the psychological theory on self-efficacy. In particular, reported higher levels of economics teaching proficiency leads to higher efficacy (lower efficacy instrument scale values), modestly correlated economics preparation to efficacy score supports the link between mastery and efficacy and the low correlation between general teaching proficiency and the instrument scale implies that only the economic teaching dimension is reflected in the responses.

Table 2 Efficacy Score Correlations

Efficacy Score with:	Item 27 -Economics preparation	Item 28 -Economics teaching proficiency	Item 29 -General teaching proficiency
Correlation	.66	.82	.06

Descriptive results by item are shown in Table 3. Nearly half the respondents were high school economics teachers and eleven percent high school non-economics teachers. Another eleven percent came from middle schools and twenty-eight percent represented elementary grades.

Table 3 Non-efficacy Item Descriptive Results

Item Number	Average	Standard Deviation	Minimum	Maximum
25-Years taught	13.49	9.23	1	40
27-Economics preparation	3.26	1.16	1	5
28-Economics teaching proficiency	2.91	1.17	1	5
29-General teaching proficiency	1.54	0.73	1	5
	Elementary	Middle School	High School -Non-econ	High School -Econ
26-Grade Taught	65 (28.5%)	25 (11.0%)	26 (11.4%)	112 (49.1%)

FUTURE RESEARCH

The personal economic teaching efficacy instrument is offered to those performing training and conducting research in economic education. Application of this research idea in economic education is new. Work in at least three areas must be conducted with findings generally supporting those revealed here, to have confidence that the instrument is valid and useful in the field.

First, the instrument's sensitivity across groups should be tested. A one-time test using Texas teachers that provides positive indications of its validity is a necessary but not sufficient condition. Next, the instrument must be tested for training intervention sensitivity in an experimental or quasi-experimental design. Settings as rudimentary as a teacher training workshop focused on some aspect of economic content with a pre-post assessment structure could provide suggestive results, if self-efficacy rose with the level of economic training. Finally, in more controlled experimental environments, the instrument's statistical robustness as an explanatory variable among others in economic learning models must be explored. Bona fide results could provide professionals the necessary confidence that the instrument measures this new content mastery-sensitive dimension of teacher influence.

SUMMARY AND CONCLUSIONS

The authors introduce and describe an instrument to measure a relatively new construct, personal teacher self-efficacy for use in economic education. Self-efficacy is defined as the extent to which the teacher believes he or she has the capacity to affect student performance. Borrowing items from a prior developed instrument for use in science education, a new 12-item efficacy instrument worded for economic education was formed with six positively worded and six negatively worded efficacy-based rating statements using a 5-point Likert scale, plus five informational items. At a statewide conference in 2002, 228 K-12 Texas teachers, who were statutorily mandated to teach aspects of economics in their classes, anonymously and voluntarily completed the instrument.

Factor analysis on the efficacy score, after reversing the scale on the negatively worded items, revealed a single factor labeled "personal economic teaching self-efficacy" that absorbed 50 percent of the total 12-item variance. Correlation analysis revealed a .82 correlation with self-rated "economics teaching proficiency" and a .66 correlation with self-reported "economics preparation." The

correlation with "general teaching proficiency" was a low .06. The correlation results suggest that this newly designed efficacy instrument does reflect personal economics teaching efficacy, but not general teaching efficacy, and that it is sensitive to the level of content mastery.

The authors suggest that the instrument be tested further in three arenas. First, the instrument's sensitivity across groups, then the instrument's training intervention sensitivity in an experimental or quasi-experimental design and, finally, in controlled experimental environments to test the robustness of the instrument as a new explanatory variable in economic learning models.

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APPENDIX

Personal Economics Teaching Efficacy Instrument

Instructions: Indicate your response to each item according to the scale below.
Do not give your name.

Scale: SA = strongly agree; A = agree; U = neutral or undecided;
D = disagree; SD = strongly disagree

1. I am continually finding better ways to teach economics.
2. Even when I try very hard, I don't teach economics as well as I do most subjects.
3. I know the steps necessary to teach economic concepts effectively.
4. I generally teach economics ineffectively.
5. I understand economics well enough to be effective teaching the subject at my assigned grade level.
6. I find it difficult to explain to students how economics works.
7. I am typically able to answer students' economics questions.
8. I wonder if I have the necessary training to teach economics.
9. Given a choice, I would not invite the principal to evaluate my economics teaching.
10. When a student has difficulty understanding an economic concept, I am usually at a loss about how to help the student better understand.
11. When teaching economics, I usually welcome student questions.

12. I don't know what to do to turn students on to economics.
13. The number of years I have taught is: years.
14. I now teach: 1) elementary 2) middle 3) senior high, NOT economics 4) senior high economics.
15. I rate my formal economics preparation as: 1) none 2) minimal 3) adequate 4) good 5) strong.
16. I rate my economics teaching proficiency as: 1) weak 2) fair 3) adequate 4) good 5) strong.
17. I rate my general teaching proficiency as: 1) weak 2) fair 3) adequate 4) good 5) strong.