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ABSTRACT

This study was designed to develop an instrument that would measure preservice teachers' belief efficacy in teaching environmental education (EE). This belief efficacy includes a person's perception of ability to perform the behavior (self-efficacy) and a person's expectation that a specific behavior will result in desirable outcomes (outcome efficacy). It was hypothesized that preservice teachers (the respondents in this preliminary study) would display lack of confidence in their own abilities to teach EE concepts (negative self-efficacy beliefs), but would show confidence that student learning in EE can be improved by effective teaching (positive outcome expectancy beliefs). The Environmental Education Efficacy Belief Instrument (EEEBI) containing self-efficacy belief and outcome expectancy scales was developed and administered to 40 preservice elementary teachers enrolled in a science/mathematics methods course. Results confirm the hypothesis as stated and support the need to address training in EE teaching among preservice teachers by either integrating environmental themes across disciplines or through a separate course. A copy of the EEEBI is included and four tables display the results. (Contains 13 references.) (LL)

PRESERVICE ELEMENTARY TEACHERS' PERCEIVED EFFICACY IN TEACHING ENVIRONMENTAL EDUCATION: A PRELIMINARY STUDY*

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Abstract

This study was designed to assess preservice teachers' belief efficacy in teaching environmental education (EE). It was hypothesized that preservice teachers will display lack of confidence in their own teaching abilities to teach EE concepts (negative self-efficacy beliefs), but will show confidence that students learning in EE can be improved by effective teaching (positive outcome expectancy beliefs). An Environmental Education Efficacy Belief Instrument was developed, containing self- efficacy belief scale and outcome expectancy scale. Forty pre-service teachers participated in the study. Results confirmed the hypothesis as stated. Implications for EE were given.

Introduction

The need to address the goals of environmental education (EE) in curriculum and in actual instruction is pretty well established (Hungerford & Volk, 1990; Hines et al., 1986/87; Marcinkowski, 1989; Sia et al., 1985/86; Volk et al., 1984). Yet a

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cursory review of different teacher education programs indicates inadequate support for preparing future practitioners to teach EE in schools. This lack of support is either shown through non-offering of an EE course or failure to integrate EE concepts in the teacher education required and elective courses. Yet these institutions are operationg on state-mandated realities for a streamlined curriculum and a well-integrated program that addresses environmental themes (California Framework, 1990).

Realizing the inadequacy of EE support in teacher education curriculum coupled by state-mandated realities, are we adequately preparing our student teachers to teach EE in schools? How do these preservice teachers perceive their efficacy in teaching EE to their respective students?

Purpose of the Study

This study was designed to develop an instrument that will measure preservice teachers' belief efficacy in teaching environmental education. Based on Bandura's (1977) construct, this belief efficacy includes a person's perception of ability to perform the behavior (self -efficacy) and a person's expectation that a specific behavior will result in desirable outcomes (outcome expectancy). Gibson and Dembo (1984), in applying Bandura's theory of self-efficacy to the study of teachers predict that ..."teachers who believe student learning can be influenced by effective teaching (outcome expectancy beliefs) and who also have confidence in their own teaching abilities (self-efficacy beliefs) should persist longer, provide a greater

academic focus in the classroom, and exhibit different types of feedback than teachers who have lower expectations concerning their ability to influence student learning" (p. 170). From the writer's experience with past student teachers during the last decade, these students generally display lack of knowledge in teaching EE in schools, but they usually demonstrate willingness to help students learn EE concepts.

Hypothesis

It is, therefore, hypothesized that respondents in this preliminary study will display lack of confidence in their own teaching abilities to teach EE concepts (negative self-efficacy beliefs), but will show confidence that student learning in EE can be influenced by effective teaching (positive outcome expectancy beliefs).

Instrumentation

An Environmental Education Efficacy Belief Instrument (EEEBI) was developed patterned after the Science Teaching Efficacy Belief Instrument Form B (STEBI B) developed by Enochs and Riggs (1990) for preservice teachers. This instrument is a 5-choice, Likert type scale ranging from strongly agree to strongly disagree (Figure 1). It contains 23 statements, 13 positively-written and 10 negatively-written. This instrument contains two scales, namely, *Personal EE Teaching Efficacy Belief Scale* (self-efficacy dimension containing 13 items) and *EE Teaching Outcome Expectancy Scale* (outcome expectancy dimension containing 10 items). For their science teaching instrument

Enochs and Riggs reported a coefficient alpha of 0.90 for the self-eficacy scale and 0.75 for the outcome expectancy scale.

Content and construct validity were noted, with validity coefficients significant at 0.05 and 0.01 levels (Enochs & Riggs, 1990). Reliability and validity of the adapted EE instrument are yet to be determined, following Cronbach's alpha coefficient and factor analysis loadings.

Preliminary Study

Subjects. Data were collected from two samples of convenience: forty preservice elementary teachers taking an elementary science/ mathematics methods course (Table 1). The first sample was taken in Spring 1992 (N=21). An additional sample was taken in Fall 1992 (N=19). A t-test revealed no significant differences between the two samples and thus were assumed to be equivalent.

Methodology. For this initial study, percentages were generated along three collapsed categories: those who are in agreement, uncertain or neutral, and in disagreement. Percentages greater than fifty were considered meaningful enough to warrant consideration. Where 25% more of the responses fell under uncertain or neutral range, this alerted the writer that the respondents were unable to take a stand and was, therefore, viewed as a matter of concern.

Results. Table 2 contains the percentages that fell into three collapsed categories.

The belief self-efficacy scale (*Sescale*) indicates that the respondents have positive belief efficacy in only three items (Table 3a). First, 95% of the respondents will continually find better ways to take EE (Item 2). Second, 80% indicate that with effort, they will try to teach EE as well as they will most subjects (Item 3). Third, 60% indicates that given the chance, they will invite the principal to evaluate their EE teaching (Item 20).

As hypothesized, the respondents show negative belief self-efficacy in the remaining items (Table 3b). Many of the respondents also are uncertain about their self-efficacy in several items. A total of 93% indicate lack of knowledge or uncertain of the steps to teach EE concepts effectively. At least 73% indicate that they lack the necessary skills to teach EE (18% uncertain). Some 50% are in disagreement that they welcome students EE questions (25% uncertain) and that they have the ability to answer students' EE questions (18% uncertain).

In brief, the respondents express that they have inadequate knowledge, training, and skill in EE to be effective in teaching it, and in welcoming and responding questions, and in turning students on to the subject. The hypothesis that the respondents have negative self-efficcacy belief is, therefore, accepted.

On the other hand, the respondents indicate positive outcome expectancy (Oescale) on all the ten items of the scale,

as hypothesized (Table 4). Some 90% agree that a teacher's good teaching can overcome students' inadequate EE background and 78% disagree that increased effort in EE teaching produces little change in some students' EE achievement. Their positive outcome expectancy belief ranges from 65% to 75% on the rest of the items in the scale. Those who are uncertain range from 10% to 30%.

In brief, the above results indicate that the respondents believe that good teaching and students' achievement in EE concepts are directly related. That is, the respondents believe that they can increase students' achievement with effective teaching. The hypothesis that the respondents have positive outcome expectancy belief, is therefore, accepted.

Discussion. The adapted instrument was able to unravel preservice teachers' belief efficacy in teaching EE. They are found to be less efficacious in ten out of 13 items in the self-efficacy scale. They acknowledge their lack of knowledge and skills in teaching EE concepts effectively. This lack of knowledge and skills may further explain why they feel less able to answer students' EE questions or welcome EE questions for that matter. Despite this negative belief in self-efficacy in teaching EE due to insufficient knowledge and skills of EE teaching, respondents reveal that they will continually find beter ways to teach EE, that they will try to teach EE as well as they will most subjects, and even will invite the principal to evaluate their EE teaching.

A very positive aspect of the preliminary study strongly indicates respondents' positive outcome expectancy belief. With

good teaching and effort, they agree that students' indadequate EE background can be overcome and increase their achievement in EE concepts.

Implications and Recommendations.

The negative personal self-efficacy belief and the positive outcome expectancy belief perceived by the preservice teachers under study strongly support the need for increasing their knowledge and skills in EE teaching. This combined negative and positive belief is not at all contradictory. They realize that they lack sufficient knowledge and skill in EE teaching (hence, negative self-efficacy) and yet they believe that with good teaching, students' achievement of EE concepts will increase (hence, positive outcome expectancy). This apparent belief efficacy mixture underscores the preservice teachers' receptiveness in EE teaching intervention. It implies their readiness to receive training in EE teaching. This training could be done through infusion in the methods courses or through having a separate course in EE. Addressing the concern for streamlining the teacher education curriculum as well as integrating environmental themes across disciplines, the infusion approach might have the upper hand. How to teach environmental education could be integrated in all methods courses while environmental science concepts could be integrated in the preservice teachers' science requirements for liberal education.

Summary

The adapted EEEBI shows promise in assessing preservice teachers' belief efficacy in teaching EE. Plans are underway to use Cronbach's alpha coefficient and factor analysis to further refine the instrument. Using the instrument to assess EE belief efficacy with other preservice teachers who are just entering the teacher education program and in other methods courses may shed more information regarding the generalizability of the instrument. The need to address training in EE teaching among preservice teachers is supported by this preliminary study.

Figure 1. EE BELIEF EFFICACY INSTRUMENT

DATE: _____ ID #: _____

SEX: _____ TAUGHT EE BEFORE? _____ HOW LONG?: _____

Please indicate the degree to which you agree or disagree with each statement below by circling the appropriate letters to the right of each statement.

SA = STRONGLY AGREE
A = AGREE
UN = UNCERTAIN
D = DISAGREE
SD = STRONGLY DISAGREE

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1. When a student does better than usual in environmental education (EE), it is often because the teacher exerted extra effort.	SA	A	UN	D	SD
2. I will continually find better ways to teach EE.	SA	A	UN	D	SD
3. Even if I try very hard, I will not teach EE as well as I will most subjects.	SA	A	UN	D	SD

4. When the EE grades of students improve, it is often due to their teacher having found a more effective teaching approach.	SA	A	UN	D	SD
5. I know the steps necessary to teach EE concepts effectively.	SA	A	UN	D	SD
6. I will not be very effective in monitoring activities.	SA	A	UN	D	SD
7. If students are underachieving in EE concepts, it is most likely due to ineffective EE teaching.	SA	A	UN	D	SD
8. I will generally teach EE ineffectively.	SA	A	UN	D	SD
9. The inadequacy of a student's EE background can be overcome by good teaching.	SA	A	UN	D	SD
10. The low achievement of some students cannot be blamed on their teachers.	SA	A	UN	D	SD
11. When a low-achieving child progresses in EE, it is usually due to extra attention given by the teacher.	SA	A	UN	D	SD
12. I understand EE concepts well enough to to be effective in teaching EE.	SA	A	UN	D	SD
13. Increased effort in EE teaching produces little change in some students' EE achievement.	SA	A	UN	D	SD
14. The teacher is generally responsible for the achievement of students in EE.	SA	A	UN	D	SD
15. Students' achievement in EE is directly related to their teacher's effectiveness in EE teaching.	SA	A	UN	D	SD
16. If parents comment that their child is showing more interest in EE at school, it is probably due to the performance of	SA	A	UN	D	SD

the child's teacher.

17. I will find it dificult to explain to students why science experiments involving environmental topics work.	SA A UN D SD
18. I will typically be able to answer students' EE questions.	SA A UN D SD
19. I wonder if I will have the necessary skills to teach EE.	SA A UN D SD
20. Given a choice, I will not invite the principal to evaluate my EE teaching.	SA A UN D SD
21. When a student has difficulty understanding an EE concept, I will usually be at a loss as to how to help the student understand it better.	SA A UN D SD
22. When teaching EE, I will usually welcome student questions.	SA A UN D SD
23. I do not know what to do to turn students on to EE.	SA A UN D SD

Table 1. Demographics of Samples

	Male	Female	Total
Spring 1992	0	21	21
Fall 1992	2	17	19
Total	2	38	

Table 2. Percentages* of Respondents Along Three Collapsed Categories of the Environmental Education Efficacy Belief Instrument (EEEBI) (N=40)

Measure	Pos-Neg	Agree	Neutral	Disagree
Personal EE TEaching Efficacy Belief Scale	Item 2	P	95	5	0
	Item 3	N	10	10	80
	Item 5	P	2	43	55
	Item 6	N	12	63	25
	Item 8	N	0	50	50
	Item 12	P	12	15	73
	Item 17	N	63	25	12
	Item 18	P	28	22	50
	Item 19	N	70	18	12
	Item 20	N	15	25	60
EE Teaching Outcome Expectancy Scale	Item 1	P	72	20	8
	Item 4	P	75	10	15
	Item 7	P	75	12	12
	Item 9	P	90	10	0
	Item 10	N	10	38	32
	Item 11	P	65	30	5
	Item 13	N	10	12	78
	Item 14	P	65	25	10
	Item 15	P	68	25	7
	Item 16	P	68	27	5

*Rounding off may result closer or equal to 100%

Table 3a. Items In the EEEBI Where Respondents Show Positive Personal EE Teaching Belief Efficacy (N=40)

Measure	Description	Percentage
Item 2	I will find better ways to teach EE.	95
Item 3	With effort, I will teach EE as well as most subjects.	80
Item 20	I will invite the principal to my EE teaching.	60

Table 3b. Items in the EEEBI Where Respondents Show Negative and Uncertain Belief Efficacy (N=40)

Measure	Description	Neg (%)	Unc (%)
Item 5	I know the steps necessary to teach EE concepts effectively.	55	43
Item 6	I will not be very effective in monitoring activities.	25	63
Item 8	I will generally teach EE effectively.	0	50
Item 12	I understand EE well enough to teach it.	73	15
Item 17	I have difficulty in explaining to students why experiments work.	63	25
Item 18	I have the ability to answer students' EE questions.	50	18
Item 19	I have the necessary skills to teach EE concepts effectively.	70	18
Item 21	I have the ability to help students understand EE concepts better.	15	50
Item 22	I welcome students' EE questions.	50	25
Item 23	I know how to turn students on to EE.	47	43

Table 4. Items in the EEEBI Where Respondents Show Positive EE Teaching Outcome Expectancy (N=4)

Measure	Description	Percentage
Item 1	Teacher's extra effort helps stuedents do better in EE.	72
Item 4	Teacher's effective teaching approach helps students improve their grades.	75
Item 7	Students' underachievement in EE is most likely due to ineffective teaching.	75
Item 9	The inadequacy of a student's EE background can be overcome by good teaching.	90
Item 11	Extra attention by teacher affects progress of a low-achieving child.	65
Item 13	Increased effort in EE teaching produces change in some students' EE achievement.	78
Item 14	The teacher is generally responsible for the achievement of students in EE.	65
Item 15	Students' achievement in EE is directly related to their teacher's effectiveness in EE teaching.	68
Item 16	If parents comment that their child is showing more interest in EE at school, it is probably due to the performance of the child's teacher.	68

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