SELF-EFFICACY, TAIWAN ELEMENTARY TEACHERS PERSPECTIVE

This paper presents the results of a case study involving Taiwanese elementary teachers who teach science at the elementary grade school level. It advocates the position that a teacher's personal science efficacy belief influences his or her science teaching outcome expectations. It promotes the position that the success Taiwan has experienced in being rated number 1 in science education (NCES 1999) is uniquely connected to teacher self-efficacy and student outcome expectations in teaching science.

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Introduction

Metamorphosis of Change

Democratic changes in Taiwan have not only brought about a shift in the way citizens view government but also in the way they view education. Moving away from an autocratic style of educational leadership and toward an egalitarian approach has paved safe communication pathways for not only parents but also educators in bringing about academic advancement and renewal. And with the enactment of the nine-year nation-wide integrated curriculum plan in 1998, the Ministry of Education (MOE) in Taiwan has encouraged teachers in Grades 1-9 toward a more innovative and creative teaching practice (MOE; Education 2003). With this goal in mind, the 3rd mandate of the nine-year nation-wide integrated curriculum plan seeks to renovate teacher education and in-service training programs.

Importance of Such Change

The attention of this study focuses upon education professionals who teach science in grades 1-6. It is during these formative years of education that students are exposed to the important elementary building blocks of mathematical and scientific concepts and processes (Riggs 1990; NSB 1999; NSF 1999). Some researchers have discovered a lack of preparatory science instruction (Appleton 1977; Appleton 1991; Roth 1992; Appleton 1995; Appleton 2003). In Australia, Appleton discovered that large numbers of primary school teachers either avoided teaching science or taught it from a "gimmicks" approach (Appleton 1991). Appleton stated that the main problem was that very few teachers practiced engaging their students as active participants in the study of science because they felt themselves intimidated by the subject matter or inept in its teaching.

Research Question and Hypothesis

If Taiwan can be counted a part of this group of countries whose teachers struggle with teaching science at the elementary level, then how has it produced students who are able to compete at a high competency level on the world science education stage (NCES 1999)? The hypothesis of this study is Taiwan elementary teachers are neither inept nor

intimidated in their teaching of science. The key to this success can be found in their personal views of their own self-efficacy and student outcome expectations.

Theoretical Framework

Self-efficacy

Within western countries, current research has discovered that teacher self-efficacy is the key toward positive student learning (Wenner 2001; Cakioglu 2003). The conceptualization of teacher efficacy has two points of origin. The first is Bandura's social cognitive theory and his construct of self-efficacy (Bandura 1977; Bandura 1997). Bandura postulates efficacy as the "belief in their [teachers] ability to have a positive effect on student learning" (Ashton 1985). The key to positively effecting student learning is the teachers' mental acceptance and conviction in his or her ability to guide and instruct.

Outcome Expectations

The second conceptualization is found in Rotter's "Locus or Control" (LOC) model (Wenner 2001; Cakioglu 2003). The LOC bipolar psychological construct theory states "an individual's beliefs about the control he or she has over his or her life, whether internal or external, has a direct result upon achievement" (Bratton-Jeffery 1997). Spicer's article "Self-belief a First Step to Success" renamed self-efficacy to academic self-belief. She said that a student's academic self-belief needed to be matched with his or her performance abilities. Without a proper match between the two, negative effects would results (Spicer 2003). The hypothesis of this study is that Taiwan elementary teacher's academic self-belief is directly tied to his or her outcome expectations (i.e. student achievement).

Method

Instrument Selection, Translation and Collection

In order to test the above hypothesis, the Elementary Teacher's Science Teaching Efficacy Belief Instrument (STEBI) was selected. The items in this instrument were science-specific and focused upon the elementary science classroom (Riggs 1990). These items also reflected the teacher's personal science efficacy belief (Sescale) and the teacher's science teaching outcome expectation (Oescale). The STEBI was translated into Chinese and submitted to two referees. It was checked for content accuracy and validity. After modifications, it was passed out to 30 science education graduate students. After they checked it for readability and content clarity, 500 copies were sent to grade school teachers teaching in the Kaohsiung City area. Respondents were asked to respond to 25 items by answering according to amount of agreement or disagreement. 280 questionnaires were satisfactorily completed and used in this study.

Results

Demographic Characteristics and Scale Score Analysis

After running t-tests and one-way Anova tests on these characteristics, the results found no significant differences with regards to Sescale or Oescale (see *Table 1*).

Table 1: Demographic Characteristics and Scale Score Analysis

Variable	*N*	%	Mean Sescale (13 items)	Mean Oescale (12 items)
Gender:				
Male	87	31.6%	37.9	33.7
Female	188	68.4%	37.2	32.7
Single grade teachers:	212	79.7%	37.4	32.9
1st	18	6.4%	36.7	32.1
2nd	12	4.3%	36.0	31.5
3rd	51	18.2%	37.4	33.6
4th	31	11.1%	36.8	33.6
5th	46	16.4%	37.8	32.9
6th	54	19.3%	37.8	33.0
Multiple grade teachers:	54	20.3%	37.7	33.0
Years Taught:				
1<	1	.4%	37.0	35.0
1 – 5	174	63.5%	37.2	33.0
6 – 10	65	23.7%	38.2	33.0
11 – 15	19	6.9%	37.2	32.7
16 – 20	12	4.4%	--	--
21 – 25	1	.4%	--	--
>26	2	.7%	--	--

Discussion

Item Correlation Analysis (self-efficacy & expected outcome)

A 2-tailed Pearson's Correlation was conducted on 6 areas: years of teaching experience (YTE), years of teaching science (YTS), hours of teaching science weekly (HSW), science background (SBKD), Sescale, and Oescale (see table 2). This table reveals an inverse relationship between 2 kinds of teacher: Group 1) teachers with more experience and education in science education and Group 2) teachers with less experience and education in science education.

Table 2: Correlations: N = 280

	Age	Gender	YTE.	YTS.	HSW.	SBKD.	Sescale	Oescale
Age		-.042	.375(**)	.767(**)	.131(**)	.264(**)	-.094	-.014
Gender			.022	.013	-.092	.216(**)	-.100	-.171(**)
YTE.				.348(**)	.031	-.024	-.011	-.049
YTS.					.205(**)	.376(**)	-.062	.038
HSW.						.045	.129(*)	.191(**)
SBKD.							-.195(**)	-.033
Sescale								.472(**)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Findings

The data appear to reveal significant evidence that Taiwan elementary teachers have been involved in continuing education in teaching science for quite some time. The older teachers had significantly more science background (.264**) than the younger teachers. This difference in background appeared to take place over time. As a teacher increased in years of teaching science, his or her education background in science (.376**) and number of hours of science taught per week (.131**) also increased. The data also seems to indicate that as teachers continue in teacher science education training and classroom teaching experience their self-belief (confidence/ efficacy) in teaching science (.129*) and student outcome expectations (-.195**) also increase.

The intercorrelations from a revised item analysis revealed a cultural difference between this test group of Taiwan elementary teachers and a test group of elementary teachers in the United States (Riggs 1990) in two areas: (1) main reason for underachievement in science and (2) principal involvement in classroom evaluation. First, the item analysis from Riggs' study seemed to indicate that U.S. teachers think that if a student is an underachiever in science, the fault could be the teacher. The item analysis from this study, on the other hand, appears to show that Taiwan elementary teachers think science teaching at the elementary level is excellent and easily understandable to all students. If a student is an underachiever in science, it is the student's fault. Second, Riggs' item analysis also seemed to indicate that U.S. elementary teachers were willing to invite the principal to come and evaluate their science teaching. The item analysis of this study, on the other hand, seems to show that inviting the principal to come and evaluate a teacher's science teaching was out of the question.

Conclusion

From the above data, the elementary teachers who teach science are clearly not a part of this group of countries whose teachers struggle with teaching science at the elementary level. Taiwan elementary teachers appear to be highly competent and confident in their teaching of science. This competence and confidence appears to be a result of their continued teacher science education training and classroom-teaching experience. Outcome expectations are significantly connected to their self-efficacy (.472**). Even though the evidence from this study cannot conclusively prove that such confidence and outcome expectations are a direct cause of Taiwan's experience of being rated number 1 in science education (NCES 1999), this research study has concluded that these two areas are uniquely connected to the success of Taiwan science education at the elementary school level.

References

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