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AUTHOR Putnam, A. R.

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ABSTRACT

Research was undertaken to determine whether technology education had moved from theory into practice in the United States. To make meaningful national comparisons, a comparative model was developed to determine the philosophy, implementation organization, and implementation processes of technology education. The model was used as a table of specifications to develop a questionnaire. After a pilot project in nine midwestern states, questionnaires were mailed to state curriculum supervisors of industrial arts/technology education at state departments of education and to a technology teacher educator in each of the remaining 41 states. Data were combined for national comparisons, then grouped by geographical regions using the six Federal Vocational Curriculum Consortium regions, and compared to determine regional differences. A Likert-type scale value was assigned to each response to develop a weighting scale to show whether the response indicated implementation of traditional industrial arts or technology education. Data analysis indicated that technology education had made a clear impact on curriculum implementation. In the Eastern regions, teacher educators considered the impact to be greater than did state supervisors. In the rest of the country, general agreement existed that a change toward technology education had occurred. (Four data tables are appended.) (YLB)

WHAT PEOPLE MEAN WHEN THEY SAY THEY TEACH TECHNOLOGY EDUCATION

A.R. Putnam, Ed.D.

Professor of Industrial Technology Education

Indiana State University

Terre Haute, Indiana

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INTRODUCTION

Curriculum in the public schools of the United States is by law the responsibility of the individual states. Curricular patterns and content are developed within the individual states by local school authorities under the supervision of state educational agencies. Principal funding is provided by local taxation with assistance from state government. A small portion of the state education budget comes from the federal government in the form of specific initiatives which have been determined by congress to be national priorities. The result of this localized pattern is that curricular definitions, organization, and content varies widely both among and within states.

Within this context of localized educational control under state supervision, regional accreditation bodies, state and national disciplinary professional associations, philanthropic foundations and some teacher education institutions have assumed much of the leadership in most curriculum areas. The federal government has maintained an influence in some areas through categorical funding and entitlement legislation, but, in general federal involvement has been minimal.

Industrial Arts, from which technology education evolved in the United States, has been a part of the American public school curriculum since the first decade of the twentieth century (AIAA, 1947). It was designed to provide a general population with a broad understanding about the industrial world in which they lived. Generally, it did not include specific preparation for any particular occupation, but traditionally had broad vocational objectives. Increasingly, as the world has changed from an industrial base to a technological base, the focus of industrial arts curriculum has changed to reflect that change.

The Jackson's Mill Industrial Arts Curriculum Theory (Hales & Snyder, 1981) called for reexamination of the rationale and structure of the field and suggested a new curriculum model based upon the universal systems model and technology. Methodology involved scientific problem solving in identified technology content clusters. The Standards for Technology Education (Dugger, 1985), and Industry and Technology Education (Wright & Sterry, 1982) developed foundations for implementation of the Jackson's Mill Theory. A Conceptual Framework for Technology Education (Savage & Sterry, 1990) redefined the content classifications of the Jackson's Mill Theory and suggested a new technological problem solving model as a basis for technology curriculum.

This research was undertaken to determine if technology education had moved from theory into practice in the United States, and if so to what extent, and in what form.

METHODOLOGY

In order to make meaningful national comparisons, a comparative model was developed to determine the (1) philosophy, (2) implementation organization, and (3) implementation processes of technology education. Philosophy is significant because it guides practice. Organization is significant because it defines implementation. The philosophical orientation, content organizers, and program descriptors adopted reveal curriculum philosophy. The implementation strategies, implementation time frame, and methods of funding the curriculum reveal the implementation organization. The curriculum articulation, teacher preparation, and instructional materials adopted or made available reveal implementation processes used. These, then, became the elements of the comparative model. Using the model as a table of specifications, a questionnaire was developed. After a pilot project in 9 midwestern states, the model and questionnaire were determined to be adequate and questionnaires were mailed to state curriculum supervisors of industrial arts/technology education at State Departments of Education in the remaining 41 states. A questionnaire was also mailed to a technology teacher educator in each state. The data were combined for national comparisons, then grouped by geographical regions using the six Federal Vocational Curriculum Consortium regions to determine regional membership. The data were then compared to determine regional differences. Data from state supervisors of technology education curriculum and from technology teacher educators were treated separately. Data analysis was accomplished using Procedure MULT RESPONSE from SPSS. "MULT RESPONSE combines elementary variables into multiple dichotomy groups and multiple response groups to produce univariate tables and multivariate cross tabulations for these groups" (SPSS, 1991, p. 359).

RESULTS

Response to the questionnaires sent to state departments of education was 98%, and the response rate for technology teacher educators was 86%. Scale reliability was computed to be .3376 using Cronbach's alpha. This relatively low coefficient was not unexpected because of the high variance of responses to items on the questionnaire.

Comparison of the data, while of interest, did not indicate the degree of implementation of technology education in the curriculums of the respondents' states or the nation. In an attempt to determine degree of implementation, a technology implementation index model was developed.

Content for technology education as described in the Jackson's Mill Theory (Hales & Snyder, 1981) and A Conceptual Framework for Technology Education (Savage & Sterry, 1990) uses an analysis of technical human-adaptive systems and embraces a holistic perspective of content. Technological literacy for the entire society is a major goal (Colelli, n.d.).

Content for industrial arts has traditionally been organized by occupational families. While the principal objective was not preparation for any particular occupation, technical skills training was always an important factor, and vocational guidance an objective. Industry was the major focus and industrial production strongly influenced curriculum and methodology (Cochran, 1970).

Although technology education and industrial arts, as well as vocational education are closely related, all being undergirded by an efficiency philosophy, they have very different objectives and methodology. In practice, the differences clearly separate them in content, orientation, program philosophy, implementation organization, and in implementation processes. By subjecting each item of the questionnaire to analysis and assigning a Likert-type scale value to each response on the questionnaire, a 5 value weighting scale was developed to show whether the response indicated implementation of a study of industry based upon technical skills training with vocational implications (traditional industrial arts) or implementation of broad technological literacy (technology education) (see table 1).

Using the weighting scale, technology education implementation index mean and standard deviation scores were computed for each state, for each region, and for the nation. A separate index was computed for the teacher educators and for the state departments of education (see tables 2 and 3). None of the mean scores of the implementation index for the technology educators were exactly the same as the implementation index scores of the state supervisors of technology education. In order to determine if the observed differences were statistically significant, the two sets of scores were subjected to a t test (see table 4).

Differences in the grand mean score for all the state supervisors and all of the teacher educators were not statistically significant at the .05 probability level on a 2-tailed estimate of pooled variance. Differences in the mean scores of the teacher educators and the state supervisors were statistically significance at the .05 level of probability for the Northeast and Southeast regions of the country. No other statistical significance was observed.

CONCLUSIONS

As the data were analyzed, it became apparent that technology education had made a clear impact on curriculum implementation. In the Eastern regions of the country, the technology teacher educators indicate the impact to be greater than do the state departments of education. One might hypothesize that the teacher educators may be predicting the future, as they are teaching the future teachers, while the state curriculum supervisors are describing what now exists.

In the rest of the country, general agreement exists that a change toward technology education has taken place. Although a great deal of autonomy in technology curriculum adoption existed in all parts of the United States, geographic regions exhibited definite curricular patterns.

In the East Central region, the greatest technology education orientation was reported, followed by the Midwest, then the Northwest. All regions scored well into the technology education column, although some states did not, and the states of the Western region appeared very heterogenous in curriculum implementation. The nation as a whole, however, with a mean score of 3.8 (a score of 5.0 would indicate complete implementation of technology education) clearly has moved technology education from theory into practice, but in a variety of forms tailored to meet individual state needs.

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Table 1

Technology Education Implementation Index Development Model

Ind. Arts		<Value>			Tech. Ed.
Item	1	2	3	4	5
1.	d	i		e	a,b,c,f,g,h
2.	c	d		a	a
3.	e	a	d	c	b
4.	a		d		b,c
5.	0^{N}-2	3^{N}-4	5	6^{N}-9	10+
6.	N.A.				
7.	N.A.				
8.	a	b		c	d
9.	b,c,d				a
10.	b		c,a		d

Table 2

State Curriculum Supervisors Technology Education Implementation Index

Region	State	Mean	Regional Mean	Standard Deviation
Northeast	CT	3.91		
	ME	4.00		
	NH	3.73		
	NJ	2.55		
	NY	3.75		
	RI	3.80		
	VT	3.36	3.5841	.5006
Southeast	AL	3.09		
	FL	3.83		
	GA	3.57		
	KY	3.40		
	MS	2.87		
	NC	4.08		
	SC	4.08	3.5358	.4434
	TN	3.36		
East Central	DE	3.85		
	IL	3.44		
	IN	4.50		
	MI	4.00		
	MD	4.21		
	MN	4.00		
	OH	4.27		
	PA	3.89		
	VA	4.7[illegible]		
	WI	4.4[illegible]		
	WV	3.21	4.0462	.45
Midwest	AR	3.77		
	IA	4.42		
	KS	4.00		
	LA	3.56		
	MO	3.77		
	NE	4.23		
	NM	4.09		
	OK	3.64		
	TX	3.64	3.9021	.2972
Northwest	AK	1.80		
	CO	4.36		
	ID	3.94		
	MT	4.08		
	ND	3.85		
	OR	4.08		
	SD	4.00		
	UT	4.08		
	WA	3.50		
	WY	3.58	3.7261	.7217
Western	AZ	3.56		
	CA	4.08		
	HI	3.40		
	NV	3.47	3.6265	.3076
National Mean			3.7710	
Standard Deviation				.507

Table 3

Technology Teacher Educators Technology Education Implementation Index

Region	State	Mean	Regional Mean	Standard Deviation
Northeast	CT	4.09		
	MA	3.92		
	ME	4.08		
	NH	4.30		
	NJ	4.38		
	NY	4.00		
	VT	4.58	4.1927	.2356
Southeast	AL	3.89		
	FL	3.58		
	GA	4.42		
	MS	4.07		
	NC	4.36		
	TN		4.1095	.4552
East Central	DE	2.67		
	IL	4.40		
	IN	3.91		
	MI	4.17		
	MD	3.50		
	MN	4.40		
	OH	4.00		
	PA	3.59		
	VA	4.00		
	WI	4.55		
	WV	5.00	4.0160	.6203
Midwest	AR	3.36		
	IA	4.44		
	KS	4.06		
	LA	3.92		
	MO	3.89		
	NM	3.33		
	TX	3.70	3.8156	.3936
Northwest	AK	4.00		
	CO	3.85		
	ID	3.81		
	MT	3.83		
	ND	4.00		
	UT	4.15		
	WA	4.11		
	WY	3.23	3.8735	.2894
Western	AZ	3.09		
	CA	4.00		
	HI	2.83		
	NV	2.88	3.1998	.5453
National Mean			3.9226	
Standard Deviation				.503

Table 4

t Values and 2-Tailed Probability Scores

Regional	t value	2-tailed p.
National	-1.44	.155
Northeast	-2.91	.013
Southeast	-2.37	.035
East Central	.12	.904
Midwest	.51	.617
Northwest	-.53	.601
Western	1.33	.221