Teacher Perceptions of an Innovation and Degree of Implementation

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This study investigated the relationship between teachers' perceptions of an innovative curriculum and the observed degree of implementation of the innovation. It was hypothesized that teachers' perceptions of the relative advantage, compatibility, trialability, and observability of the innovation would correlate positively with the degree of implementation, and that complexity would correlate negatively. It was further hypothesized that the five variables in combination would account for a significant proportion of the variance in the degree of implementation. The results lend support to the general hypothesis while pointing up the need to consider also other elements in the change process.

Nous examinons dans cet article le rapport entre la perception que les enseignants ont d'un programme d'enseignement innovateur et la mesure dans laquelle ils le mettent en application. Nous avions posé l'hypothèse que la perception des enseignants concernant la comptabilité, l'observabilité, et la mise à l'essai de l'innovation serait en corrélation positive avec le degré de mise en application, alors que la perception de sa complexité, elle, serait en corrélation négative. Nous avions également formulé l'hypothèse que les cinq variables réunies rendraient compte d'une proportion importante de la variance dans le degré de mise en application. Nos conclusions confirment notre première hypothèse, mais soulignent la nécessité de prendre un plus grand nombre d'éléments en considération dans le processus de changement.

Recent assessments of a large number of educational innovations indicate that these innovations have been generally unsuccessful in achieving their goals (Berman & McLaughlin, 1976; Boyd, 1979; Goodlad & Klein, 1970; MacDonald & Walker, 1976; Stenhouse, 1975). In many cases this lack of success has been attributed to the fact that they have not been implemented, or, at best, only partially implemented (Anderson & Robert, 1979; Charters & Jones, 1973; Hall & Loucks, 1977; Paul, 1977; Rand, 1975-78). Further, it has been suggested that it is "the lack of concern for implementation [which] is currently *the* crucial impediment to improving program operations, policy analysis, and experimentation in social policy areas" (Williams, 1978, p. 154). Such findings have helped spark a recent heightened interest in the implementation process in general (Fullan, 1979; Leithwood & Montgomery, 1978) and, more specifically, in a quest for those factors or causes associated with implementation success (Berman & McLaughlin, 1976; Hall, Zigarmi, & Hord, 1979). One

such factor, among a number postulated as being of salient importance to implementation success, is the perceptions of the innovation held by its potential users (Caffarella, Caffarella, Hart, Pooler, & Salesi, 1979; Collingwood, 1979; Fullan & Pomfret, 1977; Rogers & Shoemaker, 1971).

For the most part, research on the relationship between potential user perceptions of an innovation and their implementation of it has focused on agricultural innovations (Rogers & Shoemaker, 1971). Here it has been found that between 49 and 87% of the variance in "rate of adoption" may be accounted for by the perceptions of the innovations held by potential or target users (Fliegel, 1968; Kivlin & Fliegel, 1967; Rogers & Shoemaker, 1971). Published studies in the field of education are few, limited in the range of variables considered, and have tended to focus on adoption, i.e., acceptance of the idea, rather than implementation, i.e., the level of actual use of an innovation. Nonetheless, the findings in education do tend to confirm those in agriculture, clearly establishing a relationship between user perceptions of an innovation and their degree of implementation of it (Crowther, 1972; Goodridge, 1975; Kester & Howard, 1975; Paul, 1977). All of the research emphasizes that it is the innovation as perceived by the potential user, and not the innovation in some objective sense or as perceived by experts, that is a critical variable.

Among the various attributes of innovations which have been examined, there are five which have been found to have especially strong relationships with the degree of implementation or level of use (Paul, 1977; Rogers & Shoemaker, 1971). These are (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability.

If a user sees an innovation as having an advantage, of whatever kind, over current practice, then it is said to have a *relative advantage*. The particular form of the advantage may be improved performance on the part of the students, increased class participation, decreased preparation time, etc. The key notions are costs and benefits. For an innovation to be perceived as possessing a relative advantage, the potential user must assess its advantage as outweighing its costs.

When an innovation may be integrated into an already existing system without requiring the user to engage in an extensive reappraisal of his values, goals, beliefs, capabilities, etc., it is said to be highly *compatible*. Of course, any new idea or practice will not be perfectly consonant, but those which are viewed by users as requiring fewer and smaller changes are considered more compatible than those requiring more and larger changes.

The notion of *complexity* refers to the perception of how difficult an innovation is to understand and use. One that is perceived as consisting of many parts and requiring extensive training to learn to use is highly complex; one which is simple, straightforward, and requires no training to use is low in complexity.

If an innovation may be tried or experimented with on a partial or limited basis, then it is considered *trialable*. It requires something less than total commitment and allows the potential user to experiment with the innovation without abandoning previous practices completely.

Observability refers to the degree to which the ideas, practices, products, and results of an innovation are visible. In addition to these features being visible to potential users, it also refers to the degree to which users perceive them as being visible to others, particularly colleagues and superiors.

The present study was conducted in order to investigate the extent to which teacher perceptions of these five attributes of an innovation were related to the degree of implementation of an elementary science curriculum after approximately two years of official adoption by the provincial department of education. It was hypothesized that teacher perception of the relative advantage, compatibility, trialability, and observability of the new curriculum would correlate positively with the degree of implementation, and that teacher perception of complexity would correlate negatively. That is, a higher degree of implementation was postulated among those teachers who viewed the new program as possessing the attributes of relative advantage, compatibility, trialability, and observability than among those teachers who viewed the program as lacking them; and teachers who viewed the program as complex would implement it to a lesser degree than those who viewed it as comparatively simple. It was further hypothesized that the five variables in combination would account for a significant proportion of the variance in degree of implementation.

METHOD

Sample

The sample consisted of 30 certified teachers (potential adopters of the innovation) employed in two school systems, one rural and one urban, in Nova Scotia. They comprised all the teachers of science at the Grade 5 and 6 levels in 9 schools selected at random from a total of 36.

Seventy percent of the sample were women. Of the total sample, only three were over the age of 40, with 80% having completed between 4 and 19 years of teaching. All had taken three or fewer science courses at the university level. All teachers in the sample indicated an awareness of the official departmental adoption of the new elementary science program, and recognized it as being innovative, at least in some degree, in the sense of representing a substantial change from the previous program. However, only three of the teachers reported having been involved in any in-service activity designed to facilitate the introduction of the new program.

Instrumentation and Data Collection

The measurement of the degree of implementation has caused considerable concern in implementation research. Self report measures appear to correspond little with actual practice (Hook & Rosenshine, 1979) as assessed by observation, and it seems that the assessments provided by "more remote sources," e.g., superintendents, principals, and other supervisors, are also highly precarious (Berman & Pauly, 1975; Deal, Meyer, & Scott, 1975; Greenwood, Mann, & McLaughlin, 1975). Commentators, generally, have suggested that greater use be made of direct observational approaches (Fullan & Pomfret, 1977; Fullan, 1979; Leithwood & Montgomery, 1978).

In this study the degree of implementation of the new elementary science program was assessed through direct observation using the Classroom Observational Rating Form (CORF) developed by Ashley and Butts (1970). The CORF was considered a particularly appropriate instrument since it not only provided for direct in-class assessment of the degree of implementation but also focused on factors of particular importance in the new program. Moreover, the CORF avoids the danger of viewing implementation as a dichotomous phenomenon, i.e., implemented or not-implemented, by providing a measure of the degree or level of implementation.

Based on a classroom observation period of 30 minutes, recommended by the developers, the CORF provides a composite measure of implementation based upon patterns of teacher-student interaction, teacher behaviors, and an estimate of teacher disposition (e.g., teacher enthusiasm, patience). The focus is upon behavioral and/or role change (Fullan, 1979). Reliability tests of the instrument conducted by Ashley and Butts, employing two observers and using data from 92 observations, yielded average intercorrelation reliabilities ranging from .90 to .96. In the present study, data were collected by a single observer following the recommended procedures, with intra-rater reliability using video recordings estimated between .91 and .98, based on observations made six weeks apart.

Teachers' perceptions of the attributes of the innovation were measured using a Likert-type questionnaire (Perceptions of Innovation Scale). A large measure of content validity was assured for the instrument through the method of construction (Kerlinger, 1973). From an initial pool of items written to reflect the major characteristics of the program, 20 were retained following a review by a panel of judges. The judges were the members of the curriculum committee responsible for developing the new curriculum and writing the teaching guide. Items focused on such matters as the objectives, teaching strategies, evaluation procedures, and teacher planning strategies, all of which distinguish readily the old and the new programs. Teachers were required to rate each item in terms of relative advantage, compatibility, complexity, trialability, and observability, ad-

hering to written definitions which were provided. The summated ratings provided a measure of the respondents' perceptions of each of the designated attributes of the innovation. Administrations of the test to student teachers have resulted in test-retest reliability coefficients of .77 and .81. In both cases there was a two week interval between tests.

RESULTS

Implementation scores as assessed using the CORF are presented in Table 1. The obtained range was from —39, indicating a predominance of behaviors that would not be associated with the new program, to +61 which would indicate the presence of a very high proportion of behaviors associated with the new program. The mean score was +13.83. Negative scores may be taken as indicating non-implementation; scores between 1 and 40 as indicating partial implementation; and scores over 40 as indicating a high degree of implementation. (In a self-report measure not a single teacher reported non-implementation.)

TABLE 1

CORF Implementation Scores

CORF Score[a]	*Percentage of Sample*
High degree of implementation ($\geqslant 41$)	23.33
Partial Implementation (1 — 40)	43.33
Non-implementation ($\leqslant 0$)	33.33

[a] Mean = 13.83; Standard deviation = 28.35.

The teachers' scores on the Perception of Innovation Scales (see Table 2) revealed that the new program was viewed as being comparatively weak on all the designated attributes, with mean scores ranging between 53.87 for complexity and 43.03 for relative advantage, on a scale with a possible range of 20 to 100.

TABLE 2

Means and Standard Deviations on Perception of Innovation Scales

Innovation Attribute	*Mean*[a]	*Standard Deviation*
Observability	50.33	9.56
Complexity	53.87	9.41
Relative Advantage	43.03	6.43
Trialability	45.80	10.01
Compatibility	47.20	9.11

[a] Possible range: 20-100.

To test the relationship between teachers' perceptions of the innovation and the degree of implementation, Pearson product-moment correlations were computed for the measure of perception of each attribute of the innovation and the CORF score (see Table 3). Teachers' perceptions of four of the attributes of the innovation — relative advantage, compatibility, trialability, and observability — were found to correlate positively and significantly with the degree of implementation of the innovation. That is, the degree of implementation was greater when teachers perceived the innovation as possessing a relative advantage over the previous curriculum; when they saw it as being compatible with their existing values, past experiences, and needs; when it was viewed as being possible to experiment with on a limited basis; and when the results were clearly visible to others. The complexity, i.e., the relative difficulty of the innovation to use and understand, was not significantly related to the degree of implementation.

TABLE 3

Correlations of Perception of Innovation Ratings with Implementation Scores[a]

Attribute	*r*	*p*[b]
Relative Advantage	.33	<.05
Compatibility	.41	<.025
Complexity	—.05	N.S.
Trialability	.31	<.05
Observability	.46	<.01

[a] $n = 30$.

[b] one-tailed test.

Further analysis was performed through stepwise multiple regression using the implementation scores as the dependent variable and the teachers' perceptions of the five designated attributes of the innovation as the independent variables. The intercorrelations of the independent variables are arrayed in Table 4.

The steps in the analysis, shown in Table 5, determined the total amount of implementation variance accounted for by all the variables in combination, and the proportion of the variance accounted for by the addition of each of the independent variables to the regression equation.

In combination, the five independent variables accounted for slightly more than 40% of the obtained variance in the degree of implementation. However, more than 38% of the variance was accounted for by the first three entered of the independent variables. Observability accounted for an initial 22.1% (multiple $R = .469$) of the criterion variance, with com-

TABLE 4

Intercorrelations Among Independent Variables

	1	*2*	*3*	*4*	*5*
1. Observability	1.000	.390	.273	.530	.725
2. Complexity		1.000	.383	.172	.127
3. Relative Advantage			1.000	—.021	.322
4. Trialability				1.000	.466
5. Compatibility					1.000

TABLE 5

Stepwise Multiple Regression: Degree of Implementation by Perceptions of Innovation

Innovation Attributes	*Cumulative* R^2	*Overall* F	P	*Increase in* R^2	F	P
Observability	.221	7.92	.009	.221	7.92	.009
Complexity	.288	5.46	.010	.067	2.56	.121
Relative Advantage	.383	5.38	.005	.095	4.00	.056
Trialability	.397	4.11	.011	.014	0.56	.459
Compatibility	.401	3.22	.023	.004	0.19	.665

plexity and relative advantage accounting for a further 6.7% ($R = .537$) and 9.5% ($R = .618$) respectively. The stepwise contributions of trialability and compatibility amounted to less than an additional 2%.

The findings of the study tend to support the general hypothesis that the potential adopters' perceptions of an innovation, at least in terms of the attributes postulated by Rogers and Shoemaker, are related to the successful implementation of educational innovations. There are, of course, certain difficulties of interpretation pertaining to the fact that we are dealing with an ongoing process (implementation) observed, in this case, at a single point in time; and with the fact that while a relationship between perceptions and degrees of implementation has been established, the nature of that relationship is by no means clear. The present data do not permit any conclusion concerning the degree of causal dependence of one variable upon the other.

Certainly the results seem to be such as to warrant further investigation. If perceptions such as those examined in this study do function as determinants of the degree of implementation, then not only will they contribute to explaining the process of change in education, but they will also contribute significantly to change theory in the sense of a theory of action.

At the same time, it should be noted that while the results of the present study "explained" a significant proportion of variance in the degree of implementation, they leave an even larger portion of the variance unexplained, further highlighting the need to examine the many elements of the implementation process, both singly and in combination.

REFERENCES

Anderson, R. N., & Robert, B. A. *Reflections concerning the Canada Studies Foundation: An internal evaluation of eight years of activity.* Toronto: Canada Studies Foundation, 1979.

Ashley, J. P., & Butts, D. P. A study of the impact of an inservice education program on teaching behavior. *Research and Curriculum Development in Science Education.* University of Texas Publication, No. 7203 (Monograph), 1970.

Berman, P., & McLaughlin, M. W. Implementation of educational innovation. *The Educational Forum,* 1976, *40,* 345-370.

Berman, P., & Pauly, E. *Federal programs supporting educational change, Vol. II: Factors affecting change agent projects.* Santa Monica, California: Rand Corporation, 1975.

Boyd, W. L. The politics of curriculum change and stability. *Educational Researcher,* 1979, *8*(2), 12-18.

Caffarella, E. P., Caffarella, R. S., Hart, J. E., Pooler, A. E., & Salesi, R. A. *A methodology for predicting the diffusability of educational innovations.* Paper presented at the annual conference of the Association for Educational Communication and Technology, New Orleans, 1979.

Charters, W. W., & Jones, J. E. On the risk of appraising non-events in program evaluation. *Educational Researcher,* 1979, *2*(11), 5-7.

Collingwood, V. Planning of innovation in higher education. *Program Learning and Educational Technology,* 1979, *16*(1), 8-15.

Crowther, F. *Factors affecting the rate of adoption of the 1971 Alberta social studies curriculum for elementary schools.* Unpublished master's thesis, University of Alberta, 1972.

Deal, T. E., Meyer, J. W., & Scott, W. R. Organizational influences on educational innovations. In J. F. Baldridge, T. E. Deal, & M. Z. Ancell (Eds.), *Managing change in educational organizations.* Berkeley: McCutchan, 1975.

Fliegel, F. C. A cross-national comparison of farmers' perceptions of innovation as related to adoption behavior. *Rural Sociology,* 1968, *33,* 437-449.

Fullan, M. *Implementation: Its nature and determinants.* Paper presented at the meeting of IMTEC (International Management Training for Educational Change), Oslo, Norway, May 1975.

Fullan, M. *Conceptualizing problems of curriculum implementation.* Paper presented at the Symposium on Curriculum Inquiry, Victoria, British Columbia, February 1979.

Fullan, M., & Pomfret, A. Research on curriculum and instruction implementation. *Review of Educational Research,* 1977, *47*(1), 335-397.

Goodlad, J. I., & Klein, M. F. *Behind the classroom door.* Columbus, Ohio: Charles Jones, 1970.

Goodridge, C. G. *Factors that influence the decision to adopt an educational innovation: IGE* (Tech. Rep. 376). Madison, Wisconsin: Wisconsin Research & Development Center, December 1976.

Greenwood, P. W., Mann, D., & McLaughlin, M. W. *Federal programs supporting educational change, Vol. III: The process of change.* Santa Monica, California: Rand Corporation, 1975.

Hall, G. E., & Loucks, S. F. A development model for determining whether a treatment is actually implemented. *American Educational Research Journal,* 1977, *14*(3), 263-276.

Hall, G. E., Zigarmi, P. K., & Hord, S. M. *A taxonomy of interventions: The prototype and initial testing.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, April 1979.

Havelock, R. G., et al. *Planning for innovation through dissemination and utilization of knowledge.* Ann Arbor, Michigan: Institute for Research, Center for Research on Utilization of Scientific Knowledge, 1969.

Hook, C. M., & Rosenshine, B. V. Accuracy of teachers reports of their classroom behavior. *Review of Educational Research,* 1979, *49*(1), 1-12.

Kerlinger, F. N. *Foundations of behavioral research* (2nd ed.). New York: Holt, Rinehart & Winston, 1973.

Kester, R. J., & Howard, J. *Evaluating the process of educational change: A model and its application.* Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C., April 1975.

Kivlin, J. E., & Fliegel, F. C. Differential perceptions of innovations and rate of adoption. *Rural Sociology,* 1967, *32*(1), 78-91.

Leithwood, K. A., & Montgomery, D. J. *Evaluating program implementation.* Unpublished manuscript. Toronto: The Ontario Institute for Studies in Education, 1978.

MacDonald, B., & Walker, R. *Changing the curriculum.* London: Open Books, 1976.

Paul, D. A. Change processes at the elementary, secondary and post-secondary levels of education. In N. Nash & J. Culbertson (Eds.), *Linking processes in educational improvement.* Columbus, Ohio: University Council for Educational Administration, 1977.

Rand Corporation. *Federal programs supporting educational change* (Vols. 1-8). Santa Monica, California: Author, 1975-1978.

Rogers, E. M., & Shoemaker, F. F. *Communication of innovations: A cross-cultural approach* (2nd ed.). New York: Free Press, 1971.

Stenhouse, L. *An introduction to curriculum research and development.* London: Heineman, 1975.

Williams, W. Implementation analysis and assessment. In P. D. Cook (Ed.), *Evaluation studies review annual* (Vol. 3). Beverly Hills: Sage Publications, 1978.

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