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Strategies for Assessing the Unique Strengths, Needs, and Visions of Rural Science Teachers[1]

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The authors present those strategies developed for a National Science Foundation grant to improve rural science education. The aim of these strategies was to encourage rural teachers to identify their unique and diverse strengths and weaknesses and to use this assessment to build a vision of the future for their school's science program. These strategies, unified in the form of an "action plan," provide a methodological model for other projects aimed at improving rural education.

Historically rural education in general, and science education in particular, have either ignored the unique needs of rural societies or have viewed them from a deficit stance [4; 9]. It has been assumed that the rural school with its limited resources is inferior to its urban counterpart. The curriculum, textbooks, pedagogy and standards of excellence created for urban school models have been used in rural schools as well [12]. The use of these urban standards places rural schools at a definite disadvantage. We can no longer continue to attempt to make rural schools into urban schools.

According to Nachtigal [9] it is time for a new emphasis in rural educational reform based upon an acceptance of rural reality. Rural science education should reflect the unique and diverse strengths and weaknesses of rural life. Rather than being consumers of urban developed programs, rural teachers should learn to become developers and adapters of alternative models of curriculum and instruction that more appropriately fit their rural communities. Efforts must be made to assist science teachers to identify their specific local needs, to match these needs with community and school strengths and to use this assessment to build a vision of the future for their school's science program. However, if we are to propose such action it is essential that qualified science teachers be involved at the local and regional levels. These teachers should be highly competent both in science content and methodology and in the area of leadership and staff development. Teachers possessing these characteristics are not common; but outstanding science teachers are present on the rural scene and can be identified and trained in these areas. Such an effort is currently being conducted in a Midwestern Land Grant University program for middle and high school science teachers through a grant from the National Science Foundation.

PROJECT DESCRIPTION

In February 1985, the National Science Foundation funded a project to identify, honor and train outstanding rural science teachers in order to create a pool of excellence in teaching with the ability and skills to help others. The participants were drawn from a group of 141 school districts in a rural Midwest state. These districts are located outside the sphere of influence of cities with populations over 100,000 and have less than 600 students K-12.

Selected teachers participated in a two-week summer training session involving instruction in the areas of science, science education and staff development. In particular, the science component concentrated on biology and astronomy within the context of space technology. This week of instruction took place at a nearby space science museum. The science education and staff development components were delivered the following week on campus. Science education focused on conditions for good science teaching and included current research findings, curriculum and methodology appropriate for rural science programs. The staff development instruction incorporated the fields of school improvement and leadership preparation.

The focus of this training was to prepare participant teachers to become leaders of rural science education improvement in their own schools and districts. Project participants were encouraged to assess their own specific local needs and strengths and to utilize this knowledge to create a personal plan, termed "Action Plan," for the improvement of science education in their community. Implementation assistance was provided during the following year to enhance the science improvement efforts of teachers participating in this project.

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ASSESSING NEEDS

This rural science improvement project began with a multistage analysis of needs. These stages included the completion of an open-ended essay and follow-up survey which led to the development of site specific models. This assessment of needs provided the framework for project training and individualized plans, or visions, for improvement (see Figure 1).

This unique approach to needs analysis was developed because science teachers in the rural setting have needs that are different from teachers in larger schools in close proximity to large population centers. There is a tendency for small schools to adopt the same programs in science and to implement them in the same way as larger schools, without regard for the differences in the children's rural life experiences. Rural science teachers are frequently isolated from their peers and have difficulty in traveling long distances to professional meetings, thus making it difficult to exchange ideas in their field. These teachers often have to function in more areas than their larger school counterparts, and this sometimes results in inappropriate assignments and often results in work overload. This is particularly true in sciences where teachers sometimes are working outside their fields of strength [10]. Rural teachers face many additional problems related to scarcity of education resources in terms of people, places and materials available for science instruction. These needs are often not reflected in improvement efforts for science education.

The difficulty with assessing rural needs is best described by Nachtigal [9]: "Public policy, both state and federal, has set about defining rural education's problems from a position far removed from the local community, using a set of standards much more applicable to large school systems than to small. In fact, many of the deficiencies of small schools relate to size and, therefore, cannot be eliminated by definition. If the school cannot get bigger, it cannot get better" (p. 302). Nachtigal goes on to state that "If rural education is to be improved, it will be because rural communities define their problems in ways that make sense to them" (p. 304). McLaughlin's [9] review of rural school improvement efforts revealed that the success of rural school improvement seems directly related to the centrality of the problem to the school and community.

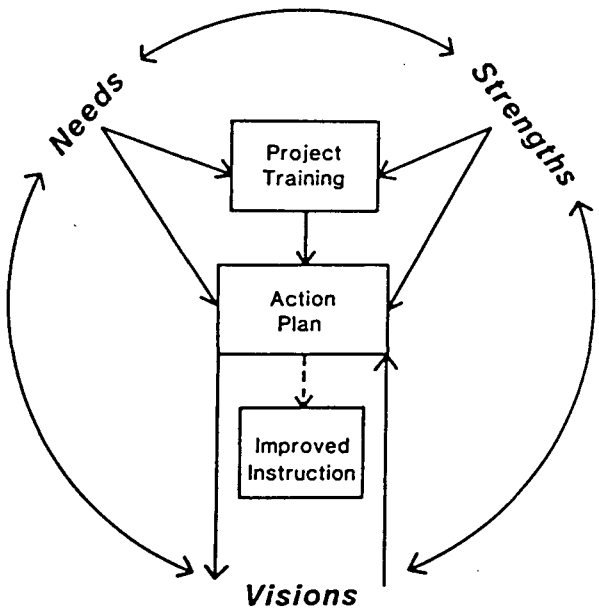

FIGURE 1. Conceptual Framework.

Keeping these issues in mind, the first step in this project was to facilitate the identification of areas of group need for training. An open-ended essay was required of applicants asking them to describe problems of science education in their community. The resultant discussion responses were a more accurate reflection of community conditions than predispositions on the part of project staff would have been. Traditionally, needs assessments consist of such predispositions and notions and subsequently do not reflect real needs.

From the responses gleaned from the open-ended essay, a study specific needs sensing survey was generated. The survey items were broken down into the three areas emphasized in the project: science, science education and staff development. These results were used to provide state-of-the-art training that related to the specific needs of the participants.

Based on the information provided in the training sessions, the teachers were asked to develop their own models of improvement of rural science education. These models provided the foundation for a more in-depth individualized assessment of the science education needs in their communities. Participants analyzed their own district practices in terms of personalized desired ends. The focus on this activity was on developing in teachers a sense of ownership for their own plans for growth and for district improvement. This information also became the basis for the next step in the project which was the individualized assessment of strengths.

STRENGTH ASSESSMENT

The strength assessment was a critical component of the project in terms of assisting teachers with their individual plans for improvement. It would have been counterproductive to concentrate on needs that a community might not have had the resources to overcome. Conducting a strength assessment was a mechanism for focusing on organizational and community strengths to be used to reduce limitations. As Clark [3] has suggested, this process can be viewed as a matchmaking that builds on the positive traits and resources that the organization has to bring to bear on their desired task. Although rural schools possess many unique needs, they indeed also have many unique strengths. It is only when we evaluate them based on an urban model of the "one best way" [12] that rural schools are ranked second best. In reality, it has not been demonstrated that rural schools produce a less well-educated adult.

In 1959, Cyr [5] proposed that small schools were more

desirable than large schools. In *Big School, Small School,* Barker and Gump [2] documented that small schools have a number of strengths when compared to large schools. Guthrie's [7] review of studies on school size concluded that there is evidence that the quality of school life is not always better in larger schools. Sher [11] and Nachtigal [9] have also noted the many strengths of rural education. Most of these writings deal with the enhanced individualized instruction available in small classes. As Dunne [11] pointed out, "Small unit size is much prized in educational circles except when applied to rural community schools" (p. 95).

The more personal contact between teachers, administrators, students and community is also viewed as an asset. This "family atmosphere" or tight coupling of organizational parts can increase solidarity, collegiality and overall group functioning. Teachers, administrators, students and the community often are more involved and feel more responsible for school improvement in tightly knit communities.

Rural settings can be especially advantageous for science education. As Colton [4] stated, "The rural environment is an open book where plants and animals, rocks and soil, sun, wind and rain are available for study and where human use of these natural resources is also evident" (pp. 1-2).

Many rural strengths can be used to reduce rural limitations. As White-Pelton [3] argued, scarce resources can even be an advantage when they result in creativity, ingenuity and innovation. Additionally, it must be remembered that what is a strength to one teacher or community may be a weakness to another. Therefore, it was essential that our strength assessments were done on an individual basis. It was also critical that teachers reviewed their aims for science education as part of the process of identifying the special attributes their rural setting had to offer for meeting those aims.

The ultimate goal of matching the positive traits or abilities identified from the strength assessment with the desired theoretical ends that resulted from the needs assessment was the third step in this project, the creation of individualized mission statements and plans for action for each teacher.

ACTION PLANNING

If we are to build a vision of the future for rural science programs, it is first necessary to develop a mission within each school/community setting that is based upon strengths as well as needs. Critical in the development of a mission statement should be a plan of action. The concept of action planning was previously utilized in a National Science Foundation project to train elementary teachers to provide leadership at the local school level for sound science education programs thoughout Oklahoma [8]. In this project Action Planning was used by teachers to demonstrate how they would use the skills and knowledge they had acquired during training. An action plan is not only a product, but a process for analyzing where a teacher is in his/her teaching career and where he/she would like to be. It is a process of assessing school or district strengths and weaknesses and determining which practices should be continued and which should be changed. It is also a process of deciding what the teacher's specific role is in the change effort. Ultimately, it is a process of making some decisions about the teacher's involvement in school improvement.

One element critical to the success of any school improvement effort, and yet frequently ignored, is the plan for implementing one's vision of the future. Knowledge of the factors that affect change and a detailed plan that takes these factors, the innovation, and the organizational context into consideration is an essential component of implementation. We have the research findings to help us with the task of putting our ideals, our goals and our strategies into practice (See Fullan [6] for a complete analysis of this research.) Grant participants were provided with an overview of these implementation factors and were asked to consider them as part of their plan for action. This idea was derived from components of an "Implementation Plan" Terry Astuto [1] requires as an assignment from her students in her course "Strategies for Educational Change" taught at Kansas State University. The concept of an "Implementation Plan" was therefore combined with the notion of "Action Plan." These action plans became a means of incorporating participant teachers' personal mission statements with an analysis of how these missions should optimally be implemented (Appendix 1).

In developing such an action plan, the following outlined factors were considered:

1. Background and assessment of current professional assignment,
2. Organizational context,
3. Analysis of the proposed change or innovation, and
4. Implementation of the plan.

The teachers began their plans by identifying basic information about their teaching positions. This assessment of their background and current professional assignment included: (1) location and general teaching background, (2) current instructional procedures, and (3) personal assessment of teaching. A description of the teachers' images of their organization and its social structure became step 2 in the plan. This organizational context included: (1) organizational structure, (2) decision-making, (3) people, (4) influences, and (5) organizational assessment. This section of the plan provided the reader with a better understanding of the school and district as an organization. The next step in the action plan was an analysis of the proposed change or innovation. This analysis included: (1) descriptional and foundational values, (2) needs addressed and beneficiaries and priorites, and (3) practicality of the proposal. The final aspect of an action plan was to consider all factors that would enable the teachers to successfully implement their desired changes into their instructional setting. These implementation plans included: (1) factors to consider, (2) participation, (3) resources, (4) evaluation, (5) staff development, and (6) timeline of plan. (See Appendix 1 for a

complete description of an action plan.)

Implementing an action plan is a process of clarification for all those involved. It is a time when participants must work out their own meaning of the proposed plan. School improvement is time-consuming, difficult, frustrating and discouraging and not everyone will indeed improve. And yet research has demonstrated that successful change is possible [6]. Understanding this situation and the interrelated complexities is essential to any implementation process. Planning must be viewed as a crucial starting point and yet it must also be viewed as a tentative set of guidelines. Schools and life in general are unpredictable and rational planning is not realistic. An action plan must therefore be considered as a trial map of the future, subject to change as events change and as everyone struggles to make their own sense out of the implementation process itself. The critical effort of this project took place during the 1985/86 school year as follow-up assistance was provided to the participating rural science teachers as they attempted to implement their action plans. According to Milbrae McLaughlin [9], rural improvement efforts must provide readily available, timely, relevant, and responsive implementation assistance to be effective.

CONCLUSION

According to Jonathan Sher [11], a major problem with college-based rural education improvement projects is that they usually depend on theoretical conceptions which come from outside the communities served. Sher believes that "the rural community must be the basis for productive change . . . [in the schools and] changes must be tailored to the needs of the community and the region" (p. 111). This project demonstrates one mechanism available to assist rural communities with their efforts to improve their education in ways that make sense to them. This project is also an answer to Paul Nachtigal's [9] plea for a rural education reform based upon an acceptance of rural reality. Project educators' improvement efforts reflected the unique and diverse strengths and weaknesses of their rural lives. These science tachers implemented plans that has significant meaning for them and that more appropriately matched their rural communities and schools.

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APPENDIX 1: Action Plan

An action plan is not only a product, but a process for analyzing where you are in your teaching career and where you would like to be. It is a process of assessing your personal, school or district strengths and weaknesses and determining which practices should be continued and which should be changed. It is also a process of deciding what your specific role is in this change effort. Ultimately, it is a process of making some decisions about your involvement in school improvement. In developing an action plan, the following outlined factors should be considered:

I. Background and Assessment of Current Professional Assignment.
II. Organizational Context
III. Analysis of the Proposed Change or Innovation
IV. Implementation Plan

I. *Background and Assessment of Current Professional Assignment*

A. Location and General Background
B. Current Instructional Procedures
C. Personal Assessment of Teaching

You should begin your plan by providing the reader with the basic information about your present position. This includes your school district, grade level, type of classroom organization and curricular area. Describe the general instructional strategies which you employ in your classroom. Explain "what" you teach and "how" you teach and include related information such as textbook, supplementary reading, curriculum guide and other teaching materials. Describe your educational philosophy or your purpose in teaching. How is this purpose

reflected in what and how you teach? A short description of your training and experience should be included. Based on your training and experience, what do you feel are your professional strengths and weaknesses?

II. *Organizational Context*

A. Structure
B. Decision Making
C. People
D. Influences
E. Organizational Assessment

This section of your plan should provide the reader with a better understanding of your school and district as an organization. Discuss the location and environment of your school district. What community factors influence education in your area? How isolated or autonomous is your school? Describe your images of your organization and its social structure. Are you a tight or loosely knit group? What are your institutional characteristics and perspectives? What does your organization see as its purpose and function? Include any social or historical factors that are part of the organizational perspective. Describe how decisions are made in your school and district and by whom. What is the nature of these decisions? How much control is there over what happens in your class? What school or district policies are reflected in your teaching? Describe the people in your organization. What is the social climate of your school? How collaborative and supportive are people of one another? What will any school change mean to these people? How will they react? Discuss any internal or external influences that have an effect on your school or district. Keeping in mind all of these factors and what you know about effective teaching, what do yo consider to be the strengths and weaknesses of your organization?

III. *Analysis of the Proposed Change or Innovation*

A. Description and Foundational Values
B. Needs Addressed, Beneficiaries and Priorities
C. Practicality of the Proposal

Based upon your assessment of personal and organizational strengths and your weaknesses, discuss any changes which you are willing to implement in your instructional setting. What new content, strategies, materials or activities would you like to include in your teaching? Are you interested in taking on a leadership role in terms of school or district improvement of science education? What role would this be? Describe the values that are involved in the changes you would like to make? What needs are being addressed? Who will benefit from your proposal? Who or what will be neglected? How much of a priority is the area of change addressed and for whom? Describe the practicality of your plan. How achievable is the change? How clear and workable are your ideas? Are they of good quality? Are they too complex or difficult? Do they fit with your teaching style and educational philosophy? Do they make the most of your personal and organizational strengths, while avoiding the limitations? What is the extent of the proposed change? Is it significantly different from current practices to warrant its effort? What are the anticipated personal and professional costs of implementing your ideas? Do the benefits outweigh the costs?

IV. *Implementation Plan*

A. Factors to Consider
B. Participation
C. Resources
D. Evaluation
E. Staff Development
F. Time Line

The final step in your action plan is to consider all the factors that will enable you to successfully implement your desired changes into your instructional setting. These can be personal, organizational, or community factors or simply aspects of the innovation which need special consideration. Think about the roles of the "actors" in your plan. Who will be involved and in what way? What are the roles and activities of the central administration, the community, the board of education, your principal and fellow teachers? In what ways will you gain their support and involvement? What special resources are available to use? What kind of outside assistance will you need? What staff development activities do you need to plan for? How will you evaluate your innovation effort? After considering all of these factors, plan a timeline for yourself. Remember to plan for adequate time. Change is a slow and detailed process.