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ABSTRACT

This digest reviews a variety of strategies that might be employed by school districts, teacher education institutions, and state educational agencies to attract, train, and retrain Hispanic teachers in math and science. The need for long-term solutions is discussed. Five action-oriented steps to attract Hispanic high school graduates into the teaching profession include identifying talented Hispanic high school students, developing their interest in teaching, locating and engaging "master" teachers, arranging significant student-teacher contact, and providing incentives for students to participate in special programs. Adaptations of recommendations by Franz, Aldridge, and Clark are also listed. Short-term solutions are listed, e.g., providing readily available opportunities for recertification, offering improved working conditions, offering teachers financial assistance during additional years of college preparation, providing summer jobs in industry, recruiting part-time instructors from other segments of society, and borrowing skilled professionals from industry. Options for financing programs for youths in teacher education programs and for Hispanic teachers currently employed or underemployed are presented. (PM)

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HISPANICS IN MATH AND SCIENCE: ATTRACTING STUDENT TEACHERS AND RETRAINING EXPERIENCED TEACHERS

By

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HISPANICS IN MATH AND SCIENCE: ATTRACTING STUDENT TEACHERS AND RETRAINING EXPERIENCED TEACHERS

Hispanics comprise less than two percent of the mathematics and science teachers currently employed in school districts throughout the United States. This digest reviews a variety of strategies that might be employed by school districts, teacher education institutions, and state educational agencies to attract, train, and retrain Hispanics in math and science.

Why Do We Need Hispanic Math and Science Teachers?

The shortage of qualified Hispanic math and science teachers is one of the most pressing problems faced by schools in the United States today. While Hispanics are, generally, underrepresented in medicine, law, engineering, and other professions, public school teaching has been an avenue available to Hispanics for many decades. However, there is a continuing lack of participation of Hispanics in teaching certain critical subject areas. For whatever social, economic, and/or political reasons, Hispanics have not traditionally entered the teaching profession in the areas of mathematics and sciences. Data provided by the National Association of Secondary School Principals indicate that Hispanics comprise less than two percent of chemistry, physics, and biology teachers currently employed (Neill, 1982).

The conditions faced by school districts regarding Hispanics (and other minorities) in math and science teaching areas are very closely associated with attracting and retaining math and science teachers in general. Much of the information and many of the recommendations to be presented in this digest will serve school districts in their efforts to retain science and math teachers regardless of ethnic background. However, if knowledge of science and mathematics is the door to modern technology and progress, then Hispanic children must have models and mentors in these areas if they are to achieve parity in a growing technological world.

How Can Hispanic Youth Be Attracted to Math and Science Teaching?

A variety of ideas have been suggested to meet the short-term needs of school districts regarding Hispanic math and science teachers. However, the long-term solution lies in attracting high school graduates into the teaching profession. Additionally, not only should Hispanic youth be attracted to the teaching profession, but they should be guided into the fields of science and mathematics. The objective, then, is to develop a plan (either at the state level or nationwide) to implement this goal. The following list of action-oriented steps is derived from a variety of plans and programs that have been suggested and many of which have already been implemented with groups other than Hispanic. However, as a whole, they also comprise a viable plan for statewide and nationwide action aimed at reducing Hispanic teacher shortages in math and science.

- **Identify talented Hispanic high school students.**
  Teacher education programs at colleges and universities need to work with public school districts to identify Hispanic youth that show promise or skill in either mathematics or science. These students must be recognized in order for the high school or the university to provide incentive, special coursework, and such opportunities for future preparation as a teacher.
- **Develop their interest in teaching.**
  Hispanic youth that have been identified as particularly interested or able in science or math must be introduced to the teaching profession while still in high school. Many of these students will have other opportunities in engineering or similar high-technology areas. Individualized programs must be developed where these students work closely with "master" science and math teachers. The intent is to demonstrate to students that the teaching profession is a viable and challenging career alternative. Additionally, students will be exposed to the various benefits of the teaching profession (e.g., working with youth, watching young people grow and develop, living in an environment of learning.)
- **Locate and engage "master" teachers.**
  State departments of education should encourage school districts to identify master teachers in science and math. Hispanic youths must be exposed to these if their interest in teaching is to grow. Whenever possible, this teacher should be Hispanic. The master teacher can be offered a variety of incentives for working with the Hispanic youth. These incentives may include release time, additional pay, opportunities to attend workshops and/or conferences, additional assistance in the form of aides, and many others.
- **Arrange significant student-teacher contact.**
  Hispanic youth with abilities in the areas of math and science can be given a variety of paraprofessional teaching responsibilities while still in school. Students can be given release time to work as aides for master teachers or to dopeer teaching. They may conduct science experiments for the class and give class presentations in specified areas. Students can be of particular use to a teacher if Spanish/English bilingualism is needed to clarify specific points or to present particular lessons. This ability is particularly useful if the teacher is a monolingual English speaker.
- **Provide incentives for students to participate in special programs.**
  As with teachers, Hispanic youth need to be given a variety of incentives to attract them to the programs outlined above. Sadly, the opportunities to be a math or science school teacher may not be particularly attractive, at first glance, to a youth from lower socio-economic standing. The idea, however, is for them to *consider* teaching as a career alternative.

Franz, Aldridge, and Clark (1983) propose several guidelines for attracting youth in general into science teaching. Adaptations of their recommendations are presented here:

- Recognition and honors (letter jackets) through city and school newspapers, assemblies, and parental gatherings should be awarded.
- Released time from regular classwork for preparation of math or science lessons or for peer tutorials in science and math should be arranged.
- Visitation to universities to observe the teaching of science and mathematics should be scheduled.
- Visitation to teacher education programs in area universities to familiarize students with the teaching profession should be scheduled.
- Apprenticeship programs in business and industry after school or during the summer should be implemented.
- Out-of-town visitations to specialized science- or math-related programs such as the Johnson Space Center, various NASA facilities, research laboratories, and science exhibits or displays should be arranged.

The basic idea of all these proposals is to introduce Hispanic students to the teaching profession. Many Hispanics are caught in a cycle of poverty and are not aware of the occupational options available. Teaching can be made an attractive choice to these young people.

What Other Solutions Are Possible?

The recommendations given above are useful if school districts begin to implement them immediately. Unfortunately, however, states or school districts that are working on them are hard to find. To meet the immediate need, therefore, schools should consider a number of options. Perhaps the best short-term remedy is to retrain Hispanics currently in teaching disciplines that are overcrowded so they are qualified to teach science and math. Burns (1982), Rush (1983), and Sigda (1983) give a number of recommendations for attracting various ethnic minority teachers into mathematics and the sciences.

- **Opportunities for recertification can be made readily available.**
  Hispanic teachers in surplus areas such as history, English, and social studies may be retrained in the areas of need. The Houston school district (Guthrie, 1982) has initiated a program that pays tuition for selected teachers to receive additional training to enable them to teach secondary school math or science. In return, the teachers must agree to teach math or science in Houston for at least three years. A Government Accounting Office report *(New Directions, 1984)* concluded that retraining programs, such as the one in Houston, is one viable solution to the teacher shortage in

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math and science.

- **Improved working conditions** can be offered.
  Many Hispanic teachers work in schools that are located in low-income or "barrio" areas whose schools may have a proportionately higher crime and violence level than do middle-income schools. While these conditions may not necessarily be characteristic of all low-income areas, they can cause a problem when schools attempt to attract teachers in specialized areas. While many Hispanics prefer teaching among their own ethnic group, an unpleasant, even dangerous, teaching environment may diminish this enthusiasm. Talented teachers in specialty areas such as math and science may need to leave such a school environment for a short time to regain their enthusiasm and self-confidence. Schools need to provide these teachers with sabbatical leaves and more clerical and laboratory assistance to perform routine tasks.

- **Teachers can be offered** financial assistance during additional year(s) of college preparation.
  School districts could identify and sign contracts with senior-year non-math and non-science Hispanic student teachers who would agree to additional college training in order to be certified in math or science areas. In addition to the first year's salary, the fifth-year student teacher would receive tuition and allowances. Many Hispanic college students would look upon this as an opportunity that might never come again. Since financial hardships often force them to teach immediately, such a program would relieve this burden while encouraging training in an area that can be used for the rest of their career.

- **Summer jobs in industry can be made available.**
  School districts must work with business and industry to seek summer opportunities for Hispanic math or science teachers. Although these opportunities are needed by all teachers, the pending social needs for Hispanic math and science teachers make it critical for school districts to find opportunities for these individuals first. Hispanic math and science teachers working in industry can assist both a school district *and* industry in their efforts towards affirmative action guidelines.

- **Part-time instructors can be recruited** from other segments of society.
  In communities with large Hispanic populations, retired Hispanic teachers or retired Hispanic members of industry or government may be available to serve as part-time math and science teachers. With the proper supervision and support, these individuals can be excellent role models for Hispanic youth contemplating careers in science, engineering, or teaching. They have been very useful to community colleges attempting to meet growing enrollments in science and math while facing a dearth of faculty in these areas.

- **Skilled professionals can also be borrowed** from industry.
  The possibility of using skilled Hispanic mathematicians, engineers, and scientists working in private industry or governmental agencies as teachers has seemed remote to public districts. Although, community colleges have been quite successful in this area, school districts continue to shy away. While Hispanics do not hold a proportional share (to the total Hispanic population) of the positions in engineering and the sciences, they do fill such positions in predominantly Hispanic communities. Many private businesses and industries are quite willing to lend their professional employees to local school districts if arrangements are agreeable to all. However, school districts must initiate the request for this type of help. While this approach may identify only one or two individuals that might assist a school district, it certainly is worth the time and effort to investigate the opportunities.

Although it is easy to see how many incentives are possible, school districts must work to implement them if Hispanic teachers of other courses are to be encouraged to qualify in the areas of math and sciences.

How Can These Programs Be Financed?

Financing these programs becomes a major problem. Guthrie and Zusman (1982), and Good and Hinkel (1983) offer a number of options that might be useful to states, teacher preparation programs, and school districts. Hispanic youths in teacher education programs can be assisted in a number of ways:

- Industry-financed, university-provided, or school district provided scholarships designated explicitly for Hispanic youth in science or mathematic teacher education should be promoted.
- Low interest or non-payable loans and/or grants can be specifically designated for Hispanics who will teach for three years or more in the public schools.
- A tuition-free fifth (or sixth) year of university teacher education can be made available to non-math and non-science Hispanics interested in certifying as science or math teachers.
- Summer or part-time jobs can be arranged in business or industry and specifically designated for Hispanics in teacher education programs directed at math and science.

For Hispanic teachers currently employed or underemployed, an additional set of options can be made available:

- Bonuses, differentiated pay, grants, tuition reimbursement, and scholarships for Hispanic teachers willing to recertify in science or math related areas constitute important financial aid.
- Mid-career internships for Hispanic teachers to work in math or science areas of industry add an important dimension to their teaching in these areas.
- State- or federal-sponsored programs can be implemented specifically for Hispanic teachers and will accomplish the following:
  - Upgrade the existing pool of teachers in science and math.
  - Retrain teachers in related subject-matter areas to become science and math teachers.
  - Assist teachers in completing master's degree requirements in math and science areas that would, in the long term, make them eligible for salary increments.
- Federal and/or state tax credits can be granted to Hispanic teachers willing to stay in or to enter math or science fields.
- Schools can initiate cooperative efforts with business and industry to employ teachers part time, summers, or (after three years of service to the schools) full time. Teachers, however, must agree to return to the school districts for a specified number of years in order to be eligible for these part-time or summer programs.

What Are the Primary Elements of a Plan to Acquire More Hispanic Science and Math Teachers?

Two key steps must be taken to alleviate the shortages of Hispanic math and science teachers. The first is to attract Hispanic youth into the areas of math and science education. Existing low teacher salaries are not going to attract talented Hispanic youth to teach science and mathematics. Therefore, while all teacher salaries need upgrading, it is imperative that salaries of Hispanic math and science teachers be attractive and competitive. Additionally, Hispanic youth will not be attracted to math and science teaching if substantial funds are not available for scholarships, low interest loans, and/or internships and part-time jobs.

The second step, albeit temporary, is to retrain Hispanic teachers in oversupplied discipline areas (e.g., history and English) so they can teach math and science. School districts and state education agencies must (1) be supportive of Hispanic teachers who return to teacher education programs to be recertified in math and science; (2) facilitate the use of part-time Hispanic professionals from business and industry as teachers; (3) facilitate the employment of Hispanic math and science teachers in business and industry on a temporary basis; and (4) provide financial incentives in the form of bonuses or other rewards for Hispanic teachers who are willing to stay in math and science teaching.

REFERENCES

Burns, M. "The Current Status of Hispanic Technical Professional: How Can We Improve Recruitment and Retention." *Integrated Education* 20, 1-2 (1982): 49-55.

Franz, J.R., Aldridge, B., and Clark, R.B. "The Crisis in High School Physics Teaching. Paths to a Solution." *Physics Today* (September 1983): 44-49.

Good, T.L. and Hinkel, G.M. Teacher Shortage in Science and Mathematics: Myths, Realities, and Research. Washington, D.C.: National Institute of Education, 1983. ED 231 653.

Guthrie, J.W., and Zusman, A. "Teacher Supply and Demand in Math and Science." *Phi Delta Kappan* 64, 1 (1982): 23-33.

Impact of Teacher Shortages and Surplus on Quality Issues in Teacher Education. Washington, D.C.: American Association of Colleges for Teacher Education, 1983. ED 238 890.

Neill, G. "Quality of Math and Science Teaching: Federal Commission Studies Problem." *National Association of Secondary School Bulletin* 66,456 (1982): 41-48.

New Directions for Federal Programs to Aid Mathematics and Science Teaching. Washington, D.C.: General Accounting Office, 1984. ED 241 300.

Proceedings of the Symposium on the Effects on Technology on a Vanishing Species: Math and Science Teachers. 1982. ED 221 356.

Rush, G.S. "Corrective Measures in the Teacher Shortages: Consequences and Conclusions." *Education* 104,1 (1983): 34-37.

Sigda, R.B. "The Crisis in Science Education and the Realities of Science Teaching in the Classroom." *Phi Delta Kappan* 64,9 (1983): 624-627.

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