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ABSTRACT

A special program was initiated in 1985 at George Washington University to encourage persons from other careers to pursue a second career in teaching in the Washington D.C. area. This report describes the variables that had to be and are continuing to be considered in the design of this training effort for mid-career professionals. Factors considered include: (1) difference in the culture of the school and the environment of the first career; (2) developmental process of learning; (3) the educated consumer and teacher education; (4) the attributes and experiences of the career population; (5) match between the mid-career professional and the level and age of the student population; (6) certification is critical, the degree is not; and (7) part-time student/full-time professional. Perspectives are also offered on reform practices for teacher education. (ML)

Innovations in Math/Science Teacher Education:

A New Population; A Revised Training Agenda

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INNOVATIONS IN MATH/SCIENCE TEACHER EDUCATION:
A NEW POPULATION: A REVISED TRAINING AGENDA

There has been a great deal of discussion about the shortages of teachers in high need areas such as Mathematics, Science, Critical Foreign Languages, and Special Education. In the Washington D.C. area, the shortages are consistent with national needs. In areas such as Special Education, universities have been able to supply needed teachers through the help of the federal government. However, financial support for teachers of mathematics and science has only recently been available and as the focus of this funding has shifted to inservice activities, the future appears questionable at best.

Given the shortage of qualified math and science teachers which is severe in the inner city and of concern in surrounding suburban school districts, The George Washington University initiated a program in the fall of 1985 specifically designed to encourage persons from other careers to pursue a second career in teaching. An assumption of this effort was that there was a significant number of content trained professionals in the Washington D.C. metropolitan area who were intested in teaching as a second career and were interested in making that change within the next two to three years. Although this fact is more than likely the case in many areas of the United States, Washington is unique in that it has an extremely high concentration of military officers who make Washington their last tour of duty. Particular attention was given to this group in our marketing activities. In addition, there is an obviously

high concentration of government employees, and other business and technology professionals who make the D.C. metropolitan area their home. In the spring of 1985, initial public affairs announcements brought over 100 inquiries about the program. To date we have had over 225 program inquiries. The first students entered the program in the fall of 1985. There are currently 27 students enrolled in the program and the first students will graduate with an M.A. in May of 1987.

Current students include military officers (60%), Ph.D. content trained professions (20%) and various other professionals from the government, business and industry (engineering, accounting, biology, physics). A few of our students currently teach in private schools but the majority are part time students who are completing their current corporate or military obligations. They range in age from 29 to 57 and bring with them significant experience in the application of the discipline in which they were trained. In terms of aptitude, Graduate Record Examinations average in the 80th percentile.

This rather unique student population has been both exciting and challenging to work with. They demand excellence and relevance from their professors and provide a continuing source of both summative and formative feedback. From an administrative perspective, they have given us the opportunity to refocus our attention on our secondary training programs which have had very little activity in the past decade.

Listed below is a sample of the variables that had to be and are continuing to be considered in the design of this

training effort. Although some of these variables are unique to this population, we have found that our responnsiveness to this audience has had a significance on all of our secondary training efforts.

VARIABLES TO BE CONSIDERED IN THE TRAINING OF MID-CAREER PROFESSIONALS:

1. THE CULTURE OF THE SCHOOL IS SIGNIFICANTLY DIFFERENT FROM THE ENVIRONMENT OF THE FIRST CAREER.
   The mid-career professional must be exposed early and often to the secondary schools as they currently exist. It should be noted at the outset that we have significant input from the local school districts in the design of this training effort. One of their initial concerns with the population we were targeting was not their content expertise but their inability to adopt the "culture" of the school. This was particularly true of the military subpopulation.
2. LEARNING NEEDS TO BE VIEWED AS A DEVELOPMENTAL PROCESS.
   Recent criticism of teaching has focused on the lack of training in the content discipline. Although not unique to this population, a criticism of much of our secondary teaching is that it has been content focused rather than student focused. There needs to be a balance between the art and the science of teaching. The content training of this population far exceeds the established prerequisites. The challenge for us was to integrate the relevant knowledge of development and

pedagogy into the training process. For this population, an attempt has been made to integrate the experiences of child rearing and it's relevance to teaching.

3. THE EDUCATED CONSUMER AND TEACHER EDUCATION.

Unlike many of our undergraduate and first degree graduate trainees, the population that is the focus of this paper is a "smart shopper". All have had graduate and undergraduate training. All have experienced both the relevance and irrelevance of that training. Our challenge is to make the learning meaningful and valuable. Field work is essential both early and often. From the trainer's as well as the trainee's perspective, we must find out as early as possible whether there is in fact a match to avoid the pitfall spoken to by local system personnel.

4. THE POPULATION BRINGS MATURITY, THEORETICAL AND APPLIED EXPERTISE, APTITUDE, ENTHUSIASM, INTEREST IN THE CONTENT AREA, AND A DESIRE TO SERVE.

The strengths of this population are many. What is perhaps more important is that they are not carrying with them some of the "baggage" that the undergraduate or inexperienced graduate student brings. They are less concerned with the lack of prestige in education because they bring with them the prestige of their first career. Our military candidates bring with them a desire to serve which is quantifiably different from

our more traditional student. There appears to be a feeling among some of our students that they need to pay back the educational system for the benefits received in their first career. They bring with them greater financial flexibility; not an insignificant variable when selecting teaching as a career choice. They also bring with them the experience of a first career which allows them to generate solutions to real problems and helps expose the student to a teacher that has made an impact on society in other than a theoretical way. Other variables that are often referred to by the prospective applicant are experiences in teaching that have been rewarding, personal styles that are compatible with teaching and a love of the subject matter.

5. THE MATCH BETWEEN THE MID-CAREER PROFESSIONAL AND THE LEVEL AND AGE OF THE STUDENT POPULATION IS CRITICAL TO THE SUCCESS OF THE PROGRAM.

   There is a tremendous range of age, experience and ability in the student population. Advanced placement physics may be appropriate for the trainee with a Ph.D. in Physics and an employee of NSF; junior high school teaching may be more appropriate for the military officer with a degree in general science and a greater interest in the early adolescent. Ongoing student advisement is critical to program effectiveness.

6. CERTIFICATION IS CRITICAL; A DEGREE IS NOT.

There is a danger that the natural resource of the mid-career professional may be lost to education if we require the student to do an inordinate amount of coursework of questionable quality and relevance. There must be a balance between what is required to teach and the strongest possible training design.

7. A PART TIME STUDENT/A FULL TIME PROFESSIONAL. The typical student is a part time professional who is two to three years removed from separation or retirement. The sequencing of coursework and the opportunities for field work must be carefully and individually designed.

The following chart delineates the variables that have been considered in the design of the Mid-Career Math/Science Program at G.W.U. The list is by no means exhaustive but attempts to give the reader a feel for the innovations that are essential to success in this type of endeavor.

RELEVANT VARIABLES IN THE MCMS TRAINING POPULATION	RESPONSIVENESS IN THE TRAINING DESIGN
A. The culture of the school is foreign. Maturity is a strength but the schools are different now.	A.1. 30 hours of field work in first course (Observation/ Interaction) A.2. Western Educational Thought, a certification/ degree requirement
B. Content has been the focus of previous training, not development. The need to link child rearing (if possible) to teaching or explaining the relevance of the relationship is essential.	B.1. Psychology of learning and teaching focusing on the adolescent: 30 hours of field work; small group seminars to discuss relevance of Math/Science
C. The match of the MCMS trainee to teaching. The realities of the profession must be introduced early and often. The "desire to serve" may be insufficient.	C.1. Field work early and often: a. Psychology of Learning and Teaching. b. Peer teaching/Micro teaching in general methods. c. Field work requirement in specific methods either assigned to a model teacher or taught by district personnel. d. Formal internship dually supervised by university & LEA staff.
D. A mature professional with significant content expertise.	D.1. Focus on pedagogy: development, curriculum design, management, culture and teaching as an art as well as a science. 2. A "refresher" course may be appropriate to renew content expertise

3. Separate sections of coursework in deficiency areas. Small group "labs" as a minimum.

E. Range of professional and personal experiences

E.1. Individualizing field work, placement and career counseling.

2. Utilizing a greater range of placement options.

3. Cooperative arrangements with LEA's for internships.

F. Certification is critical; a degree is not.

F.1. Certification is embedded in degree sequence.

2. M.A. coursework beyond certification may include speciality work in computer technology, special needs groups and research methods. Electives in recent developments in teaching the discipline development & learning.

3. Core curriculum for 2nd professional degree program may be integrated into first professional degree programs at the end rather than the beginning of the degree sequence.

G. Meeting the needs of the part time student.

G.1. Evening classes; day and Saturday field work.

2. Internship/Student teaching may be paid experience.

We have been challenged at G.W. to design a highly individualized and relevant curriculum with significant fieldwork and a clear articulation of both theory and practice. The question in our minds currently is whether what we must do for this population should we not do for all trainee populations. In meeting the needs of this population, ideas have been generated for both our undergraduate and graduate trainee populations in other areas. One comes back to the premise that if good teaching is good teaching no matter what the discipline then good teacher training is good teacher training.

The demands of the mid-career professional is a healthy impetus to reform current practice while building enrollments in areas woefully underenrolled in the past decade. It is hoped that the innovations that have been reported in this paper, while not revolutionary, will foster a renewed interest in the reform of teacher education by those of us who are the implementers.