

# EXAMINATION OF APPLICANT PROFILES

## Examination of Applicant Profiles for Admission into and Completion of an Online Secondary Teacher Certification Program

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Abstract

This research examines the academic and biographic profile of applicants to program admission and success in completing an online alternative secondary teacher certification program. Results of statistical analyses conducted on 170 applicants over the past three years affirm the importance of the applicant's performance on the state content licensure examination. Other academic variables and biographic variables were found not to influence success in completing this secondary teacher certification program.

### Introduction

As recently as five years ago, it was widely believed that severe teacher shortages were imminent caused by increasing student enrollments and increasing teacher turnover due to a “graying” teacher force. The resulting shortfall of teachers would force school districts to lower standards to fill teacher vacancies, inevitably resulting in high levels of under qualified teachers and lower student performance. The policy response has been to increase the supply of teachers through recruiting new candidates to teaching with career-change programs, (i.e., troops-to-teachers), Peace Corps-like programs (i.e., Teach for America), alternative certification programs (Birkeland & Peske, 2004), and financial incentives (signing bonuses, student loan forgiveness, housing assistance, tuition reimbursement). The “No Child Left Behind Act” has provided federal funding for many of these initiatives (Ingersoll, 2003), including the alternative certification program, *Accelerate Online/OPTIONS*, that is discussed in this paper and is part of the Transition To Teach (TTT) program. The Transition to Teaching program (TTT) is described in Chapter B of the No Child Left Behind Act. Its purposes are “(a) to recruit and retain highly qualified mid-career professionals (including highly qualified paraprofessionals), and recent graduates of an institution of higher education, as teachers in high-need schools, including recruiting teachers through alternative routes to certification; and (b) to encourage the development and expansion of alternative routes to certification under State-approved programs that enable individuals to be eligible for teacher certification within a reduced period of time, relying on the experience, expertise, and academic qualifications of an individual, or other factors in lieu of traditional course work in the field of education” (AIR, 2006).

(a) *Teacher Shortage or Turnover*

Recurring accounts of local school districts and state departments of education experiencing teacher shortages continue to appear in professional journals (Budig, 2006; Guarino, Santibanez, & Daley, 2006), daily newspapers (Chaker, 2006), and the evening news offered by broadcast networks. To illustrate these accounts, approximately half of our nation's promising young educators as well as their more experienced colleagues choose to leave their schools during their first five years in the profession (Levin, 2006; Weaver & O'Brien, 2004). Of those who stay, especially teachers in high need settings, some remain to gain the seniority needed to transfer to schools whose needs are not as pronounced. While not affecting the overall teacher supply in a state, transfer from high need settings can and do lead to continuing shortages of experienced teachers in high-turnover schools (Hull, 2004).

Teacher turnover can be grouped under two categories, migration and attrition with about equal numbers of exiting teachers grouped under each category. Ingersoll (2003) reports that teachers usually offer personal reasons for exiting their teaching position, but some (about one-fourth of those leaving) add that job dissatisfaction due to low salaries, lack of instructional and emotional support, feelings of isolation, and little influence on how they do their work are reasons for their departure from classrooms. Approaches frequently noted in the literature for reducing teacher attrition include quality induction and mentoring programs (O'Neill, 2004); while the teacher migration problem can be addressed by providing extended professional development opportunities for all teachers beginning with induction and continuing with career-long opportunities for instructional leadership throughout their careers (Hull, 2004).

(b) *Quality Teacher Preparation*

Factors contributing to national leaders' concerns about teacher supply are that states and school districts face the challenge of attracting more people into teaching while improving teacher quality (Stroup, April 24, 2002). The report, *Meeting the Highly Qualified Teachers Challenge: The Secretary's Annual Report on Teacher Quality* (USDE, 2002), provides recommendations for carefully examining and changing aspects of teacher certification including: state certification requirements, minimal criterion teaching

candidate performance on state licensure examinations, and the practice of hiring teachers on emergency certificates. The following quotation captures the serious tenor of this report about teacher certification and teacher education programs across the country.

Many academically accomplished college graduates and mid-career professionals with strong subject matter backgrounds are often dissuaded from entering teaching because the entry requirements are so rigid. At the same time, too many individuals earn certification even though their own content knowledge is weak (p. vii).

Academic standards for teacher certification are set quite low. To illustrate, for a teacher licensure test, only 1 of 29 states sets its passing score near the national average in reading; 15 states established passing scores below the 25<sup>th</sup> percentile. Similar low criterion pass scores are noted for mathematics and writing tests. These low criterion scores and the statistic that more than 90 percent of teaching candidates pass these tests do not instill confidence in the quality control aspect of licensure examinations (Goldhaber & Brewer, 2000; USDE, 2002).

Other reports convey similar views, i.e., the National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century (also known as the Glenn Commission) reported an urgent need to “increase significantly the number of mathematics and science teachers and improve the quality of their preparation”(USDE, 2000). Similarly, the Committee on Science and Mathematics Teacher Preparation of the National Research Council called for a fundamental restructuring of teacher preparation/professional development (NRC, 2000a). A few years earlier, the authors of the National Science Education Standards advocated changes in how teachers are educated, and recommended “a new way of teaching and learning about science that reflects how science is done, emphasizing inquiry as a way of achieving knowledge and understanding about the world” (NRC, 1996, 1997). This view is reinforced by Bransford, Brown and Cocking (2000) who contend that teacher preparation programs need to prepare teachers to think about the enterprise of teaching as building on the student’s existing knowledge base and preconceptions, and to continually assess student progress. These processes of knowing will facilitate deep understanding of themselves and the subject matter they will teach. For the sciences, the *Atlas of Science Literacy* (AAAS, 2001) provides clear guidance for teaching candidates to understand what

students can be expected to learn in different grades.

(i) *Higher Standards*

The demand for higher science education standards is evident at the state and local levels as well. Texas has added science (biology, integrated chemistry, and physics) to the Texas Assessment of Knowledge and Skills (TAKS) examination that 11<sup>th</sup>-grade students are required to pass in order to graduate from high school (OTHSE, 2001). Yet a major challenge to improving science education lies in the shortage of qualified science teachers (Chaika, 2005; Darling-Hammond, 2000a; NCES, 2001; NRC, 2000a, 2000b; USDE, 2000; UTC, 2000). “Research has generally shown that high school math and science teachers who have a major in the subjects they teach elicit greater gains from their students than out-of-field teachers, controlling for the student’s prior academic achievement and socioeconomic status” (USDE, 2002). Supporting this point-of-view, Goldhaber and Brewer (2000) reported from their analysis of a subset of the national Educational Longitudinal Study of 1988 (NELS: 88) that 12<sup>th</sup> grade student achievement in mathematics was greater if their teachers had subject specific preparation (a mathematics degree or teacher certification in mathematics). Most experts agree that personnel entering science teaching fields should have a science major *in addition* to pedagogical studies (AFT, 2000; Berry, 2002; Bybee & Loucks-Horsley, 2001; NRC, 2000a). Further, Darling-Hammond (2000b) emphasizes the importance of pedagogical studies in her analysis of teacher quality on student achievement citing research that reported consistent positive effects of teachers’ formal education preparation on supervisor ratings of teaching performance and student learning.

Nevertheless, the use of non-credentialed personnel in teaching roles was widespread in urban school districts a few years ago (UTC, 2000), with 20-25% of high school science and mathematics teachers nationwide not possessing a major or minor in their teaching field (USDE, 2000). Unfortunately, academically weak college graduates are more likely than those who are academically strong to prepare to teach and to remain in teaching (USDE, 2002).

(c) *Advancing Knowledge and Understanding in Preparing Natural Science Teachers*

Prior reports have documented the need for fundamental restructuring of teacher preparation and professional development. In addition, a potential solution consists of directing the energy and talent of graduate students and postdoctoral scientists to reinvigorate science education in schools (Alberts, 1999). This requires creating new, more accessible pathways for science professionals to enter teaching careers. One study included the finding that while 36% of doctoral-level mathematics and science graduate student/postdoctoral fellows surveyed had considered secondary school teaching in their career decision-making, only 0.8% of science and mathematics Ph.D.s work in K-12 education. Reasons for not pursuing teaching careers include perceptions about the difficulty of obtaining teacher certification (NRC, 2000b). Paradoxically, many undergraduate teacher preparation programs produce teachers who are weak in one or more science content areas, while at the same time, existing alternative certification requirements are thought to be so rigid and time consuming that content experts, such as scientists and engineers, are discouraged from transitioning into teaching.

(d) *Call for Teacher Preparation Research*

In the introduction of their monograph, *A Good Teacher in Every Classroom*, Darling-Hammond and Baratz-Snowden (2005) note that more than one hundred thousand new teachers enter classrooms across the country each year. These beginning teachers vary greatly in the professional skills and knowledge they bring to the classroom with many having little or no formal learning experiences regarding essential knowledge and clinical experiences needed to succeed in the classroom. Darling-Hammond and Baratz-Snowden continue by listing the following traits and applications exhibited by teachers whose students exhibit strong academic achievement.

Effective teachers use many different tools to assess how their students learn as well as what the students know. They use this information to help students advance from where they are to where they need to be. They carefully organize activities, materials, and instruction based on students' prior knowledge and level of development so that all students can be

successful. They know what conceptions students should bring with them about the subject and what misconceptions are likely to cause them confusion - and they design their lessons to overcome these misinterpretations. They adapt the curriculum to different students' needs; for example, making content more accessible for students who are still learning English and for those who have special educational needs. (pages 2-3)

These authors stress that teacher preparation has evolved to the degree that there is agreement on what beginning teachers need to know in order to enter the classroom with professional competence to adequately serve the very first students they teach. Two other recent policy papers supported by the National Council on Teacher Quality and the Education Commission of the States provide accounts regarding whether empirical research supports commonly held notions and practices applied to teacher certification, selection, retention and compensation. The reports, *Increasing the Odds: How Good Policies Can Yield Better Teachers* (NCTQ, n. d.) and *Eight Questions on Teacher Preparation: What Does the Research Say?* (Allen, 2003) examine factors affecting policies enacted by state governments and local school districts in deciding who will be admitted to the teaching profession. Drawing from these sources, it is evident the assumed relations among variables (professional and personal characteristics) for selecting and preparing tomorrow's teachers need additional examination given the following findings reported in these reports.

- Research evidence does not exist to support or refute more stringent teacher preparation entrance requirements or conducting more-selective screening of program candidates to positively affect student achievement.
- Personal attributes of high achievement orientation, accepting responsibility, demonstrating critical thinking, being organized, being motivated, being respectful of others, and supporting the goals of the organization are soft attributes thought to relate to greater student academic gains.
- Teachers with strong academic credentials generally produce greater student academic gains.

- Empirical evidence supports the idea of a positive association between the level of literacy of teachers and academic achievement of their students.
- Greater subject matter knowledge has mixed empirical support with secondary mathematics and science teachers with greater subject preparation generally showing a positive relation to student achievement, but this modest support does not occur with other secondary content areas.
- The research evidence suggests that preparation in a given subject does not necessarily develop understanding of how particular knowledge and skills of the content domain are best learned.
- There is insufficient empirical evidence to support any teacher preparation models that will produce effective teachers in hard-to-staff and low-performing schools.

The underlying theme from all of these reports is the call to strengthen research capacity by defining a strategic and coordinated research agenda for teacher preparation. Our experiences (Denton, Davis, Smith, Strader, Clark, & Wang, 2004-05) with technology professional development for teacher educators and classroom teachers are consistent with the literature (Garet, Porter, Desimone, Birman, & Yoon, 2001; Joyce & Showers, 2002; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003) regarding professional development experiences that emphasize academic subject matter (content), provide opportunities for “hands-on” activities (active learning), are integrated with ongoing classroom operations (coherence), and provide many development experiences for an extended period of time are more likely to produce desired knowledge and skill changes. In melding our experiences with an evolving research agenda, we begin with this investigation of examining academic and biographic variables of applicants associated with being admitted as a candidate and then completing all requirements for secondary teacher certification. The following section provides a description of components of the Accelerate Online/OPTIONS program including recruitment and placement protocols. Sections following this description include the research questions, methods, results, and conclusions.

This program was established to provide a flexible alternative certification program for life science and physical science, including chemistry, physics, composite science, and mathematics (grades 8-12). This program has three features setting it apart from other alternative certification programs offered in Texas. First, it is offered as a university-based continuing education program that does NOT yield student credit hours to the University, thus reducing costs (no tuition expenses) for candidates although they do pay an enrollment fee to participate in the program. Second, because the pedagogy content associated with state licensure is accessible, 24/7 as an on-line experience throughout the state, certification can be completed by those possessing or pursuing science degrees with an online program of education that can be completed in 12-18 months. Third, the program has been developed from a partnership between a College of Education and Human Development and a College of Medicine that is providing a talent pool of candidates with strong academic backgrounds in science and mathematics. The curricular elements of the program consist of an on-line curriculum with web-supported field experiences. The online Curriculum consists of 35 online modules developed to engage the candidate with concepts and skills identified as necessary for a beginning teacher by the Texas Board of Educator Certification. The Field Based Experience consists of a 40 clock-hour supervised teaching field experience in a secondary school during the initial phase of the program. The final program component is a paid internship where candidates are supported by both a trained classroom teacher mentor and the university supervisor, who guide, observe and provide constructive feedback to the interns during their year-long development as a beginning teacher. These program components are described in greater detail elsewhere by Denton, Davis, Smith, Beason, and Strader (2005).

### *Section 1.02 Recruitment & Selection of Participants*

*Candidate Recruitment.* Extensive recruitment efforts have been implemented by project staff with differing levels of success. Initial marketing techniques we applied with little yield included: a Jumbotron ad placed on the scoreboard screen during a home football game with over 80,000 in attendance, a radio ad aired during each football game across a season, a program flyer used as a screen saver on all student workstations located in university computer laboratories; and information presented about the *Accelerate*

*Online/OPTIONS* program at local school district substitute teacher meetings held each month. Additional approaches tried were: newspaper ads placed in the campus newspaper targeting particular times in the semester; ads in the alumni association quarterly journal; newspaper ads placed in local and Houston newspapers. These marketing techniques were directed at soon-to-be graduates, recent graduates and mid-career participants and have yielded modest inquiries from prospective applicants. As our experience with marketing our program evolved, we have sought opportunities to personally engage current students and recent graduates through vis-à-vis interactions at career fairs and booths at professional conferences and personal visits with college and departmental academic advisors. These approaches, although quite time intensive are yielding personal contacts leading to program candidates. Additional techniques we have implemented and continue to use to communicate our program to the educational community include: poster placements on bulletin boards at strategic locations on campus (close proximity to college advising offices); direct communication (e-mail, telephone, cover letter and brochure) with school district certification offices and secondary school principals; website banner ads; program announcements provided on an intranet bulletin board; program description links on college homepage, and recently Google search engine “Ad words” and URL advertising based on keyword selection by potential applicants. We believe these marketing techniques collectively are communicating our program as an avenue to secondary teacher certification.

Gradually, these marketing efforts and personal contacts have succeeded in raising awareness about our program to the extent that 70 to 100 inquiries are received each month. During the past year, we registered 973 inquiries about the program. The cost of marketing the program to achieve this increased awareness has also increased proportionately with \$2,000/month now being spent on recruitment. In an effort to determine which of these marketing approaches are achieving the highest number of additional applicants, we began posing a question to individuals contacting us about how they learned about our program. Increasingly the response the individual gives is that she initially encountered our program by searching the internet and located our website, <http://accelerate.tamu.edu> that describes the program attributes, costs, and requirements.

*Admission of Candidates.* The following requirements for admission into *Accelerate Online/OPTIONS* are based on admission requirements of the undergraduate teacher preparation programs at our University. These requirements have provided quality assurance to teacher education faculty that entry requirements into *Accelerate Online/OPTIONS* are equivalent to the requirements developed and approved for the undergraduate teacher education programs. In order to be admitted the applicant must:

- either be a college graduate or graduate student, or be within one year of completing a baccalaureate. Applicants must have at least a 2.5 GPR in their baccalaureate course work attempted or a 2.75 GPR on the last 60 hours of the baccalaureate degree or 3.00 GPR on advanced degree course work.
- have a minimum of 24 semester hours in a specific content specialization, or 36 semester hours in a composite field (including a minimum of 3 semester hours in all sub-areas).
- pass or be exempt from TASP (basic competency test). Holding a baccalaureate degree exempts the applicant from this requirement.
- pass the required Texas Examinations of Educator Standards (TExES) content exam(s). This requirement was included to enable our candidates to be considered “fully qualified” in content area as defined by the “No Child Left Behind” guidelines.
- have access to an Internet-capable computer.
- pass a background check of any criminal activity relating to children.
- submit two letters of recommendation.
- demonstrate verbal fluency with English and convey a genuine interest for teaching youth in a personal interview with program staff.

Demonstrating verbal fluency in English in a personal interview was added to the selection criteria, after a number of candidates exhibited some difficulty in communicating orally in English. While the primary function of the interview is to determine oral fluency, this interview also provides the candidate an opportunity to meet project staff and seek additional information about the program before making a commitment. The project staff also assesses the applicant’s “soft” characteristics of high achievement orientation, accepting responsibility, demonstrating critical thinking, being

organized, being motivated, being respectful of others, and supporting the goals of the organization. Although rare, two applicants have been advised to seek other employment opportunities due to their interview responses.

*Candidate Program Costs.* For the initial three years of this program, the total cost to complete certification was \$5,165.00. This total included an enrollment fee of \$4,775.00 with an additional \$390.00 being assessed for a criminal background check of the applicant, and State of Texas certification fees for examinations and licenses. During this period of program start-up, anticipated costs for travel and supervision were lower than initially projected due to locating university supervisors in communities relatively near the interns' schools. As a result the total cost to complete certification became \$4,590.00 on September 1, 2005. This reduced total reflects a lower enrollment fee of \$4,200.00 with all other fees remaining unchanged. For a candidate to begin the program an Enrollment Agreement is entered into by the candidate and *Accelerate Online/OPTIONS*. This agreement delineates the cost of the program with different payment options, the availability of scholarships, and the expected time to complete the program with provisions for extending the time to complete the program. Generally, candidates opt for an extended payment schedule with the convenience of online payments.

*Scholarships.* Scholarships to defray all or a portion of the enrollment fees have been available on a limited and intermittent basis since this program began. The following table presents grants, scholarships or tuition waivers provided to eligible program participants.

Table 1. Scholarships - Grants for *Accelerate Online/OPTIONS* Candidates

Year	Type of Support – Funding Source and amount	Eligibility Requirements	Number of Participant Awards
1	Teach for Texas Alternative Certification Conditional Grant - State of Texas, \$5,376	Participant in Alternative Certification Program – partially funded by State	1
1	Tuition wavier to OPTIONS candidates - Houston Endowment, Inc., \$4,775	Participants in OPTIONS	6
2	Transition To Teach Scholarships - U.S. Dept. of Ed., \$3,000	Available to candidates placed in high need school internships	3
3	Noyes Fellowship - National Science	Available to mid-career	12

	Foundation, \$10,000	candidates	
4	Noyes Fellowship - National Science Foundation, \$10,000	Available to mid-career candidates	4*
4	Transition To Teach Scholarships - U.S. Dept. of Ed., \$5,000	Available to candidates placed in high need school internships	2*

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\*Year 4 presents participant awards occurring during the initial 2 months of the year.

During the initial year of the Accelerate Online/OPTIONS program, our candidates were eligible for a Teach for Texas Alternative Certification Conditional Grant administered by the State Board of Educator Certification. Individuals participating in approved Alternative Certification Teacher Certification programs were eligible for these awards. The “conditional” aspect of this grant required the grant recipient to teach in a Texas public school for five years, or repay the grant. Two of our candidates submitted applications for these grants of \$5,376. Yet due to state funding shortfalls, a limited number of awards were distributed based on the submission date of the applications. This decision rule resulted in just one of our applicants receiving this grant. Also during this period, our College of Medicine partner received funding from the Houston Endowment Foundation to support candidates they were recruiting to become teachers. This funding permitted waiving the enrollment fee for all (six) OPTIONS candidates for year 1.

A concerted effort was undertaken during year 2 of this program to offer Transition-To-Teach (TTT) scholarships of \$3,000 to interns who sought and obtained teaching positions in high need school districts. Funds were set aside to fund 25 interns accepting assignments in high need schools, yet just 3 of 14 interns accepted positions in high need school districts. These interns received awards to partially defray the cost of this certification program.

During year 3, our College of Medicine partner applied for and received funding for Noyce Scholarships from the National Science Foundation. Twelve mid-career applicants from our program were selected to receive these awards once they had progressed to their final field assignment. No requirement was placed on the intern to accept an assignment in a high need school district for the Noyce fellowship, although there is a requirement of teaching three years in a science or mathematics secondary assignment. It has been a surprise, that grants, tuition waivers, fellowships, and scholarships have not noticeably influenced decisions of applicants to participate in our

program. We believe the conditions associated with accepting an award of teaching for an extended period (Noyce fellowship) in a particular type of school district for at least one of these awards (TTT scholarship) has influenced decisions of program applicants to not accept a scholarship or grant award.

### *Completing Online Curriculum and Early Field Experience*

*Monitoring Candidate Progress.* An extensive digital monitoring system was developed for Accelerate Online/OPTIONS that includes an on-line registration system with password protection for candidate entry, and an underlying management tracking resource. For the candidates, the management system serves to affirm their program status in terms of completed assignments and module deliverables and it will return them to the point they exited when they come back to the module. As a management resource for program administrators, this digital monitoring system attends to each candidate's visits to a module, the elapsed time spent examining the contents of the module and whether items requiring a response have in fact been completed as well as module pretest and posttest performances by the candidates. Given these data, candidate progress in completing the modules are continually monitored to determine whether individual candidates are progressing satisfactorily in the program, as well as determining whether modules have potential design flaws given the collective performance of the candidates on particular activities as well as overall performance on the module.

*Early field experience and postings to ePortfolio.* Early field experiences are assigned to engage candidates in thinking about classroom actions in terms of the principles and concepts presented in the online modules. Candidates are expected to upload completed lesson observations and interview forms to their ePortfolios across the multiple week experience that document their observations, experiences and reflections. Further, candidates are expected to participate in activities that involve more interaction with students during the latter stages of the initial field experience. The digital artifacts associated with the early field experience are closely monitored because they provide documentation the prerequisite experiences have been met to qualify the candidate for their internship.

(a) *Candidate Placement in Final Field Experience*

Establishing effective strategies for placing candidates in paid teaching assignments has evolved from *denial* (affirming among ourselves that job placement was NOT our responsibility) to *affirmation* (actively marketing all of our candidates to school districts). Ultimately, our goal is to place *all* of our candidates who have completed their online modules and early field experiences in paid internships. As placement protocols have evolved, we have actively communicated the qualities of the *Accelerate Online/OPTIONS* program and the credentials of our candidates to school officials in assisting our candidates obtain *paid* internships. Approaches we have employed include: *direct mailings* to school district administrators (both principals and superintendents) about our available secondary mathematics and science teaching candidates; *personal visits* with human resource directors at fall and spring Career Fairs regarding our available teaching candidates; *booth* at the Texas Association of School Administrators annual meeting to inform school administrators and human resource officials from school districts across the state about the program and our available candidates; *luncheons* with superintendents and human resource professionals to promote teaching candidates participating in the program; and *direct communications* by our coordinator of placement with human resource officials and school administrators.

We have found that powerful tools in recruiting schools to hire our candidates are the ePortfolios the candidates have developed after beginning their programs. To facilitate the active review of the credentials of our candidates, an online *ePortfolio Center* <http://empowermentzone.tamu.edu/portfolios/center/> was set up for school administrators to search ePortfolios of teaching candidates – by *Last Name*, or *Certification Area*, or the candidate’s preferred location or *Regional Preference*. Over the course of these events and activities, we have learned that contacting secondary school principals and human resource officials about our available candidates and providing them access to the candidates’ ePortfolios have been very effective placement tools. Increasingly, placements are being negotiated throughout the school year, rather than just the months prior to the opening of school in the fall.

Hopefully the preceding account of the processes we have implemented in recruiting, providing hands-on instructional experiences, monitoring performances, and placing interns provide sufficient background to gain a sense of our need to know more from a quantitative perspective about individuals who participate and complete our program. The following research questions have been phrased to guide this inquiry.

### Research Questions

1. What academic and biographic variables of program applicants relate to successful admission into the certification program?
2. What academic and biographic variables of program candidates relate to successful program completion and certification?

### Methods

#### *Sample*

The sample includes 170 individuals who have provided applications to the Accelerate Online/OPTIONS Secondary Teacher Certification Program. Table 2 presents descriptions of academic variables examined in this study. The academic variables selected are based on the program's admission criteria as well as recommendations from the literature on recruiting and preparing quality teachers (Alberts, 1999; Allen, 2003; Goldhaber & Brewer, 2000; NCTQ, n.d.; USDE, 2000). The study consisted of 126 females and 44 males, across five teaching fields Life Sciences ( $n = 95$ ), Physical Sciences ( $n = 13$ ), Composite Science ( $n = 22$ ), Mathematics ( $n = 18$ ), Other ( $n = 22$ ); holding PhD/MD ( $n = 28$ ), MS ( $n = 19$ ), or BS ( $n = 123$ ) degrees. Five ethnicities were represented Euro-American ( $n = 121$ ), African-American ( $n = 6$ ), Asian-American ( $n = 9$ ), Hispanic ( $n = 13$ ), Indian ( $n = 9$ ), not specified ( $n = 12$ ), and either a recent graduate ( $n = 108$ ), or a mid career changer ( $n = 62$ ),

Table 2. Frequencies and Descriptive Statistics of Select Academic Variables

Academic Variable	N	Mean	S.D.	Maximum	Minimum
Undergraduate Grade Point Ratio	144	3.12	.46	4.00	2.00
TExES Content Score	155	254.5	24.0	294	182

Semester hours in content field	83	43.5	13.6	80	20
Years since undergraduate degree	169	6.2	9.0	0	35

Summarizing the values in the preceding description and table as an applicant profile, we note that the typical applicant to our program is a Euro-American female who majored in a life science program accumulating more than 43 credit hours in their major and recently earned a baccalaureate degree while maintaining a B grade average.

#### *Data Collection.*

Extensive biographic data on applicants are compiled into a program data base beginning with the submission of an application. Assuming all admission criteria have been met, the applicant is then officially accepted into the program as a candidate. The final steps to be certified as a secondary science or mathematics teacher assuming a successful final field experience are that the candidate passes the TExES Pedagogy and Professional Responsibilities (grades 8-12) examination (i.e., meeting or exceeding the State's criterion score of 240) and submits an application to program staff who verify the candidate's successful completion of certification requirements. At present, every Accelerate Online/OPTIONS intern who has sit for the TExES Pedagogy and Professional Responsibilities examination has attained a passing score. Scores from the TExES tests and additional program data are added to the record of each candidate as the information is received resulting in a record containing more than 300 variables on each candidate who successfully completes the program.

#### *Data Analysis.*

The Statistical Package for the Social Sciences (SPSS, 2004) was used to conduct descriptive statistical analyses of the biographic and academic variables across this sample to determine the status of applicants with respect to completing teacher certification in our program. The resulting summaries presented in the preceding *Sample* section confirm sufficient diversity across the applicants to warrant additional analyses of these data. Subsequently non-parametric correlations were calculated to determine whether particular profile variables of applicants were related to successful program entry and program completion. Discriminant analyses were then conducted to determine whether biographic

and academic profiles can be identified to predict both successful program admission and completion to become a certified secondary teacher.

## Results

### *Descriptive Analyses*

Participant status has been monitored as an important formative evaluation function in determining our progress in implementing the program. The following table provides a summary of participant status across three years of program operation.

Table 3. Status of Individuals Submitting Applications to Accelerate Online/OPTIONS Program Partitioned by Highest Degree Earned\*

Highest Academic Degree	PhD/MD	MS	BS	Total
Not Admitted	16	8	48	72
Current Applicant	0	0	2	2
Dropped Candidate	0	1	0	1
Current Candidate	4	4	15	23
Current Intern	0	0	5	5
Dropped Internship	1	1	3	5
Completed Certification	7	5	50	62
Total	28	19	123	170

\*Values were obtained on May 31, 2006 from program database.

We note from examining the values in Table 3, a sizeable number of applicants across all levels of academic preparation were not admitted into our online certification program. Attrition ratios (# of applicants not admitted/ # of applicants) partitioned by highest degree attained were found to be .57 for PhD/MD and .42 for MS and .42 for BS applicants. Reviewing admission criteria and corresponding data, four factors were found that inform non-admission decisions. These factors and the number of applicants affected are presented in Table 4.

Table 4. Reasons for Program Non-admission of *Accelerate Online* Applicants

Highest Degree Attained	PhD/MD	MS	BS	Total
Not admitted	16	8	48	72
Failed TExES Content Test	6	0	22	28

Unsuccessful Interview	1	1	0	2
Low GPA	0	0	5	5
Incomplete Application	9	7	21	37

The most common reason for non-admission has been failing to complete the application process. Thirty-seven (37) applicants have failed to provide one or more required elements needed for a complete application to the program and have not been admitted. Apparently a “change of heart” about becoming a teacher occurred for the applicant during the process of submitting a complete application packet. Possibly the tasks of obtaining transcripts to document their GPA and course work in their specialization, the background check of criminal activity, obtaining two support letters, and the prospect of not successfully completing the TExES content test caused some applicants to reconsider their career decision about becoming a teacher. Perhaps these admission requirements were too rigid and time consuming that scientists and engineers, and some recent graduates with science majors, were discouraged from transitioning into teaching as suggested by recent reports (NRC 2000b; USDE, 2002). Yet these admission procedures are thought to be necessary to assure ourselves and employing school districts the applicant has at least been carefully screened to teach secondary students.

Low undergraduate grade point ratios resulted in non-admit decisions for 5 applicants with BS degrees, although each of these individuals had transcripts that documented sufficient academic courses in the teaching field to meet admission requirements. Less pronounced but meaningful is the listing of two applicants who were not being admitted because personal views and expectations about teaching were expressed during their interviews that are quite incongruent with actual classroom environments. The soft attributes cited previously (Allen, 2003; NCTQ, n.d.) about personal attributes of high achievement orientation, accepting responsibility, demonstrating critical thinking, being organized, being motivated, being respectful of others, and supporting the goals of the organization have been integrated into the interview process and assessed on each applicant.

Twenty-eight (28) of the 72 applicants who were not admitted to the program did not attain the TExES content test criterion score for admission. Masters level applicants performed as expected with all of these applicants reaching or exceeding the criterion score

of 240. Yet similar results did not occur for the PhD/MD applicants with 6 applicants holding advanced degrees not achieving the criterion score. Also, 22 applicants holding baccalaureate degrees with academic concentrations in the content domain tested failed to reach the admission criterion score on the TExES content test. Although reasons for the less than expected performance of PhD/MD applicants have not been determined, one conjecture is that the advanced degree applicants have become so specialized in their graduate or professional studies that some areas of the content domain addressed on the test had not been considered for several years. A second hypothesis that we have posited is that these individuals over-analyzed the test questions. Whatever the reason or reasons for these less than expected performances, this TExES criterion score standard for admission has impacted whether an applicant has become a candidate in our teacher preparation program. This finding suggests the content test admission standards are not as lax as has been suggested in the literature (USDE, 2002).

Looking at the program participants from the perspective of program completers was then undertaken. In the following table (Table 5) we examined the ratios of success for attaining certification.

Table 5. Success Ratios of Applicants Classified by Highest Degree Attained

Highest Degree Attained	PhD/MD	MS	BS	Total
Number Completing Certification (A)	7	5	50	62
Number of Applicants (B)	28	19	123	170
Success Ratio (A/B)	0.25	0.26	0.41	

With these ratios clustering at .31 +/- .10 when partitioned by highest degree of applicant, other biographic variables (gender, ethnicity and career status) were examined to determine whether an observed relation occurred when individuals who successfully completed the program and were certified were partitioned by these biographic variables. The results of these analyses are presented in Table 6.

Table 6. Ratios of Applicants Attaining Certification Partitioned by Gender, Ethnicity, and Career Status

Applicants	Gender		Ethnicity		Career Status	
	Female	Male	Euro-American	Other	Recent Graduate	Mid-career

Attained Certification (number)	49	13	50	10	48	14
Total Applicants (number)	126	44	109	35	108	62
Ratio (A/B)	.39	.30	.46	.29	.44	.23

The ratios for gender, ethnicity and career status cluster at .35 +/- .11; it appears these biographic variables are modestly associated with the applicant ultimately completing the program and becoming a certified secondary teacher. Yet if we assume the five current interns (see Table 3) who are female, Euro-American, and recent graduates will complete certification, then variation across these ratios increase and have led us to examine these data from another perspective.

#### *Bivariate Correlations*

Non-parametric correlations were calculated between the variable, *program admission* with two nominal academic (criterion TExES score, criterion undergraduate GPA), one ordinal variable (highest degree) and three nominal biographic variables (Euro-American, gender, career status), and then repeated for the variable, *completed certification* with those same academic/biographic variables.

Table 7. Kendall's tau\_b Correlations of Academic/Biographic Variables with Admission and Certification

Independent Variables	Admitted			Certified		
	n	r	Sig.	n	r	Sig.
Criterion TExES Content Score	155	.612	<.001	155	.392	<.001
Criterion Undergrad. GPA	144	.106	n.s.	144	.076	n.s.
Highest Degree	170	-.102	n.s.	170	-.136	.069
Ethnicity (Euro-American/Other)	144	.163	.051	144	.151	.072
Gender	170	.069	n.s.	170	.045	n.s.
Career Status	167	-.213	.006	167	-.231	.003

Statistically significant correlations were found between becoming a *candidate* with attaining criterion TExES content scores ( $r = .612$ ), and career status ( $r = -.213$ ) favoring recent graduates becoming candidates. Similarly, statistically significant correlations were found between becoming *certified* with attaining criterion TExES content scores ( $r = .392$ ), and career status ( $r = -.231$ ) favoring recent graduates. The relation

between program admission and meeting or exceeding the criterion score on the TExES content test was expected because a TExES criterion score must be reached before the applicant can be admitted and ultimately certified; in fact, Table 4 provides values to determine that 39% of the applicants not admitted did not reach the TExES criterion content score. The negative correlations for career status occurred due to coding the recent graduate as “0,” and the mid-career applicant as “1”. Given the values reported in Table 6 for candidates attaining certification, it was expected that more candidates and program completers would occur under “recent graduates” than “mid-career,” and the negative correlations support these expectations. The biographic variable ethnicity presented as a nominal variable, Euro-American (coded as 1) and Other (coded as 0) yielded a correlation ( $r = .163$ ) with being admitted as a candidate, and a correlation ( $r = .151$ ) with becoming a certified secondary teacher. These values align with the success ratios presented in Table 6 where the Euro-American ratio exceeded the Other ratio in terms of the ethnicity of candidates completing certification. Finally, the academic variable, highest degree presented as an ordinal variable with doctorate (coded as 3), masters (coded as 2) and baccalaureate (coded as 1) yielded a correlation ( $r = -.136$ ) with completing teacher certification. This correlation although not statistically significant is consistent with the values presented in Table 5 where a higher success ratio and a substantially greater number of baccalaureate candidates completed certification compared to candidates holding masters and doctoral degrees.

### *Discriminant Analyses*

A final set of analyses was then conducted to determine whether dichotomous biographic variables (i.e., ethnicity [Euro-American or Other], career status [mid-career or recent graduate]), and academic characteristics of applicants (i.e., criterion TExES content score attained [yes/no], highest degree [3 = doctorate, 2 = masters, 1 = baccalaureate]) could be combined to predict whether the applicant would become a candidate in our certification program and complete certification. These biographic and academic variables, presented in Table 7, were selected for these analyses based on the magnitude of the correlations between these variables with becoming a candidate and completing certification. Discriminant analysis was selected because this procedure is useful for

situations where a predictive model of group membership is desired based on observed characteristics of each applicant. The procedure produces a single discriminant function based on linear combinations of the predictor variables that provide the best discrimination between the two groups, (i.e., candidate/non-candidate or certified/not certified). The function is generated from a sample of cases for which group membership is known; the function can then be applied to new cases with measurements for the predictor variables but unknown group membership (SPSS, 2004; Stevens, 2002).

Table 8 summarizes two discriminant analyses conducted for classifying whether applicants would become candidates in the program and then complete certification. Each of the two canonical discriminant functions yielded the following values: canonical correlation, Wilks' lambda, standardized function coefficients, and classification results using cross validation of the left one out method (Huberty, 1994).

Table 8 Summary of Canonical Discriminant Functions

		Discriminate Function	
		Admitted	Completed
Standardized Coefficients			
Program Candidate		*	.999
TExES content criterion score		.999	-.048
Ethnicity		.011	.060
Career Status		-.026	-.251
Highest degree		.108	.055
Group Centroids	(yes)	.648	.891
	(no)	-1.425	-.786
Correctly Classified Cases		86.4%	76.3%
Correct Predicted		88 (23)	60 (40)
Incorrect Predicted		17 (0)	28 (0)
Sample size		128	128
Canonical Correlation		.696	.645
Wilks' Lambda		.516	.584

Statistical sig.	$p < .001$	$p < .001$
Sample size	128	128

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*Note.* \*Variable omitted from analysis

For each discriminant analysis, the sample size was reduced from values reported previously (see Table 2) due to missing data, usually the TExES content score. Results of the discriminant analyses revealed that each function was statistically significant ( $p < .001$ ) with Wilk's lambda values being .516 for *admission into program*, and .584 for *completing certification*. Because each analysis consisted of just two groups, i.e. candidate/non-candidate, or certified/not certified only one discriminant function per analysis could occur (Stevens, 2002). These analyses also reveal that these discriminant functions do distinguish group membership reasonably well. The canonical correlation between the discriminant function and *program admission* was .696. For becoming *certified*, it was .645. Further, the distance between the group centroids for the two functions ranged from 1.67 to 2.07, with the function exhibiting the greater inter-centroid distance yielding a greater number of correct group classifications.

The standardized discriminant function coefficients reported in Table 8 indicate the relative importance of each of the independent variables in classifying program admission as a candidate and program completion or certification when all of the predictors were added at once. For the discriminant function for program admission, the TExES content criterion score variable provided the largest coefficient in determining group membership, while for the discriminant function predicting certification; the largest coefficient occurred for the variable, program candidate. The relative importance of the other predictors varied depending on the focus of the discriminant function.

The percentage of cases correctly classified or "hit rate" was 86.7% for program admission and 78.1% for completing teacher certification. The case wise statistics (discriminant scores, actual group and predicted group membership per individual) for each analysis combined with an examination of the raw data file revealed that for the *program admission* analysis, all of the misclassified cases occurred due to the applicant electing to withdraw from the program for reasons that are not captured by the four

independent variables applied in this analysis or any variable in our program data base. Similarly, all of the misclassified cases for the completing teacher certification analysis occurred because these individuals are currently “in-progress” as candidates or interns.

### Conclusions

Applying the results of the canonical discriminant function - admitted to program to Research Question 1, the TEExES content criterion score was found to be the most influential variable. The relative importance of the other predictors were quite modest with highest degree providing some influence and career status and ethnicity providing very limited influence on predicting whether an individual would become a candidate. The values reported in Tables 4 – 7 for the analyses leading to the discriminant analysis confirm the relative importance of the TEExES content criterion score in predicting whether the applicant would become a candidate in the Accelerate Online/OPTIONS program. To illustrate, in Table 4, we note that 39% (28/72) of the applicants failed to attain the criterion score and were not being admitted to the program. Table 6 contains the non-parametric correlation between TEExES content criterion score and program admission exhibiting the greatest magnitude among the correlations reported. Of the remaining predictors in the discriminant function, only career status yielded a statistically significant correlation with program admission. The other predictors, highest degree and ethnicity did not yield statistically significant correlations with becoming a candidate, but did account for variation in the success ratios of applicants becoming certified (Tables 5 & 6). Other academic variables (undergraduate grade point ratio, accumulated semester hours in teaching field) often cited in the literature (Allen, 2003; NCTQ, n.d.; USDE, 2000) and biographic variables (gender and years following BS degree) were considered but not included in the final set of analyses due to small quantitative associations with program admission. The low correlations for cumulative undergraduate grade point ratios with program admission, and total number of semester hours in teaching field with being admitted into our certification program occurred because our criteria for these admission variables include minimum values that likely restricted the range of values for these variables across the applicants.

As program developers, we are pleased that the biographic variables (gender, ethnicity, and career status) yielded little quantitative support to indicate these variables significantly influence admission decisions into our certification program. If these variables had been found to influence admission decisions, we would have had immediate adjustments to make in our recruitment and admission protocols to eliminate discriminating against applicants on the basis of gender, ethnicity and age (career status). However, the observation from our analyses, that 42 % (72 of 170) of our applicants do not become candidates, indicates our recruitment and admission procedures need refinement. The most common reason for not becoming a candidate is failing to complete the application process, suggesting the applicant has a “change of heart” about becoming a teacher. Perhaps more attention to the “soft attributes” of a teacher is needed in our recruitment materials for the applicant to consider before initiating the application process.

Other factors may be program costs (time and financial), and lack of flexibility in meeting admission requirements. In terms of costs, both in terms of dollars (total costs: approximately \$4,600) and time to completion (6 months to enter classroom as the teacher of record, and an additional 12 months to complete a yearlong paid internship and certification) are comparable to other alternative certification programs in the region and less expensive in time and money than a university program leading to certification and earned credit toward a graduate degree. Additional evidence that financial costs have not been a primary consideration for participating in this program is that grants, tuition waivers, fellowships, and scholarships available to completely cover program costs have not dramatically influenced decisions to participate in our program.

As noted previously, obtaining transcripts to document grade point averages and course work, undergoing a background check for criminal activity, obtaining support letters, and successfully completing the TExES content test may cause some applicants to reconsider their career decision about becoming a teacher. Perhaps these admission requirements are considered to be so rigid that prospective teaching candidates are discouraged from transitioning into teaching as suggested by recent reports (NRC 2000b; USDE, 2002). Yet we believe these admission procedures are necessary to affirm the candidate’s fitness to teach in secondary schools.

In formulating a response for Research Question 2, we again examined the results of a discriminant analysis, in this case the canonical discriminant function for completes certification, and found the most influential variable to be whether the individual had become an active candidate in the program. Of the other predictors, career status provided some influence in predicting whether a individual would complete certification but the other variables' predictive power were subsumed into the variable, active candidate. Because this discriminant function on predicting program completion is sensitive to the status of active candidates, given that all of the misclassifications of this function were active candidates, perhaps this function should be re-analyzed next year after program completion data of active candidates and interns will be more complete.

However, the status of individuals submitting applications reported in Table 3 support the generalization that once an individual becomes a candidate, she will very likely continue in the program and complete certification. At present, just 6 of 98 candidates or former candidates (6%) have elected to withdraw from the program. Exit interviews with interns who withdrew from the program suggest greater attention to the soft attributes during the recruitment and application processes may prevent a change of heart about pursuing a teaching career. It seems that for these disillusioned interns, idealized expectations held about secondary teaching were immediately challenged. Expectations about guiding and nurturing highly motivated students who were inherently interested in the course content were called to question the first day in the classroom. Facing more than 100 students each day, many of whom appeared unmotivated and disinterested immediately produced a sense of being overwhelmed and frustrated that shortly turned to despair. Acting upon specific recommendations and suggestions of supervisors and mentors, and reviewing resources for directly managing so many people by applying the tenets of curriculum organization they had recently experienced in the online curriculum and early field experience simply were not cognitively possible given the disequilibrium they were experiencing each day. It is quite likely unrealistic ideas about teaching and students led these beginning interns to the decision to exit the classroom. Perhaps the untenable circumstances these ill-fated interns found themselves in could have been prevented had a more formal process been in place to assess their unsupported beliefs

related to: assuming high achievement orientation, accepting responsibility, demonstrating critical thinking, being organized, being motivated, being respectful of others, and supporting the goals of the organization.

In summary, we have found from this investigation that attaining a criterion score on the TExES content test is the best single predictor for determining whether an applicant will become a candidate in our program. This finding reinforces the intensive diagnostic effort our admissions officer invests in reviewing applicant transcripts, administering and scoring a practice certification test and providing feedback to the applicant on their probable success with/without additional remediation before sitting for the state's content certification test. This support is provided to applicants as they consider whether to invest the time and money to become a secondary teacher. Further, if the applicant matriculates into the program, then the best variable to predict completing certification is the variable, program candidate. While the various statistical analyses conducted have produced internally consistent results, we have found that we may be able to further inform our recruitment, selection and placement protocols by incorporating inventories that seek to measure the applicant's soft attributes thought to impact whether the beginning teacher succeeds and completes their internship and certification.

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