As the “Sputnik generation” of mathematicians retires, colleges and universities nationwide are scrambling to fill vacancies. Traditional vacancies in the areas of statistics, pure mathematics and geometry continue, but many new positions require a candidate who is prepared to teach mathematics education courses for future K-12 teachers. We consider these positions “new” because the nature of both the course content and instructional strategies have changed dramatically in response to a recent nation wide emphasis on teacher training. As a result, many institutions need to hire professionals who are not only qualified to teach mathematics, but who have a firm grasp of how younger students learn, current issues in educational research and how course content and methodologies need to be developed from research findings.

Most universities have either a mathematics education department separate from a larger mathematics (or for that matter, education) department, or at least have large subgroups of mathematics education faculty in the mathematics department. However, this is not typically the case for mathematics departments at large or small colleges. We will focus on those college mathematics departments who typically employ fewer than three professors charged with teaching mathematics to future K-12 teachers. From this, we see two distinct subsets:

1) The mathematics department is part of a small (typically private) institution where mathematics education courses would only be part of one professor’s course load.

2) The mathematics department is part of an institution in which one, or possibly two, professors would be responsible for teaching all of the mathematics education courses offered by the department.

We will examine a case where a mathematics education candidate is considered for a position within a department similar in structure to the one described in subset 1 above (labeled Candidate A), and another mathematics candidate is to be considered for a position within a department similar in structure to the one described in subset 2 (labeled Candidate B). While we realize that recent graduates face many possibilities, these are two that we feel could result in potentially difficult transitions for both the candidate and the department. We also acknowledge that the second scenario is much more likely than the first, given the current job market and increased demand for mathematics education PhD’s (For more information see the Chronicle of Higher Education, February 19, 2002 issue, or online—for subscribers—at http://chronicle.com/jobs/2002/02/2002021901e.htm).

Case 1: Candidate A

Candidate A began her undergraduate experience as a mathematics major at a liberal arts college. During her sophomore year, Candidate A decided that she wanted to become a math teacher. She obtained a teaching certificate in mathematics by completing (in addition to the coursework in her major) a sequence of education courses and a student teaching semester. Upon graduation, Candidate A obtained a position in a local high school. While she enjoyed success as a teacher, she came to realize that many of her students were plagued with math anxiety that seemed to stem from poor mathematical experiences with prior teachers.

Although Candidate A loved her students, she decided that she could make a greater impact on the field of mathematics education if she worked with future teachers. She thought that if she could excite and instill the love of mathematics into future elementary and secondary school teachers, they would then create a wonderful learning environment for their students. As a result, she enrolled in graduate school to learn more about teaching and learning mathematics and went on to earn a Ph.D. in mathematics education.

In graduate school, Candidate A taught at least one course for pre-service elementary teachers per semester. She was responsible for all aspects of the course from designing and implementing the lessons to creating and grading tests. After a few years she team-taught the secondary mathematics methods course with a tenure-track mathematics educator and also developed her research agenda. She was treated as an equal within the mathematics education faculty and felt welcome and supported. En route to the Ph.D., she earned a master’s degree in mathematics education and took nearly enough mathematics graduate courses for an MA in mathematics. Upon graduation, Candidate A sought to obtain a position in a college or university mathematics department as opposed to an education department.

Case 2: Candidate B

Like Candidate A, Candidate B began her career as a mathematics major in a liberal arts college. She enjoyed mathematics and like Candidate A, also obtained a teaching certificate by completing the required coursework and student teaching semester. Upon her graduation, Candidate B decided to pursue her love of mathematics by enrolling as a traditional full-time Ph.D. student. All of her courses focused on mathematics content and her dissertation was in a traditional mathematics field. Her teaching experience in graduate school revolved around homework sections of calculus. Students who did not understand the mathematics content and didn’t seem to be helped by traditional calculus teaching in the large lecture halls seemed to seek out Candidate B for assistance and guidance. As a result, she began to develop an interest in how teaching strategies could be improved. In an effort to learn to more fully develop her own teaching ability, Candidate B taught summer courses at a local community college and at a private liberal arts college. Upon her graduation, Candidate B sought a position in a mathematics department, but became more interested in researching and investigating the teach-
ing of mathematics rather than her pure mathematics training.

Benefits

Some of the benefits that each of the candidates bring to the two positions might be obvious, but the reader might be surprised by some of the additional benefits that we have identified:

Candidate A brings real-world and graduate education experience in the field of mathematics education—this gives her mathematics education pre-service teachers a realistic perspective on what it means to be a teacher. Candidate A can also provide her students with valuable insights on how best to analyze and assimilate meaningful instructional strategies, since she has an understanding of both the importance of research within the profession as well as the practical realities of applying the research findings to real classroom settings.

Candidate B shares Candidate A's interest in mathematics education research, a valuable addition to any department. Candidate B's decision to pursue her PhD directly after graduation from her undergraduate institution, coupled with her work with undergraduate students while pursuing her advanced degree puts her in a position to identify with the problems, needs and concerns of undergraduate students.

Although each candidate has a different educational background, both A and B enjoy mathematics education. Both candidates would likely promote interesting discussions and idea exchanges within their departments.

With a new push for university faculty to assess their own teaching and develop a research agenda that includes "scholarship of teaching," both candidates could be helpful to the department by providing ideas and valuable assistance in understanding the nature of teaching mathematics.

Pitfalls

Of course, the transition for neither the candidate nor the department can be entirely without pitfalls, some of which include the following.

For Candidate A:

Candidate A could be asked to teach first or second year undergraduate classes in pure mathematics, courses which may require a good deal of additional preparation on her part, given the fact that Candidate A's graduate focus was on mathematics education. However, a benefit to this scenario for Candidate A (and her students) is that she will likely employ the latest proven teaching strategies to help her students learn.

Candidate A could face colleagues and upper level mathematics students who do not feel her mathematics education Ph.D. is equivalent to a Ph.D. in mathematics.

Candidate A may face some form of tenure and/or promotion discrimination by both faculty and administration tenure boards because of her research interests and resultant publications. Some institutions may attempt to assert that her research isn't of the same caliber as her colleagues in the mathematics department because it focuses on educational issues and not on pure mathematics.

Candidate A will most likely be the only mathematics educator in the department, which can be an extremely isolating experience after her graduate years spent with a group of mathematics education specialists.

For Candidate B:

Candidate B could be asked to teach undergraduate classes in mathematics education, courses which may require a good deal of additional preparation on her part, given the fact that Candidate B's graduate focus was on pure mathematics. If she is to be successful, Candidate B will need to focus a great deal of her time and attention on current issues in education.

Candidate B could face colleagues who feel that she is not doing enough "pure math" research—and view her research as based upon her students playing with manipulatives in a classroom or purely anecdotal or observational research.

Candidate B could be met with resistance from the institution's education department for teaching courses that the education department feels should be their responsibility, not the responsibility of a mathematician.

Conclusions:

Before seeking qualified candidates to fill a mathematics education position, it is important for a department to decide what its priorities are and what expertise they want to cultivate. In addition, a department should be aware of the potential weaknesses and possible feelings of isolation any candidate may experience and be ready to support them however necessary. In other words, every department really needs to examine the needs of their students and the college as a whole, thereby identifying what type of educator they want as their newest department member.

Before any interview takes place, the department should make explicit its priorities and expectations in the job description. Once appropriate candidates are selected for an interview, members of the search and screen committee should have a pre-established set of questions designed to ascertain how well the candidate will succeed in fulfilling the needs of the college, the department and the students. Once a successful candidate is identified, the department should reiterate its expectations, especially in terms of tenure and promotion, formally and in writing within the body of the initial contract. Finally, and perhaps most important, it is incumbent on the members of the department to make new faculty members feel welcome and a part of the mathematics community.

For job seekers, it is best to be open and honest about what you would like to do in terms of teaching and research throughout the entire application and interview processes. Ask questions to be sure that you know what is expected of you as a new faculty member and what is continued on page 16
required of you to achieve tenure. Once you have accepted a position, strive to be involved in the activities hosted by the mathematics department, using them as a way to network both inside and outside the department for support. Make it a point to interact with both members of the mathematics and education department to gain valuable insights and information. Finally, establish a mutually convenient time to meet with other mathematics educators in similar situations to avoid the feeling of isolation.

Any time a department hires a new member, difficulties for both parties will inevitably occur. In this paper, we have examined only two scenarios among several possibilities. Yet these two scenarios reveal steps that both candidates and institutions can take—regardless of the complexity of their particular situation and set of circumstances—to make the transition easier. Although it takes an awareness and appreciation of one another's strengths and weaknesses, we believe that mathematics departments, and candidates for positions within those departments, who take the time to garner this appreciation will ultimately develop an educationally fruitful environment for their students.

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Short Takes

Six Mathematicians Elected to the National Academy of Sciences

Late in April, the National Academy of Sciences elected 72 new members and 15 foreign associate members. This year's list includes six mathematicians: David W. McLaughlin of the Courant Institute, Peter Sarnak of Princeton University, Peter W. Shor of AT&T Laboratories, David O. Siegmund of Stanford University, Yum-Tong Siu of Harvard University, and David P. Ruelle of the Institut des Hautes Etudes Scientifiques, who was elected as a foreign associate. More information on the National Academy of Sciences, including the full list of new members, can be found at the NAS web site at http://national-academies.org.

Elibron.com Sells Reprints of Older Books

New technology is making it much easier to get copies of old and/or rare books. One example is Adamant Media, a Boston-based company that developed agreements with two major libraries in Russia to scan and reprint old books in many fields. Over 50,000 such books are available at their web site at http://www.elibron.com, both as paper reprints and in electronic form. Mathematics offerings include classics by Archimedes and Al-Khwarizmi and more recent books by Todhunter, Salmon, and others.

50 Billion Zeros of Zeta

Sebastian Wedeniwski, with the help of many others and about 550 PCs, has computed the first 50 billion zeros of the Riemann zeta function. Every one of those zeros has real part 1/2, as predicted by the Riemann Hypothesis, and they are all simple zeros. The computation, which is done in distributed fashion using idle time on ordinary PCs and workstations, confirms the Riemann Hypothesis for all zeros whose imaginary part is less than 13,486,858,172.324. At this point, the program is available only for users at IBM Deutschland Entwicklung GmbH., but there are plans to make it available for other users who want to join the fun. See http://www.hipilib.delzeta/index.html for more information.

Saxon Math Books Have Growing Market Share

According to Education Week (May 1, 2002), the series of mathematics textbooks from Saxon Publishers has dramatically increased its market share over the last ten years. Despite being controversial, Saxon's books have about "11% of the K-4 market, 8% of the 5-8 market, and 3% of high school classrooms. That's a greater share than the combined total of the top two products underwritten by the National Science Foundation: Everyday Math, published by McGraw-Hill, and materials published by Dale Seymour Publications."

Saxon's books focus on basic math skills, using an approach that emphasizes drill, practice, and review. They are often criticized for ignoring the big ideas of mathematics in favor of developing mechanical skills. On the other hand, some teachers praise the series for helping students achieve good results on standardized tests.

Celebrating 800 Years of the Liber Abbaci

The year 2002 is the 800th anniversary of the completion of one of the most famous books in the history of mathematics: the Liber Abbaci, by Leonardo of Pisa, often known as Fibonacci. (It is interesting to note that the name "Fibonacci" seems to have been given to him in the 19th century; there is no evidence that he ever used it for himself.) Springer-Verlag will be publishing an English translation of the book this fall.

The University of Pisa, together with the "Giardino di Archimede - Un Museo per la Matematica" and the SISMEL (Italian