The Supply of New Science Teachers in Florida

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Science Certification Areas in Florida

- **Middle School**
  - Middle Grades General Science (Grades 5-9)

- **High School**
  - Biology (Grades 6-12)
  - Chemistry (Grades 6-12)
  - Earth-Space Science (Grades 6-12)
  - Physics (Grades 6-12)
Science Curriculum in Florida

- Middle School
  - Life Science
  - Earth/Space Science
  - Comprehensive Science
  - Physical Science
Science Curriculum in Florida

- High School
  - Biological Sciences
    - Biology, Physiology, Botany, Ecology and Genetics
  - Earth/Space Sciences
    - Earth/Space Science, Astronomy
  - General Science
  - Physical Science
  - Integrated Sciences
    - Environmental Science, Integrated Science, Marine Science
  - Physical Sciences
    - Chemistry, Physics
Pathways to Teaching in Florida

- Florida Teacher Preparation Program Graduate
  - Course Analysis
    - Requires handful of core education courses
      - May be an education minor or not part of any formal program
    - Default category for meeting certification requirements
  - Out-of-state
    - Teacher Preparation Program Graduate
    - Certified in Another State
- Alternate
  - District Alternative Certification Program
    - No special recruitment procedures
    - No formal education coursework required
    - Must complete competency-based alternative certification program and pass certification exams
  - ABCTE Passport
  - Educator Preparation Institutes
    - Two-semester program at community colleges
  - College Teaching Experience
Trends in Demand for Science Teachers in Florida

- Membership in Florida Schools
  - Recent reduction in growth of school aged population

- Class Size
  - Constitutional class size initiative leading to smaller class sizes over time
School Membership by Grade in Florida

Source: Florida Dept. of Education, “School Membership by Grade”
Average Class Size by Grade in Florida

Source: Florida Dept. of Education, “District Class Size Averages”
Main Research Questions

- Number of first-year secondary science teachers produced through traditional and alternative routes
  - Many alternative routes do not involve a set program of study
  - Only aggregate data on initial preparation program completers is available
2009-2010 Completers Employed in Florida Public Schools 2010-2011

Source: Florida Department of Education, “Teacher Preparation” Presentation
Main Research Questions

- Number of people seeking certificates and certified to teach science
  - No data on applicants available; only on certificates issued
  - From certification exam data can determine number of individuals taking a subject area exam for the first time
Number of First-Time Exam Takers by Science Certification Subject Area

Source: Computations based on individual-level records from the Florida Dept. of Education Office of Teacher Certification
Main Research Questions

- Number of people taking jobs teaching science
  - Number of New Hires in Fall
  - Number of First-Year Teachers (0 Years of Experience in Florida) by Science Certification Area
  - Number of First-Year Science Teachers by Pathway
  - Number of First-Year Teachers by Science Courses Taught
  - Number of First-Year Teachers Teaching Science Courses by Pathway
Number of New Hires in Fall

Source: Florida Dept. of Education, “New Hires in Florida Public Schools”
Percent of Fall New Science Hires Not Certified in Appropriate Field

Source: Florida Dept. of Education, “New Hires in Florida Public Schools”
Number of First-Year Teachers by Science Certification Subject Area

Source: Computations from individual-level records on certification and experience in the Florida Education Data Warehouse
Pathway of First-Year Teachers Certified in Science as a Percentage of Those with Known Pathway

Source: Computations from individual-level records on certification and experience in the Florida Education Data Warehouse plus data from the Bureau of Teacher Certification
Number of First-Year Teachers by Science Courses Taught

Source: Computations from individual-level records on teaching activity, courses and experience in the Florida Education Data Warehouse
Pathway of First-Year Teachers Teaching Science Courses as a Percentage of Those with Known Pathway

Source: Computations from individual-level records on teaching activity, courses and experience in the Florida Education Data Warehouse
Main Research Questions

- Types of schools to which teachers are initially assigned
  - Number of First-Year Teachers Certified in Science by School Type
    - Traditional vs. Charter
    - School-level Percent Free/Reduced-Price Lunch
    - School-level Racial/Ethnic Composition
    - School-level Average Achievement Level
  - Number of First-Year Teachers Teaching Science by School Type
    - Traditional vs. Charter
    - School-level Percent Free/Reduced-Price Lunch
    - School-level Racial/Ethnic Composition
    - School-level Average Achievement Level
Number of First-Year Teachers Certified in Science by School Poverty Level
Number of First-Year Teachers Teaching Science Courses by School Poverty Level

- 70-100% FRL
- 30-70% FRL
- 0-30% FRL
Number of First-Year Teachers Certified in Science by School Percent Non-White

- 70-100% Non-White
- 30-70% Non-White
- 0-30% Non-White
Number of First-Year Teachers Teaching Science Courses by School Percent Non-White
Main Research Questions

- Transfer behavior and attrition in the first 5 years
  - Years Until Departure from Florida Public Schools
Years Until Departure from Florida Public Schools by Pathway (First-Year Science Teachers, 2000-2005)

- One Year
- Two Years
- Three Years
- Four Years
- 5+ Years
Supplemental Analyses

- Modal Major of First-Year Teachers Certified to Teach Science (Only Florida Public University Graduates)
  - By Certification Subject and Pathway
- College Credits in Science Courses of First-Year Teachers Certified to Teach Science (Only Teachers with 100 or more Credits in Florida Public Community Colleges and Universities)
  - By Pathway – All Science Certification Subjects
  - By Pathway – Biology Certification
- Pre-Service Test Scores and Demographics
  - By Pathway – All Science Certification Subjects
Modal Major of First Bachelor’s Degree by Pathway and Certification Area - First-Year Teachers, 2000/01-2009/10

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Science Certification Area</th>
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<tbody>
<tr>
<td>Course Analysis</td>
<td>Biology</td>
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<tr>
<td>Alternative Certification</td>
<td>Biology</td>
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Source: Computations from individual-level records in the Florida Education Data Warehouse plus data from the Bureau of Teacher Certification
Coursework Credit Hours by Pathway
First-Year Teachers Certified in Science

Source: Computations from individual-level records in the Florida Education Data Warehouse plus data from the Bureau of Teacher Certification
Coursework Credit Hours by Pathway
First-Year Teachers Certified in Biology

Ed. Field Work
Science Ed.
Math Ed.
Education - All
Engineering
Math
Physics
Chemistry
Biology
Science - All

0.00  10.00  20.00  30.00  40.00  50.00

Alternate  Course Analysis  Florida Teacher Preparation

Source: Computations from individual-level records in the Florida Education Data Warehouse plus data from the Bureau of Teacher Certification
### Characteristics of First-Year Teachers Certified in Science by Pathway

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pathway</th>
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<tr>
<td></td>
<td>FL Teacher Prep.</td>
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<tr>
<td>% from Most Competitive Colleges</td>
<td>22.3</td>
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<tr>
<td>% from Least Competitive Colleges</td>
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<tr>
<td>% Pass GK Math 1st Try</td>
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<tr>
<td>% Non-White</td>
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<tr>
<td>% Male</td>
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<tr>
<td>Average Age</td>
<td>29.8</td>
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<tr>
<td>Average SAT Score</td>
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</table>

Source: Computations from individual-level records in the Florida Education Data Warehouse plus data from the Bureau of Teacher Certification
Summary

- Growing student population and mandated class size reduction lead to increased hiring of teachers (including science teachers) until peak around 2006
- Increased demand for science teachers met by hiring from out of state and expansion of alternative pathways into teaching
  - Supply of graduates from traditional teacher preparation programs fairly constant
Summary

- Market for middle school science teachers and high school Biology teachers much larger than physical sciences and hiring trends follow those of general teacher labor market
  - Peak in 2006 and sharp decline thereafter
- Market for teachers in the physical sciences (Chemistry, Earth/Space, Physics) are smaller and exhibit less volatility
  - Take about equal amount of math as traditionally prepared teachers, but many more science, social studies and business courses
Summary

- As hiring diminished in late 2000s, proportion of new science teachers going to schools serving disadvantaged students increased
  - Likely due to lower turnover in schools serving more advantaged students
- Lower attrition among alternatively certified science teachers than traditionally prepared teachers
  - May reflect the fact that alternatively prepared teachers are older and many are career changers
Summary

- Alternatively prepared teachers more likely to major in science, whereas traditionally prepared teachers major in science education
  - Also take more science courses
- Even among alternatively prepared teachers, few with majors in physical sciences
- Alternatively prepared and traditionally prepared science teachers have similar test scores
  - Alternatively prepared older and more likely to be male