Introduction
There is an growing need for all students, particularly English Learners (ELs), to develop fundamental understanding of science, technology, engineering, and mathematics (STEM) to fully participate in STEM because:
• While ELs are the fastest growing population in the nation's schools, National Center for Education Statistics (NCES), 2011, achievement gaps in mathematics and science have persisted between ELs and their non-EL peers (NCES, 2013).
• Recent educational policy reforms, including the Common Core State Standards (CCSS) for mathematics and the Next Generation Science Standards (NGSS), are language intensive and thus present both challenges and opportunities for language learning and content learning for ELs (Lee, Quinn, & Valdes, 2013).
• Today's technological and global society requires that all students learn challenging mathematics and science for personal and social reasons as well as for college and career readiness.

Both governmental and nongovernmental organizations are increasingly influential in education policy through grant funding (Ferris, Hornscheme, & Hammsen, 2008; Hamen, 2008). Funding programs can play a critical role in shaping new research interests by prioritizing specific research topics and designs or by requiring the portfolio of innovative resources, models and tools" (NSF, 2011, p. 2).

Research Questions
What are the research characteristics of the portfolio of DR K–12 projects and the literature of non DR K–12 projects in the fields of mathematics, science, and mathematics education in terms of research topics, design, methods, scale, samples, outcomes.
Content analyses of the literature of non DR K–12 projects in the fields of EL science and mathematics education.

Research Questions
What are the research characteristics of the portfolio of DR K–12 projects and the literature of non DR K–12 projects in the fields of EL science and mathematics education: What do they compare?

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What are the research characteristics of the portfolio of DR K–12 projects and the literature of non DR K–12 projects in the fields of EL science and mathematics education: How do they compare?

Analysis Approach
Content analyses of the curricula vitae (CVs) of the DR K–12 projects' PIs and co-PIs in terms of disciplinary expertise.
Content analyses of the portfolio of DR K–12 projects and the literature of non DR K–12 projects in the fields of EL science and mathematics education: How do they compare?

Discussion
The results of this study were shaped by the DR K–12 solicitation and the peer review process, both of which influence which projects were funded.

The DR K–12 projects’ greater use of mixed methods and experimental designs seems to reflect the increasing focus on intervention studies supported by federal funding agencies.

K–12 researchers, with their focus on instruction and teacher preparation, have already begun to contribute to the critical areas of preparing teachers to teach science and mathematics to the growing number of ELs.

Although the DR K–12 researchers may not be representative of all investigators in conducting research in STEM education, the finding that indicated that the DR K–12 program is building the capacity of a core group of EL science and mathematics education researchers.

Policy Implications
Researchers applying for DR K–12 funding responded to grant criteria, including research designs and methods that test the effectiveness of interventions, and a focus on language diversity, and thus moved the fields forward in important ways.

Federal agencies should continue to provide funding to support this research as a necessary step to improving the quality of science and mathematics education for ELs, closing the achievement gap, and enabling them to be ready for college and careers by the end of high school.

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Contributions of NSF’s Discovery Research K–12 Projects to Research in Science and Mathematics Education with English Learners

Linda Caswell and Alina Martinez

Methods
Samples
34 DR K–12 projects that focused on ELs from the first five cohorts funded from 2007 – 2011 (12% of all projects funded). Of these projects, 15 focused on science, 16 on mathematics, and 3 on both science and mathematics.

Table 3: Topics Addressed

<table>
<thead>
<tr>
<th>Research Topic</th>
<th>Non DR K–12 EL projects (n = 45)</th>
<th>Non DR K–12 EL projects (n = 45)</th>
<th>DR K–12 EL projects (n = 39)</th>
<th>DR K–12 EL projects (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>19%</td>
<td>23%</td>
<td>42%</td>
<td>51%</td>
</tr>
<tr>
<td>Social Studies</td>
<td>23%</td>
<td>25%</td>
<td>22%</td>
<td>32%</td>
</tr>
<tr>
<td>Multiple sites</td>
<td>36%</td>
<td>44%</td>
<td>40%</td>
<td>44%</td>
</tr>
<tr>
<td>Experimental design</td>
<td>Rare 8%</td>
<td>28%</td>
<td>2%</td>
<td>17%</td>
</tr>
<tr>
<td>Mixed methods</td>
<td>Rare 26%</td>
<td>89%</td>
<td>29%</td>
<td>84%</td>
</tr>
<tr>
<td>Qualitative methods only</td>
<td>Most 31%</td>
<td>6%</td>
<td>24%</td>
<td>16%</td>
</tr>
<tr>
<td>Quantitative methods only</td>
<td>Rare 44%</td>
<td>6%</td>
<td>47%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Research Topic
Science learning
Emerging 44% 11% 42% 5%

Research Topic
Mathematics
Emerging 23% 44% 33% 56%

Research Topic
Social Studies
Emerging 23% 25% 22% 32%

Research Topic
Multiple sitesc
Infrequent 36% 44% 40% 44%

Research Topic
Experimental design
Rare 8% 28% 2% 17%

Research Topic
Mixed methods
Rare 26% 89% 29% 84%

Research Topic
Qualitative methods only
Most 31% 6% 24% 16%

Research Topic
Quantitative methods only
Rare 44% 6% 47% 0%

Research Topic
Content analyses of the curricula vitae (CVs) of the DR K–12 projects’ PIs and co-PIs in terms of disciplinary expertise.

Results—Research Questions
All but one project had expertise in the content area focus of project (mathematics or science or both).

A majority of science projects (but not math projects) had EL/ELA expertise among key investigators.

The most common area of expertise added by advisory group members was EL/ELA expertise (7 of 9 additions), and this was more likely to be added to mathematics projects that lacked EL/ELA expertise in their key investigators.

Research Question
Content analyses of the curricula vitae (CVs) of the DR K–12 projects’ PIs and co-PIs in terms of disciplinary expertise.

Results—Investigator Expertise

Table 1: Research Method, Design, and Scale

<table>
<thead>
<tr>
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<th>DR K–12 EL projects (n = 39)</th>
<th>DR K–12 EL projects (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>81%</td>
<td>65%</td>
<td>68%</td>
<td>67%</td>
</tr>
<tr>
<td>Qualitative</td>
<td>19%</td>
<td>35%</td>
<td>32%</td>
<td>33%</td>
</tr>
</tbody>
</table>

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