An alternative route to teacher certification: Schoolyard ecology

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An Alternative Route to Teacher Certification: Schoolyard Ecology
Feiro, C.S., Burgess, D., Dowdy, S.

**RESEARCH QUESTIONS**
This research focuses on an alternative route to teacher certification program that prepares 16 working paraeducators to become certified elementary teachers. Because the majority of the paraeducators are bilingual and first generation college students, they had to navigate institutional, cultural, linguistic and relational borders to become certified elementary teachers.

Two questions guided our summer research:
1. How will paraeducators content and pedagogical knowledge change as they experience a summer science program that includes a content immersion in cell biology and teaching a schoolyard ecology unit?
2. How will paraeducators understanding of research-based elements of effective instruction change due their involvement in the summer program?

**METHODS**
Our study employed mixed methodology that included four primary data sources: content assessments, surveys, observations and documents. Both the content assessment in Cell Biology and pedagogical survey employed a pretest-posttest research design. The survey tool concentrated on paraeducators views in four targeted areas (see Table 1.):

- **Beliefs about effective science instruction**
- **Self-efficacy as a learner of science**
- **Self-efficacy as a teacher of science**
- **Beliefs about peer collaboration in learning science concepts**

Lastly, we collected field observations and paraeducator’s reflective writing during the summer program to evaluate changes in their understanding of effective instruction.

**RESULTS**
- Our results show that paraeducators who participated in the Summer Program increased their content knowledge in biology and also improved their understanding of research-based elements of effective science instruction.
- Paraeducators responses to the post MORE survey indicated an increase in belief that everyone is capable of learning science.
- Paraeducator’s responses to the MORE survey also indicated an increase in understanding of science concepts and confidence in teaching those concepts.
- As the summer progressed, paraeducators selection of instructional strategies better fit the content, and paraeducators became more comfortable as teachers of science content.
- Since there is little research on effective mentoring of bilingual and first generation teacher candidates in alternative route to certification programs, our findings could benefit the education community’s knowledge base about what constitutes effective support for alternative route paraeducators.

**TAKEAWAYS**
- **Realia**: The use of realia or physical and tangible examples is much more effective than standard visual aids. The content needs to be connected to the student’s lives and experiences for them to better grasp concepts and connections.
- **Collaboration**: The use of collaboration and various content delivery methods such as white-boarding, the use of artistic representations, sentence stems, guided notes, and role playing further aid students in retention and overall content knowledge.
- **Wait Time**: The importance of wait time, was further solidified in my own practice.

**FIELD OBSERVATIONS**
- When teaching challenging content, paraeducators employed many diverse strategies to reach all students such as song, dance, visual aids, sentence stems, white-boarding, and collaboration.
- Paraeducators were able to connect with their students through language and by using realia (objects or materials from everyday life-visual aids).
- Students were repeatedly heard saying they thought science was supposed to be boring but this is fun, and that they now think summer school is fun.

**ACKNOWLEDGEMENTS**
We would like to thank NASA for the grant to conduct this research, Maria Timmons Flores and Barbara Waxman for coordination and preparation efforts, Allen Elementary School for the use of their facilities, the 16 paraeducators, and 5 experienced teachers for serving as mentors to our paraeducators, and the migrant youth for participating in our summer school.

**Figure 1**: Student produced field guide pages to be incorporated into a collaborative field guide of the plants of the schoolyard.

**Figure 2**: a. A student closely observing a grasshopper that was found in his study site. b. Students using realia found in their study site to create artistic representations of organisms they have seen in nature. c. Dr. Don Burgess assisting a student with her daily field observation.

**Table 2**: MORE for Teachers Pre/Post Survey Components

<table>
<thead>
<tr>
<th>Targeted Beliefs</th>
<th>Instrument</th>
<th>Factors (# of Items)</th>
<th>Items (total #, type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beliefs about effective science instruction</td>
<td>MRI Teacher Views about Science Instruction</td>
<td>Learning-theory-aligned science instruction (13)</td>
<td>21 Likert items (OA to SO)</td>
</tr>
<tr>
<td>Self-efficacy as a learner of science</td>
<td>Colorado Learning Attitudes about Science Survey (CLASS)</td>
<td>Personal interest (6)</td>
<td>12 Likert items (OA to SO)</td>
</tr>
<tr>
<td>Self-efficacy as a teacher of science</td>
<td>Science Teaching Efficacy Belief Instrument- Preservice (STEB-I-P)</td>
<td>Personal science teaching efficacy belief (13)</td>
<td>2 Likert items with factor loadings and reliability coefficients above .50 (Q23 excluded due to vague/outdated language) (OA to SO)</td>
</tr>
<tr>
<td>Beliefs about peer collaboration in learning science concepts</td>
<td>Survey constructed by MORE</td>
<td>Beliefs about peer collaboration in learning science concepts (12)</td>
<td>13 open-ended item</td>
</tr>
</tbody>
</table>

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