Agricultural Education
Pre-Service Teachers’ Perceived Competence in an Advanced Agricultural Mechanics Course

John Ewing
Rama Radhakrishna

The Pennsylvania State University
Introduction

Secondary Agricultural Education

✓ Variety of technical areas

✓ Animal Science
✓ Plant Science
✓ Environmental/Natural Resources
✓ Youth Leadership/FFA
✓ Agricultural Mechanics
Introduction

Agricultural Mechanics

☑ Variety of technical areas

☑ Welding
☑ Gas/diesel engines
☑ Woodworking/construction
☑ Electrical wiring
☑ Concrete/Masonry
☑ Plumbing
☑ Land Surveying
Introduction

Pre-service Candidates

- Need to be prepared to teach effectively, and safely in all of these areas (PDE, 2015).

- Preparation in such a diverse number of areas can be difficult (Byrd, Anderson, Paulsen, & Shultz, 2015).

- Often cite agricultural mechanics to be an area of low competence (Saucier & McKim, 2011).
Theoretical Framework

✔ Bandura’s Self-efficacy theory (Bandura, 1997).
  ✔ Connects an individual’s belief in their ability to a task or action, and future choices of that individual regarding that task.
  ✔ Pre-service teacher competence can be examined through this lens.

✔ Experiences provided can be examined to gather perceptions of students’ self-efficacy.
Purpose

Determine:

✓ Pre-service teacher candidates’ perceived level of competence in agricultural mechanics.
Objective

Determine:

✓ The perceived change in competence of twelve instructional areas from the beginning of a course to the end of that course.
Methods

✓ Population – Eleven students enrolled in advanced-level agricultural mechanics course (prior to student teaching).

✓ Survey instrument
  ✓ Administered on first day of class and then following completion of the course.
  ✓ Fifty-eight Likert-type items
  ✓ Scale (1 = Not Competent to 10 = Very Competent).
Methods

✓ Twelve instructional areas
✓ Laboratory Management/Safety
✓ Cold Metal Work
✓ Power Tools
✓ Hand Tools
✓ Wood Construction
✓ ARC Welding
✓ Oxy-fuel Cutting and Welding
✓ Plasma Arc Cutting
✓ General Project Construction
✓ Plumbing
✓ Small Gas Engines
✓ Concrete/Masonry
Methods

- Data were entered into Excel and means were calculated for each of the competency areas (Pre-test and Post-test).

- Comparison of the means (Pre-test to Post-test) were conducted.
## Results

<table>
<thead>
<tr>
<th>Pre-Test Competency Means</th>
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</thead>
<tbody>
<tr>
<td>✓ Cold Metal Work (2.98)</td>
</tr>
<tr>
<td>✓ Oxy-fuel Cutting and Welding (4.60)</td>
</tr>
<tr>
<td>✓ Plasma Arc Cutting (4.82)</td>
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<tr>
<td>✓ ARC Welding (5.09)</td>
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<tr>
<td>✓ Plumbing (5.25)</td>
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<tr>
<td>✓ Small Gas Engines (5.39)</td>
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<tr>
<td>✓ Concrete/Masonry (5.61)</td>
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<tr>
<td>✓ Wood Construction (5.98)</td>
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<tr>
<td>✓ General Project Construction (6.18)</td>
</tr>
<tr>
<td>✓ Laboratory Management/Safety (6.71)</td>
</tr>
<tr>
<td>✓ Power Tools (7.18)</td>
</tr>
<tr>
<td>✓ Hand Tools (7.43)</td>
</tr>
</tbody>
</table>
Results

Post-Test Competency Means

✓ Cold Metal Work (5.84)
✓ Small Gas Engines (6.29)
✓ ARC Welding (6.86)
✓ Oxy-fuel Cutting and Welding (7.00)
✓ Concrete/Masonry (7.09)
✓ Plasma Arc Cutting (7.27)
✓ General Project Construction (8.12)
✓ Plumbing (8.12)
✓ Wood Construction (8.18)
✓ Laboratory Management/Safety (8.62)
✓ Power Tools (8.72)
✓ Hand Tools (8.75)
Results

Pre-Test/Post-Test Comparison

- Cold Metal Work (2.98)
- Oxy-fuel Cutting and Welding (4.60)
- Plasma Arc Cutting (4.82)
- ARC Welding (5.09)
- Plumbing (5.25)
- Small Gas Engines (5.39)
- Concrete/Masonry (5.61)
- Wood Construction (5.98)
- General Project Construction (6.18)
- Laboratory Management/Safety (6.71)
- Power Tools (7.18)
- Hand Tools (7.43)
- Cold Metal Work (5.84)
- Small Gas Engines (6.29)
- ARC Welding (6.86)
- Oxy-fuel Cutting and Welding (7.00)
- Concrete/Masonry (7.09)
- Plasma Arc Cutting (7.27)
- General Project Construction (8.12)
- Plumbing (8.12)
- Wood Construction (8.18)
- Laboratory Management/Safety (8.62)
- Power Tools (8.72)
- Hand Tools (8.75)
Results

Pre-Test/Post-Test Comparison

- Plumbing (2.87)
- Cold Metal Work (2.86)
- Plasma Arc Cutting (2.45)
- Oxy-fuel Cutting and Welding (2.40)
- Wood Construction (2.20)
- General Project Construction (1.94)
- Laboratory Management/Safety (1.91)
- ARC Welding (1.77)
- Power Tools (1.54)
- Concrete/Masonry (1.48)
- Hand Tools (1.32)
- Small Gas Engines (.09)
Conclusions

- Overall, competency levels increased for each of the twelve areas.

- Areas where students had higher perceived competence prior to the course, remained high following the course.

- Areas where students had low perceived competence prior to the course, remained low in comparison to other areas.
Recommendations

- Teacher education faculty should further examine:
  - Lowest areas of perceived growth
  - Lowest post-mean scores

- Opportunities can be developed to increase perceived competency through:
  - Course changes
  - Structured opportunities outside of class
  - Promotion of internship/work experience opportunities related to agricultural mechanics
Recommendations

✓ Upcoming professional development in agricultural mechanics should be designed around the current findings.

✓ Teacher educators should examine other program areas in a similar fashion.
  ✓ Animal Science
  ✓ Plant Science
  ✓ Environmental/Natural Resources
  ✓ Youth Leadership/FFA
  ✓ Agricultural Mechanics

✓ The findings from such research could support similar professional development structure for the new and beginning teachers of Pennsylvania.
This study has implications for:

- Current course structure/content.
- Providing/helping students seek out opportunities for growth in these content areas to fill gaps in knowledge/skills.
- Professional development of teachers in the state (content, as well as structure).
Thank you!