Service Learning as an Effective Tool in an Animal Breeding Curriculum

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Introduction

• Optional service-learning experience in ANSC 3319, Animal Breeding, in Spring 2016 and Spring 2017

• Supported by Engaged Scholar Academy
  – Center for Academic Outreach & Engagement

• Approved Applied Learning Experience (ALE)
Service-Learning

• An approach to teaching and learning in which students use academic knowledge and skills to address genuine community needs.

  – The National Youth Leadership Council
ANSC 3319—Animal Breeding

• Application of genetic principles to animal production in order to make informed decisions on improving the next generation
  – Genetics
  – Math and statistics
  – Business and management
Challenges

• Students in ANSC 3319 were:
  – Disengaged
  – Not connecting course materials to real life applications
  – Performing poorly in “why?” questions
Hypothesis

Students can learn complex animal breeding concepts equally well in a real-world scenario, while gaining interpersonal skills and providing a service to the community.
Farm Partners

• Match 2-4 students with an area farm
• Farm identifies a genetic challenge/question
• Students analyze situation and present a solution
• **Optional** for students to participate *in lieu of*:
  – Two homework assignments
  – Two attendance quizzes
  – Final exam
Service-Learning Details

• Initial report with project plan
• Two project status updates
• In-class group presentation of solution
• Deliverable to the Farm Partner
  – Decision flowchart, list of animals, spreadsheet, etc
• Peer and Partner Evaluations
• Program satisfaction survey
• ALE project reflection (individual)
Quantitative Data Collected

• Service-learning vs. control scores in aggregate
  – Exam scores and course grade
  – Scores on skills assessment quiz
    • Questions testing skills in all topics covered in the course

• Satisfaction survey of service-learning students
  – (Likert scale)

• IRB# 2016-010616-16032
Qualitative Data Collected

• Student reflection themes (ALE Learning Outcomes)
  – Knowledge and skills within the discipline
  – Knowledge and skills outside the discipline
  – Use of skills beyond academic experiences
  – Change in global awareness
  – Impact on themselves, partner, and industry
# Course Performance

Comparison of exam and course scores for service learning and control students.

<table>
<thead>
<tr>
<th></th>
<th>Spring 2016</th>
<th></th>
<th></th>
<th></th>
<th>Spring 2017</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Service learning</td>
<td>Control</td>
<td>SL-C</td>
<td>P-value</td>
<td>Service learning</td>
<td>Control</td>
<td>SL-C</td>
<td>P-value</td>
</tr>
<tr>
<td>Number of students (n)</td>
<td>27</td>
<td>28</td>
<td></td>
<td></td>
<td>15</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam 1</td>
<td>68.32%</td>
<td>74.81%</td>
<td>-6.49%</td>
<td>0.13</td>
<td>78.67%</td>
<td>74.74%</td>
<td>3.93%</td>
<td>0.29</td>
</tr>
<tr>
<td>Exam 2</td>
<td>72.75%</td>
<td>81.25%</td>
<td>-8.5%</td>
<td><strong>0.02</strong></td>
<td>85.27%</td>
<td>77.83%</td>
<td>7.44%</td>
<td>0.06</td>
</tr>
<tr>
<td>Exam 3</td>
<td>72.14%</td>
<td>74.44%</td>
<td>-2.3%</td>
<td>0.47</td>
<td>77.40%</td>
<td>66.30%</td>
<td>11.10%</td>
<td><strong>0.01</strong></td>
</tr>
<tr>
<td>Total Course</td>
<td>77.32%</td>
<td>79.93%</td>
<td>-2.61%</td>
<td>0.33</td>
<td>86.03%</td>
<td>77.12%</td>
<td>8.91%</td>
<td><strong>0.02</strong></td>
</tr>
</tbody>
</table>
## Skills Assessment

<table>
<thead>
<tr>
<th>Question-subject matter</th>
<th>% Service-learning students answered correctly</th>
<th>% Control students answering correctly</th>
<th>% Difference (Service learning – control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Livestock industry trends</td>
<td>95.0%</td>
<td>85.2%</td>
<td>9.8%</td>
</tr>
<tr>
<td>2-Relatives as sources of data</td>
<td>95.0%</td>
<td>96.3%</td>
<td>-1.3%</td>
</tr>
<tr>
<td>3-Allele frequency changes</td>
<td>100%</td>
<td>70.4%</td>
<td>29.6%</td>
</tr>
<tr>
<td>4-Contemporary groups</td>
<td>15.0%</td>
<td>66.7%</td>
<td>-51.7%</td>
</tr>
<tr>
<td>5-Types of breeding values</td>
<td>5.0%</td>
<td>37.0%</td>
<td>-32.0%</td>
</tr>
<tr>
<td>6-accuracy of data calculations</td>
<td>95.0%</td>
<td>77.8%</td>
<td>17.2%</td>
</tr>
<tr>
<td>7-accuracy of measurements</td>
<td>90.0%</td>
<td>92.6%</td>
<td>-2.6%</td>
</tr>
<tr>
<td>8-proper data reporting</td>
<td>100%</td>
<td>100%</td>
<td>0.0%</td>
</tr>
<tr>
<td>9-phenotypic to genotypic relationship</td>
<td>100%</td>
<td>77.8%</td>
<td>22.2%</td>
</tr>
<tr>
<td>10-records adjustments</td>
<td>35.0%</td>
<td>22.2%</td>
<td>12.8%</td>
</tr>
<tr>
<td>11-records adjustments</td>
<td>25.0%</td>
<td>29.6%</td>
<td>-4.6%</td>
</tr>
<tr>
<td>Average score</td>
<td><strong>68.64%</strong></td>
<td><strong>68.69%</strong></td>
<td><strong>-0.05%</strong></td>
</tr>
<tr>
<td><strong>p=0.99</strong></td>
<td></td>
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</tbody>
</table>
## Satisfaction Surveys

<table>
<thead>
<tr>
<th>Question</th>
<th>Ave score (n=21 students)</th>
<th>Positive response (n=9 farms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How effective was this overall experience?</td>
<td>3.71/5.0*</td>
<td></td>
</tr>
<tr>
<td>How effective was this to help learn animal breeding concepts?</td>
<td>3.95/5.0</td>
<td></td>
</tr>
<tr>
<td>Were the students’ solutions useful?</td>
<td></td>
<td>7/9 = yes</td>
</tr>
<tr>
<td>Would you participate again?</td>
<td></td>
<td>9/9 = yes</td>
</tr>
</tbody>
</table>

*Likert scale: 5=extremely effective, 4=quite effective, 3=somewhat effective, 2=slightly effective, 1=not at all effective*
Reflections & Learning Outcomes

• Knowledge and skills within the discipline
  “I got to work with this very real life problem and help solve it by using the information and classes that I have taken for my degree.”

• Knowledge and skills outside the discipline
  “This was the first time I have ever done anything like it... I had to get my thoughts together and use information that I had learned throughout my school years that I never had the chance to apply until this project.”

• Use of skills beyond academic experiences
  “…main skills consisted of organization, critical thinking, team work, and basic communication.”
Reflections & Learning Outcomes

• Change in global awareness
  “We as students do not think about all the hard work it takes to keep everything up and running and all the tough decisions that need to be made to be successful.”
  “[Listening] to the other projects helped me realize that there are so many opportunities in agriculture...”

• Impact on themselves, partner, and industry
  “Our group was able to make connections out in the animal industry that we may not have had before.”
  “This is something I see myself doing later on, and to be able to get a foot in the door and see what it takes and what is involved in some of the production process really helps.”
Conclusions

• Students did learn the material at least as well
  – Somewhat dependent on their specific project

• In addition to:
  – connecting to the industry
  – applying knowledge to a real situation
  – developing soft skills
  – benefiting the community partners
Future Directions

• Continue the program in the future

• Consider further analyses:
  – How each student learns best?
  – What type of learners opt for the service-learning?
  – How to accommodate gaps in skill mastery?
Thanks!

“We were better able to understand concepts taught in class and apply them in a real-world setting.”