Where Success Begins: Leveraging Learning Analytics to Predict Student Program Success

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Overview

• Initiative Goals
• Research Questions
• Sample
• Methods
• Findings
• Next Steps
What can learning analytics do for a degree program?

- Evidence-based education to support program, faculty, & student needs
  - Evaluate course content
  - Assess students progress
  - Predict students future performance
  - Identify at-risk students in a degree program

- Move from data-rich and information-poor TO data-rich and information-rich
Goals of the Initiative

1. Build Education Data Warehouse
2. Generate predictive model for Fall 2017 DVM courses
3. Create Analytic Dashboards
Research Questions

• How is the class performing in a first semester DVM program?
• How is the class performing in a first semester DVM course?
• How are students performing in the Professional & Clinical Skills (PCS) course?
• How are the student performing on the New Graduate Outcomes with the Histology course?
• How well are the instructional activities telling us what we want to know for a student’s knowledge and skill acquisition?
Sample: Class of 2021
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Course Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIBS 911</td>
<td>Histology</td>
<td>1</td>
<td>Dana Kneese</td>
</tr>
<tr>
<td>VSCS 910</td>
<td>Integrated Animal Care I</td>
<td>3</td>
<td>Stacy Eckman</td>
</tr>
<tr>
<td>VTPP 910</td>
<td>Physiology I</td>
<td>6</td>
<td>Randy Stewart</td>
</tr>
<tr>
<td>VTPP 914</td>
<td>Professional &amp; Clinical Skills I</td>
<td>3</td>
<td>Alice Blue-McLendon</td>
</tr>
<tr>
<td>VIBS 910</td>
<td>Small Animal Anatomy</td>
<td>4</td>
<td>Anton Hoffman</td>
</tr>
<tr>
<td>VIBS 936</td>
<td>Veterinarians in Society</td>
<td>2</td>
<td>Tacy Vemulapalli and Michelle Pine</td>
</tr>
<tr>
<td>VTPB 910</td>
<td>Veterinary Immunology</td>
<td>2</td>
<td>Roger Smith</td>
</tr>
</tbody>
</table>
Goal #1 Build DVM Education Data Warehouse
Goal #2: Generate predictive models
Goal #2: Generate predictive models
Goal #2: Generate predictive models

Course-level data
What: View of how each student is progressing in the course and how the course activities and assessments are supporting student’s mastery of the NGOs.
Stakeholders: PPO, course coordinators, and course instructor(s)

Student-level data
What: View of how a student is progressing in each course and level of mastery of the NGOs.
Stakeholders: Course coordinators, course instructor(s) and students

Program-level data
What: View of how each class is progressing and how curriculum content is supporting student’s mastery of the NGOs.
Stakeholders: CVM, PPO, curriculum committee, accreditation entities
Statistics Methods

• Predictive Modeling
  • Research purpose: create multiple models to predict students' course final grade by each week of the course activities
  • Dataset: historical data in Fall 2017
  • Model features: every scored activities (e.g., quizzes, assignments, participation, etc.)
Statistics Methods

• Linear Regression
  • “predicts a continuous numeric output from a linear combination of attributes.” (The Handbook of Learning Analytics, p. 64)
  \[ y_i = \beta_0 + x_{i1}\beta_1 + \cdots + x_{ip}\beta_p + e_i. \]

• Applied relaimpo package in R
  • Relative importance of regressors in the linear model
    • Averaging over orderings of regressors
    • Using both direct effects and effects adjusted for other regressors in the model
Example Predictive Model for Final Course Grade in Professional & Clinical Skills
Goal #3: Create Analytic Dashboards
Program-level Dashboard

Program Dashboard
Class 2021 Fall 2017 Week 9

- VGIS 911 Number of Students with Predicted Course Final Grade
- VTPP 910 Number of Students with Predicted Course Final Grade
- VTPP 914 Number of Students with Predicted Course Final Grade
- VGIS 910 Number of Students with Predicted Course Final Grade

Number of Students

- A
- B
- C
- D
- Null
Course-level Dashboard (Faculty View)
Course-level Dashboard (Content-View)
Next Steps in the Initiative

• Locate other data sources for the program (e.g. MMI results, participation in student organization activities, wellness measures, VEA, track-selection, etc.)

• Refine existing models by adding more data (e.g. pre-admissions) and meta-data (e.g. NGO tags)

• Refine the predictive models by adding the Class of 2022 data set