From Descriptive Reports to Actionable Predictive Business Intelligence: How to Enhance Institutional Productivity in the Age of ‘Big Data’

Serge Herzog, PhD, University of Nevada – Reno
John Stanley, MEd, University of Hawaii – West Oahu
The Impact of Business Intelligence (BI) Tools on Institutional Research

- BI more accessible to IR than ever before
- Transitioning from unidimensional spreadsheets to interactive dashboards
- Data becoming more visual; expectation to ‘captivate’ your audience
Challenges for Institutional Research

• Compliance vs. Self-Improvement
• From reporting to analysis
• Converting results into ‘actionable’ statements
• From ‘data silos’ to integrated warehouse
• Leverage technology, stay abreast of tech
• Follow highest standards, best practices
• Know your customers, mission
• Empower staff, continuous honing of skills
Examples of Business Intelligence (BI) Reports and Dashboards To Improve Institutional Effectiveness

• University of Nevada, Reno
  • Student Recruitment and Admission
  • Student Enrolment Persistence and Graduation
  • Student Outcomes: Course Success Rates and Degrees Awarded
  • Tuition Revenue Tracking and Forecasting
  • Faculty Workload and Productivity

• University of Hawaii - West Oahu
  • Academic Programme Marketing
  • Accreditation/Compliance Reporting
  • Post-Graduate Student Outcomes
University of Nevada, Reno

Serge Herzog, Director of Institutional Analysis
Student Recruitment and Admission

• **Purpose:** Identify Prospective Student Markets, Increase Admission Yield Rate, and gauge effectiveness of recruitment activities

• **Data Elements**
  • Student demographics, Pre-college academic profile, Application timing, Recruitment contact modality, Prospective academic unit

• **Data Sources**
  • Matriculation system (transactional), Census extracts (warehouse), Prospective Student Office (OPS-DB)
Student Enrollment and Persistence

• Purpose: Longitudinal enrollment tracking, At-risk student identification to increase persistence/graduation rates

• Data Elements
  • Student socio-demographics, Pre-college academic profile, First-year academic/campus experience

• Data Sources
  • Census enrolment extracts (warehouse), Course matriculation student survey (transactional system)
### New Full-Time Freshmen Retention Rates

Drill-down selection features are grey-rectangle titled, output metrics are blue-rectangle titled. High school origin works as a smart filter.

<table>
<thead>
<tr>
<th>Freshmen</th>
<th>Min Academic Index</th>
<th>Max Academic Index</th>
<th>Min HS Core GPA</th>
<th>Max HS Core GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>19387</td>
<td>44</td>
<td>114</td>
<td>0.00</td>
<td>6.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% Selected</th>
<th>FAFSA Filers</th>
<th>Academics Index</th>
<th>Credit Load: 12</th>
<th>Credit Load: &gt;15</th>
<th>First Term GPA</th>
<th>Cumulative GPA</th>
<th>Spring Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>77</td>
<td>9.15%</td>
<td>40.42%</td>
<td>2.89</td>
<td>3.03</td>
<td>92.01%</td>
<td></td>
</tr>
</tbody>
</table>

#### New Freshmen Fall to Fall Retention by Tuition Status

#### Ethnicity/Race Composition

<table>
<thead>
<tr>
<th>Gender</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA</td>
<td>77.7%</td>
<td>79.9%</td>
<td>80.5%</td>
<td>80.5%</td>
<td>80.5%</td>
<td>81.1%</td>
<td>79.9%</td>
</tr>
<tr>
<td>WHITE</td>
<td>75.8%</td>
<td>83.2%</td>
<td>85.0%</td>
<td>78.7%</td>
<td>81.4%</td>
<td>85.5%</td>
<td>80.1%</td>
</tr>
<tr>
<td>UNIV/UN</td>
<td>76.9%</td>
<td>85.7%</td>
<td>50.0%</td>
<td>77.8%</td>
<td>85.0%</td>
<td>72.7%</td>
<td>78.9%</td>
</tr>
<tr>
<td>PACIF</td>
<td>72.7%</td>
<td>700.0%</td>
<td>54.5%</td>
<td>82.6%</td>
<td>70.6%</td>
<td>85.1%</td>
<td>68.8%</td>
</tr>
<tr>
<td>MULTI</td>
<td>71.3%</td>
<td>74.4%</td>
<td>85.3%</td>
<td>78.1%</td>
<td>85.5%</td>
<td>72.0%</td>
<td>72.2%</td>
</tr>
<tr>
<td>ASIAN</td>
<td>74.7%</td>
<td>77.7%</td>
<td>76.6%</td>
<td>79.3%</td>
<td>77.3%</td>
<td>80.7%</td>
<td>78.0%</td>
</tr>
<tr>
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<td>77.0%</td>
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</tr>
<tr>
<td>ALUMN</td>
<td>84.8%</td>
<td>89.3%</td>
<td>87.0%</td>
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<td>83.3%</td>
<td>89.1%</td>
<td>85.6%</td>
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<tr>
<td>APIK</td>
<td>100.0%</td>
<td>88.9%</td>
<td>83.0%</td>
<td>83.3%</td>
<td>86.7%</td>
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#### New Freshmen Fall to Fall Retention by Gender and Ethnicity/Race

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</tr>
</tbody>
</table>

#### AAIR SIG Forum

Image courtesy of VisitCanberra
Student Outcomes:
Course Success Rates and Degrees Awarded

• Purpose: Identify attrition gateway courses to improve student progression and degree completion

• Data Elements
  • Academic marks by individual course, by course department/college, by instructor department/college

• Data Sources
  • Census course enrolment extracts (warehouse), instructional assignment census extracts (HR, warehouse)
### Degrees Awarded by College, Department, and Academic Program

<table>
<thead>
<tr>
<th>College</th>
<th>Time to Grad-Yrs</th>
<th>Final GPA</th>
<th>Avg Age</th>
<th>Degrees Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4.08</td>
<td>3.30</td>
<td>24.82</td>
<td>2680</td>
</tr>
<tr>
<td>Business</td>
<td>4.03</td>
<td>3.24</td>
<td>25.23</td>
<td>6342</td>
</tr>
<tr>
<td>Comm Health Sci</td>
<td>4.22</td>
<td>3.20</td>
<td>24.46</td>
<td>1859</td>
</tr>
<tr>
<td>Education</td>
<td>3.61</td>
<td>3.58</td>
<td>30.22</td>
<td>6337</td>
</tr>
<tr>
<td>Engineering</td>
<td>4.22</td>
<td>3.29</td>
<td>25.84</td>
<td>4538</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>3.27</td>
<td>3.54</td>
<td>29.41</td>
<td>2126</td>
</tr>
<tr>
<td>Interdisciplinary</td>
<td>5.48</td>
<td>2.82</td>
<td>29.48</td>
<td>1936</td>
</tr>
<tr>
<td>Journalism</td>
<td>4.25</td>
<td>3.21</td>
<td>24.08</td>
<td>1557</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>4.26</td>
<td>3.31</td>
<td>26.36</td>
<td>1213</td>
</tr>
<tr>
<td>Mortarline</td>
<td>1.11</td>
<td>3.46</td>
<td>39.48</td>
<td>881</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4.09</strong></td>
<td><strong>3.34</strong></td>
<td><strong>26.98</strong></td>
<td><strong>49641</strong></td>
</tr>
</tbody>
</table>

#### Status at Entry (available data only)
- Transfer-in
- Started at UNR
- N/A

#### Honors Level
- No Honors
- Cum Laude
- Distinction
- High Distinction
- Honors Program Participant
- Magna Cum Laude
- Summa Cum Laude

### Gender, Pell Student, Multiple Degrees
- Gender: F M
- Pell Student: No Yes
- Multiple Degrees: No Yes

#### Graph: Bachelor Degree, Master’s Degree, Doctorate Degree, First Professional

![Graph showing degrees awarded over academic years](Image courtesy of VisitCanberra)
Tuition Revenue Tracking and Forecasting

• Purpose: Longitudinal tuition revenue tracking to support budget planning and development by academic/administrative unit

• Data Elements
  • Course credit enrollment, course funding level, student academic level, student residency/tuition discount status, course subject, course owner (department/college), per-credit tuition rates, residency tuition flat rates

• Data Sources
  • Course enrolment census extracts (warehouse), student census extracts (warehouse), tuition rate schedule by term (System Office)
Faculty Workload and Productivity

• Purpose: Measure instructional activity by individual faculty, academic department, and college

• Data Elements
  • Course credit, subject, level, type, state-support, and enrollment; Faculty name, contract type, department/college affiliation

• Data Sources
  • Census course enrolment extracts (warehouse), instructional assignment census extracts (HR, warehouse)
University of Hawaii – West Oahu

John Stanley, Director of Institutional Research
Academic Programme Marketing

• Purpose: Provide local government and University Board of Trustees with highly visual, intuitive, and interactive public data on new academic programmes, student enrolment and job market.

• Data Elements
  • Student enrolment and demographics, community college transfer pipeline, and labor market (job openings locally)

• Data Sources
  • Matriculation system (transactional), Census extracts (warehouse), Occupational demand (Hawaii Industry Sector Database)
Accreditation Compliance

• Purpose: Provide accreditor with disaggregated student success data (retention, graduation rates, achievement gaps)

• Data Elements
  • New student demographics, re-Enrolment and graduation outcomes

• Data Sources
  • Matriculation system (transactional), Census extracts (warehouse), Cohort tracking tables (warehouse)
Credits: Dr. Ken Nelson of Loma Linda University for designing this template.
Post-Graduate Student Outcomes

• Purpose: Provide a broad audience of stakeholders (government, public, parents) with information about what happens to students after graduation.

• Data Elements
  • Employment by industry sector, name of employer, wages, graduate school enrolment, permanent address post-graduation

• Data Sources
  • Alumni survey (self-reported), Hawaii State Labor Department (direct measures of employment outcomes and wages), Census extracts (warehouse)
## Employment Status of Degree/Certificate Earners

**AY 2014-15 to 2017-18 Sample of Graduates (n=345)**

### Graduates Entering Workforce by Industry Sector and Average Wage

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Average Wage</th>
<th>Headcount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation</td>
<td>$63,859</td>
<td>4</td>
</tr>
<tr>
<td>Administrative and Support Services</td>
<td>$59,827</td>
<td>20</td>
</tr>
<tr>
<td>Air Transportation</td>
<td>$70,616</td>
<td>1</td>
</tr>
<tr>
<td>Ambulatory Health Care Services</td>
<td>$47,174</td>
<td>19</td>
</tr>
<tr>
<td>Amusement, Gambling, and Recreation Industries</td>
<td>$52,468</td>
<td>3</td>
</tr>
<tr>
<td>Animal Production and Aquaculture</td>
<td>$30,550</td>
<td>1</td>
</tr>
<tr>
<td>Beverage and Tobacco Product Manufacturing</td>
<td>$27,040</td>
<td>1</td>
</tr>
<tr>
<td>Broadcasting (except Internet)</td>
<td>$71,654</td>
<td>5</td>
</tr>
<tr>
<td>Building Material and Garden Equipment and Supplies Dealers</td>
<td>$60,124</td>
<td>3</td>
</tr>
<tr>
<td>Chemical Manufacturing</td>
<td>$69,628</td>
<td>2</td>
</tr>
<tr>
<td>Clothing and Clothing Accessories Stores</td>
<td>$45,970</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>$51,376</td>
<td>345</td>
</tr>
</tbody>
</table>

### Employment Pathways of Graduates

- Business Administration
- Public Administration
- Social Sciences
- Applied Science
- Education
- Humanities

- Employed out of Field
- Employed in Field
- Employed But GIP Not Mapped
- No Current Employment Listed

### About This Dashboard

This dashboard reports employment outcomes for University of Hawaii – West Oahu graduates that participated in the Alumni Insight Survey administered by the University of Hawaii Foundation and Emsi Labor Market Analytics Inc. in the spring of 2018. Data are for a sample of bachelor’s degree and certificate earners between academic years 2014-15 and 2017-18 (n=345). Results are not representative of all UH West Oahu graduates or their employment outcomes.

### Top Employers

- University of Hawaii
- Time Warner Inc.
- Bank of Hawaii Corporation
- Hawaii State Department
- Elementary School
- Hawaii State Library
- Honolulu Commuter
- Kamehameha Sc.
- Macy’s Inc.
- Sears Holdings Corporation

### Graduates Working in the Continental U.S.

[Map showing graduates working in the Continental U.S.]

[Map image courtesy of VisitCanberra]
http://uhcc.hawaii.edu/workforce/industry_sectors.php
Questions

Serge Herzog, PhD
University of Nevada – Reno
serge@unr.edu

John Stanley, MEd
University of Hawaii – West Oahu
jstanley@hawaii.edu