SAINT LOUIS UNIVERSITY

Program Assessment: *Annual Report*

Program(s): MS Applied Analytic

Department:

College/School: School for Professional Studies

Date: April 2019

Primary Assessment Contact: Dr. Srikanth Mudigonda

1. Which program student learning outcomes were assessed in this annual assessment cycle?

Following a program review in 2017, the program's learning objectives were set to be:
LO1: Employ research methodologies appropriate for the field of analytics.

LO2: Assess evidence to draw reasoned, ethical conclusions.

LO3: Implement analytics systems that facilitate context-appropriate decision making.

LO4: Utilize effective discipline-specific argumentation skills.

For the year 2018, we will be assessing LO1 and L03, by looking at the data from the following courses: (a) AA 5300: Advanced Analytics; (b) AA 5800: Simulation and Modeling; (c) AA 5950/5963 Applied Analytics Project – the implementation phase. AA 5300 and 5800 were selected as they are two of the three ones where these LOs are reinforced (having been introduced in other courses in the curriculum). In addition, AA 5300 and AA5800 provide skills that are more advanced and thus are seen as likely to be useful for students completing the master's research projects. As such, identifying issues in these courses and determining the extent to which these courses would help students in addressing the LOs at an advanced stage would help us understand whether deficiencies observed during the master's research project are due to weaknesses not addressed during AA 5300 and 5800. In the next iteration (2019), the courses where these LOs are addressed at the introductory level would be assessed so as to back-trace any deficiencies, thereby completing a comprehensive evaluation of these LOs.

Note that AA 5950 is course that we still offer to students who entered the program under the old curriculum, while AA 5963 is its exact equivalent in the new curriculum – both courses involve students implementing the master's research project and involve no teaching.

2. What data/artifacts of student learning were collected for each assessed outcome? Were Madrid student artifacts included?

Our new assessment protocol integrates data from three sources to evaluate student learning:

1. Instructors complete a formative assessment through a survey at the end of each course. Through the survey, instructors are asked to

describe specific artifacts that are related to each LO that is mapped to that course. Instructors then assess competency in this area, as well as potential opportunities for improvement. It is important to note that this process is meant to gather data that is independent of grades given.

2. Faculty mentors of a student completing their applied analytics research project (AA 5950/5963) complete a summative assessment on each student at the conclusion of their capstone. The mentors provide assessment of each student on each of the four program's learning outcomes.
3. A student assessment of learning outcomes is also completed by students at the end of their degree. This indirect measure asks students to rate the extent they learned and developed on each LO. They also indicate what specific competencies they developed and which they feel they need additional development.

** Given the online nature of our program, students from Madrid would have the same learning experience, and thus assessment of their data would be the same. It should be noted that presently we do not have students from overseas.

3. How did you analyze the assessment data? What was the process? Who was involved?
NOTE: If you used rubrics as part of your analysis, please include them in an appendix.

Data were collected via assessment instruments hosted in Qualtrics. Reports were generated from these data, for each course that implemented each learning outcome. These data are both quantitative, providing the overall degree to which each LO was met in each course, and qualitative data consisting of comments provided by the instructors on each of the learning outcome, as well as the course as a whole. The compiled results were shared with faculty and administrators associated with the specific courses used in the assessment, and with the administration of the program's curriculum and its implementation.

4. What did you learn from the data? Summarize the major findings of your analysis for each assessed outcome.
NOTE: If necessary, include any tables, charts, or graphs in an appendix.

Based on the formative assessments conducted by the instructors teaching AA 5300: Advanced Analytics and AA 5800: Simulation modeling, the LO "Employ research methodologies appropriate for the field of analytics" was met fully in 78.57% of the students who were included in the assessment and partially in 22.43% of the students (N = 11). The LO, "Implement analytics systems that facilitate context-appropriate decision making" also had the same level of support: met fully in 78.57% of the students who were included in the assessment and partially in 22.43% of the students (N = 11).

Based on the summative assessment of each individual student's master's research project artifacts, the LO "Employ research methodologies appropriate for the field of analytics" was met fully in 100% of the students (N = 16), while the LO, "Implement analytics systems that facilitate context-appropriate decision making" also had the same level of support: met fully in 94% of the students who were included in the assessment and partially in6% of the students (N = 16).

Taken together, there is evidence to state that both LOs have reasonably good support for being met at to a high degree in a substantial number of students. However, there appear to be issues with some of the preparation of a minority of students coming into these two courses and into the master's research project. These issues appear to be

with the students' grasp of more foundational concepts and skills, in the areas of statistics and programming, and with communication of results. In the next assessment cycle, courses further upstream, i.e., those that serve as pre-requisites to the courses assessed in the assessment cycle, will be evaluated to identify which of the learning materials and activities, and evaluative components require improvements and, if needed, replacements, so as to provide a stronger foundations that would enable students in meeting these LOs across the introductory, reinforcing, and evaluative phases of the curriculum.

5. How did your analysis inform meaningful change? How did you *use the analyzed data to make or implement recommendations for change* in pedagogy, curriculum design, or your assessment plan?

Based on our previous year's assessment, we had implemented a revised version of research methods and statistics sequence of courses (AA 5221 + AA 5222/5223). Students whose work was assessed during the current assessment cycle were those who completed the previous sequence of the research methods and analyses courses. As such, improvements in their learning would be determined once they take the next iteration of the courses AA 5300 and AA 5800.

In addition, we have made revisions to the foundational course in the curriculum AA 5000: Foundations of Analytics, which precedes all of the courses students take. So in our next assessment cycle, we will assess all of the courses that are part of the introductory phase for these two LOs, viz., AA 5000,

6. Did you follow up ("close the loop") on past assessment work? If so, what did you learn? *(For example, has that curriculum change you made two years ago manifested in improved student learning today, as evidenced in your recent assessment data and analysis?)*

This (2018) is the first year during which courses in the revised version of the curriculum have been offered. So in this first stage of the loop, in 2018, decided to focus on those LOs (LO 1 and LO 3) that appear to indicate weakness in how the required concepts and skills are taught, based on the results drawn from the summative assessment of the master's research projects.

Tracing the data back from the master's research project to the courses immediately closer to it that address these two LOs, we found some weaknesses in how two courses used in the assessment – AA 5300 and AA 5800 – appear to have some weaknesses. These weaknesses appear to emanate from further upstream, in courses that are pre-requisites to these two.

In the next stage of our assessment, we will continue to focus on these two LOs, by looking at data obtained from courses that are precursors to AA 5300 and AA 5800, viz., AA 5000; AA 5221, 5222, and 5223; AA 5100; AA 5200. AA 5000, 5221, and 5222 will be taught twice in 2019, while AA 5223, 5100 and 5200 will be taught once.

We believe the data from these courses would provide enough evidence to determine which parts of these courses' content, learning activities, and evaluative activities need to be revised so as to strengthen the needed

concepts and skills among our students. This second phase would then be followed by a third phase, where the loop could be closed by looking at the extent to which the changes enacted in all of the above-listed courses during 2019 and 2020 have been effective. As such, the loop on these two LOs would be closed based on the assessment data from 2020.

IMPORTANT: Please submit any revised/updated assessment plans to the University Assessment Coordinator along with this report.

Appendices to accompany assessment report of MS Applied Analytics for calendar year 2018

Formative Assessment data for AA 5300: Advanced Analytics

Artifact(s) used for assessment: The final project.
Criteria and methods of assessment:
The effectiveness in using the methods of analysis covered in the course in completing the requirements of the final project.
An elaborate grading rubric was used for rating the performance of students on the final project.
A student who fails to meet all of the criteria, for example by falling on conducting all of the analyses or by not using appropriate rationale for using or excluding all of the appropriate analyses would lose points on the corresponding criteria in the rubric, while a student whose report shows no such shortcomings would achieve all of the assigned problems.

Learning Objective	Degree to which the LO was met	Comments
Employ research methodologies appropriate for the field of analytics.	Fully: 78.57% Partially: 22.43% N: 11	As was the case in the past, several of the students have taken the course after having completed the research methods + stats course sequence, in addition to completing the revised version of AA 5000, where students have learned the foundational aspects of R programming, and statistical modeling, all the way up to multiple linear regression and general linear model. These students performed well in the course. The ones who had a less than perfect overall (i.e., A-) grade, appear to have struggled a little in the previous coursework, too. So, overall, while the lowest grade in the course for all students is A-, there is room for improvement in the course content, involving providing some additional remedial material to help with R programming. As mentioned earlier,
Implement analytics systems that facilitate context-appropriate decision making	Fully: 78.57% Partially: 22.43% N: 11	

		providing remedial materials in R programming, and statistical foundations (general linear model) are expected to be useful.

Formative Assessment data for AA 5800: Simulation and Modeling

Artifact(s) used for assessment: The final project.
Criteria and methods of assessment:

1. The effectiveness in using the methods of analysis covered in the course in completing the requirements of the final project.
2. An elaborate grading rubric was used for rating the performance of students on the final project.
3. A student who fails to meet all of the criteria, for example by falling on conducting all of the analyses or by not using appropriate rationale for using or excluding all of the appropriate analyses would lose points on the corresponding criteria in the rubric, while a student whose report shows no such shortcomings would achieve all of the assigned problems.

Learning Objective	Degree to which the LO was met	Comments
Employ research methodologies appropriate for the field of analytics.	Fully: 75% Partially: 25% N: 8	As was the case in the past, several of the students have taken the course after having completed the research methods + stats course sequence, in addition to completing the revised version of AA 5000, where students have learned the foundational aspects of R programming, and statistical modeling, all the way up to multiple linear regression and general linear model. Several of these students had also completed AA 5300, which further strengthened their understanding of concepts in probability and statistics. These students performed well in the course. The ones who had a poor (i.e., C+) grade, appear to have struggled due to time management (in the case of one student) and lack a required level of grasp of foundational concepts (in the case of a second student). Providing remedial materials that re-emphasize statistical and programming concepts, along with some advice on how to manage one's time in
Implement analytics systems that facilitate context-appropriate decision making	Fully: 75% Partially: 25% N: 8	

		order to complete the coursework successful are expected to help.

Summative Assessment data for AA 5950/5963

The summative assessment was based on the analysis of a students master's research project. The artifacts submitted by each student included a final project report, a presentation artifact (a PowerPoint file, a dashboard to enable interactive visualization of data to aid decision-making), if feasible, associated datasets, and program code Each of the four learning outcomes of the program were assessed.

Learning outcome	Degree of achievement	Summary of comments
Employ research methodologies appropriate for the field of analytics	High degree of mastery: 100% Moderate degree of mastery: 0% Low degree of mastery: 0% (N = 16)	The variety of student projects included projects that involved interactive decision-support dashboards, analyses of publicly available datasets from a particular domain of interest of the student, analyses of proprietary (organizational) datasets. Despite the wide variety of project types, the approaches employed by the students indicated a high degree of mastery of the materials
Assess evidence to draw reasoned, ethical conclusions	High degree of mastery: 100% Moderate degree of mastery: 0% Low degree of mastery: 0% (N = 16)	Students scored well on this LO as well. In addition to formal coursework in research design, and in ethical, evidence-based decision making, students are required to complete a set of CITI training modules related to conducting research related to human subjects or related areas in the social sciences domain. These coursework and training modules, together, appear to have inculcated in students a systematic approach for collecting valid data, analyzing the data, and drawing conclusions that take into account not just the problem being addressed but also the ethical dimensions of the problem.
Implement analytics systems that facilitate context-appropriate decision making	High degree of mastery: 94% Moderate degree of mastery: 6% Low degree of mastery: 0% (N = 16)	The majority of students performed well, showing a high degree of mastery. One student (1/16), struggled with the implementation of project, seeking a lot of

		additional help from the project mentor, in addition to advice. Based on this experience, there appears to be a need for re-iterating the concepts in students as they begin their final project, to bring back to their attention some of the pertinent concepts and skills they may have learned a little to long time ago.
Utilize effective discipline-specific argumentation skills	High degree of mastery: 94% Moderate degree of mastery: 6% Low degree of mastery: 0% (N = 16)	The majority of students performed well, showing a high degree of mastery. One student (1/16) (the same one as the one who was referenced in the previous LO), struggled with presenting her results via cogent argumentation. Her previous education and most of her work experience was in South America, so transitioning to writing and communicating at a graduate level in the United States was a challenging endeavor for her. Nevertheless, she worked hard and with help from the project mentor, produced a report that was sufficient.