

Foreign Language Assessment Report

Fall 2016

Author: Joseph F. van Gaalen, Ph.D., Director, Academic Assessment

1 INTRODUCTION

Florida SouthWestern's Foreign Language Department employs a common course assessment to measure student progress in course level objectives, a practice shown to be effective in establishing data driven instruction (Hall, 2010). Courses included in assessment are: FRE 1120 *Elementary French I*, FRE 1121 *Elementary French II*, SPN 1120 *Beginning Spanish I*, and SPN 1121 *Beginning Spanish II*. Through achievement of the courses students will acquire and demonstrate competency in speaking, writing, reading comprehension and listening comprehension in standard Spanish or French at the beginner's level. The assessment outcomes outlined below define the method of assessment for each course assessment as well as measure current Student Learning Objectives (SLOs) and identify areas for future SLOs to be assessed. Additionally, the plan provides information on achievement levels of Dual Enrollment artifacts compared with non-Dual Enrollment, as well as Online artifacts compared with traditional artifacts as highlighted in the course level assessment plan. This report provides achievement analysis for both fall 2016 as well as longitudinal studies, where applicable.

For additional detail or further analysis not provided in this report, please contact Dr. Joseph F. van Gaalen, Director of Academic Affairs Assessment, Academic Affairs (jfvangaalen@fsw.edu; x16965).

2 FRENCH

The lead professor (and sole full-time faculty member) of the French Department departed Florida SouthWestern State College at the end of AY 2015-16. The new incoming professor elected to start fresh with a new assessment tool. The AY 2016-17 is currently being used to develop and/or pilot a new tool for implementation in the fall 2017 term. As a result, no analyses for AY 2016-17 are included herein.

3 SPANISH

During the fall 2016 semester 16 sections of SPN 1120 Beginning Spanish I were offered. Of those, artifacts from a common final were collected from 15 sections. Sections were taught by eight different instructors, seven of which were represented in the artifacts collected. A total of 328 students were enrolled in SPN 1120. Of those, 240 artifacts were collected representing a sample size of 62% of the population. Five sections of SPN 1121 Beginning Spanish II were offered. Of those, artifacts were collected from a common final from three sections. Sections were taught by three different instructors, two of which were represented in the artifacts collected. A total of 95 students were enrolled in SPN 1121. Of those, 42 artifacts were collected representing a sample size of 44%.

3.1 SPN 1120

3.1.1 Descriptive Statistics & Learning Objectives

Using a common course assessment the FSW Spanish faculty defined three areas of interest for evaluation that apply to SPN 1120. The Student Learning Outcomes (SLOs) and their measure of success are:

- SLO 1: Students will be able to understand spoken Spanish. The faculty established measure of success for this SLO is for 80% of students to demonstrate competency with a score of 70% or better in the oral comprehension exam sections (Section I).
- SLO 2: Students will be able to understand written Spanish. The faculty established measure of success for this SLO is for 80% of students to demonstrate competency with a score of 70% or better in the reading comprehension exam sections (Section II and III).
- SLO 3: Students will be able to write effectively in the Spanish language. The faculty established measure of success for this SLO is for 80% of students to demonstrate competency with a score of 70% or better in the writing competency exam sections (Section IV and V).

The faculty established measure of success for SLO 1, 80% of students scoring 70% or higher in Section I, was nearly met as results exhibit 73% of artifacts score 70% or higher in the oral competency exam section (Section I) (Table 1). The faculty established measure of success for SLO 2, 80% of students scoring 70% or higher in Sections II and III, was partially met. Results exhibit 48% of artifacts scored 70% or higher in Section II and 84% of artifacts scored 70% or higher in Section III. The faculty established measure of success for SLO 3, 80% of students scoring 70% or higher in Sections IV and V, was not met. Results exhibit 60% of artifacts scored 70% or higher in Section IV and 73% of artifacts scored 70% or higher in Section V. For a graphical representation of SLO achievement, see Figure 1.

n = 240	Section I (Oral)	Section II (Reading)	Section III (Reading)	Section IV (Written)	Section V (Written)	Combined (Overall)
Goal	80% of artifacts scored $\geq 70\%$ for all sections					
% above 70%	73%	48%	84%	60%	73%	
Mean (as %)	79%	66%	85%	73%	76%	72%
Median (as %)	87%	68%	90%	71%	85%	76%
Section Score Max	15	60	15	15	20	125
Section Mean	11.9	39.8	12.8	10.9	15.2	90.6
Section Median	13	41	13.5	12	17	94.8

Table 1. Percentage of student achievement level as per SLOs (SPN 1120).

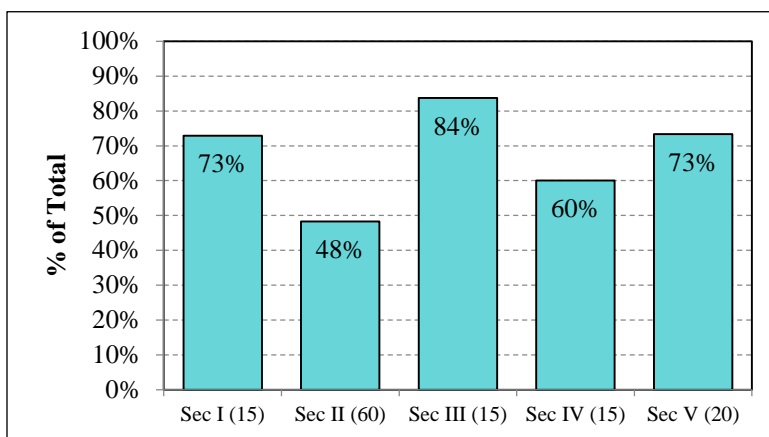


Figure 1. SLO achievement for SPN 1120 by exam section (Percentage of student achievement level as per SLOs).

3.1.2 Exploratory Analysis & Significance Testing

Multiple comparisons of artifact scores across varying formats, campuses, and student types were made to more thoroughly detail the assessment data. Each course was divided into appropriate subgroups such as by campus or enrollment status to perform the analysis. Where possible, additional methods of analysis were conducted to provide a broader picture of these comparisons.

3.1.2.1 Dual Enrollment to Non-Dual Enrollment Comparison

No dual enrollment sections of the course were run during fall 2016 so no comparison study between dual enrollment and traditional courses could be completed.

3.1.2.2 Online to Traditional Comparison

During the fall 2016 semester, two online sections reported data using the newly developed shell which includes the common final exam. From those course sections, 17 total online artifacts were collected from SPN 1120 and 223 traditional artifacts were collected from SPN 1120. A comparison of basic statistics is provided in Table 2. Online artifacts mean scores are 16.1 higher than traditional artifacts. Differences in the means were tested for significance using a Welch's t-test according to standard methods (Davis, 1973; McDonald, 2009; Wilkinson, 1999) and were found to be statistically significantly different. Therefore, we can reject the null hypothesis that the differences in the means of the online and traditional artifacts are equal to 0, and we can conclude this with a 95% confidence that the differences in scores are not solely due to chance. However, based on the work of Johnson (2013), there is a 17-25% chance that the marginally significant result may be false positives (i.e. Type I errors).

Effect size was calculated using a method devised by Rosenthal and Rosnow (1991) for meta-analytical purposes in potential comparisons with other institutions (Lipsey and Wilson, 1993). The results exhibit what Cohen (1988) would consider a small-to-medium effect size. In other words, non-overlap score distribution from online artifacts to traditional artifacts is approximately 23%. For a graphical representation of this see Figure 2.

df = 238	
Online mean	88.7
Online standard deviation	26.2
Traditional mean	72.6
Traditional standard deviation	18.57
Effect size	-0.324
p-value	0.023*

Table 2. Comparison of mean scores for online and traditional artifacts. Positive effect sizes indicate a higher mean score for traditional artifacts. *Denote marginal significance as defined by Johnson (2013).

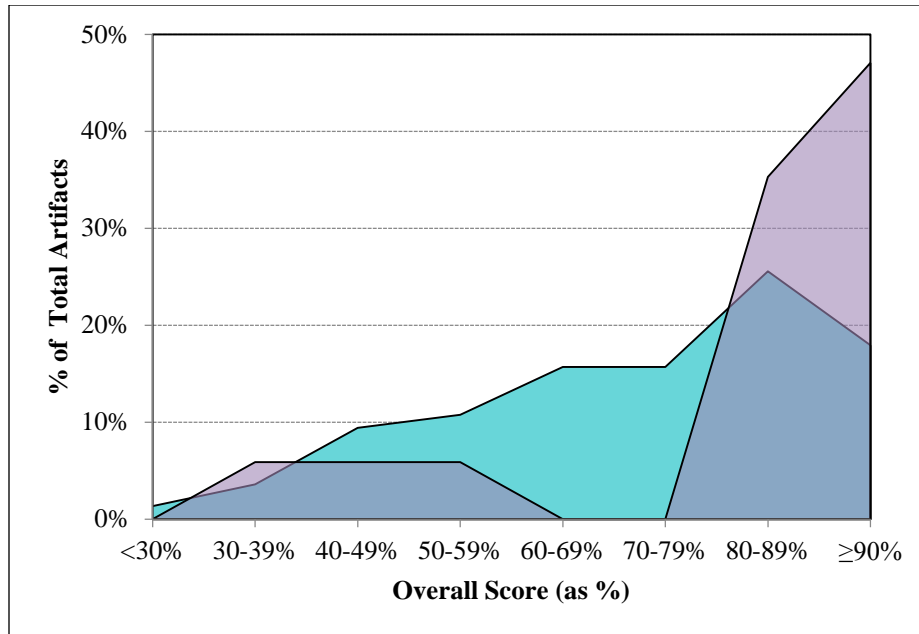


Figure 2. Score distribution for online (purple) and traditional (teal) artifacts of SPN 1120.

3.1.2.3 Comparison by Campus/Site

Of the 240 artifacts collected from SPN 1120, 43 originated from the Charlotte campus, 39 from the Collier campus, 17 from FSW Online, and 141 from the Thomas Edison (Lee) campus. Scores by rubric dimension varied greatly across campuses. A comparison of mean scores by rubric dimension is provided in Table 3.

	Section I	Section II	Section III	Section IV	Section V	Combined Score
<i>Rubric Max</i>	15	10	10	5	5	100
Charlotte	9.8	31.9	10.9	9.9	11.1	73.7
Collier	13.1	43.3	14.3	12.7	17.6	101.0
FSW Online	12.2	41.2	13.0	10.7	15.9	93.0
Thomas Edison (Lee)	11.6	39.6	12.4	11.0	14.1	88.7

Table 3. Comparison of mean scores by site for SPN 1120. Bold denotes highest mean score in that dimension among all sites. Rubric dimensions identified in SLOs in blue.

Collier campus exhibits higher scores in all sections of the exam. Thomas Edison consistently exhibits the second highest scores across sections. FSW Online consistently exhibits the third highest, and Charlotte is consistently the lowest scoring on all exam sections.

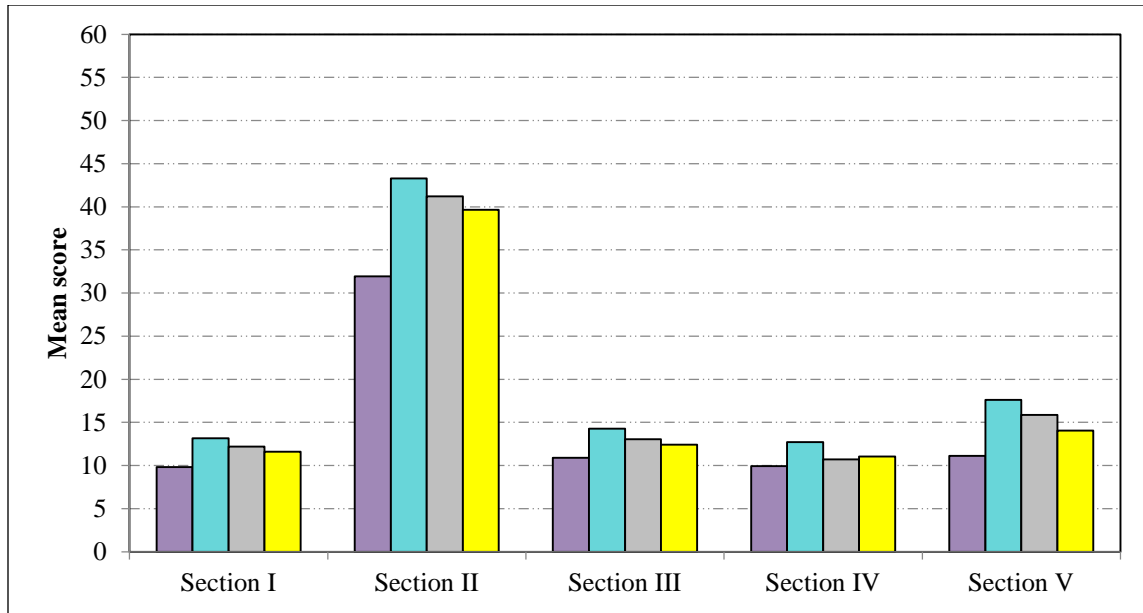


Figure 3. Comparison of mean score of exam sections by site with Charlotte in purple, Collier in teal, Thomas Edison in gray, and FSW Online in yellow.

A plot comparing descriptive statistics of the combined (overall) scores by site is presented in Figure 3. Collier, Thomas Edison, and FSW Online exhibit peaks centered on 80-89% or higher. By comparison, Charlotte exhibits a peak in score distribution centered on 40-49%.

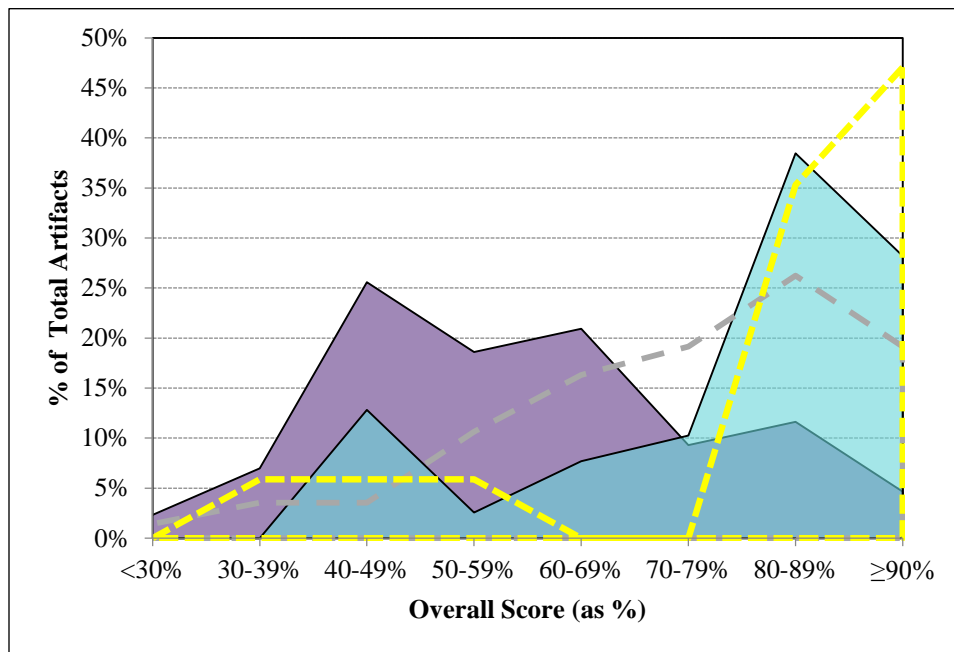


Figure 4. Comparison of artifact score distribution for Charlotte in purple, Collier in teal, Thomas Edison in gray, and FSW Online in yellow.

A one-way analysis of variance was used to compare means of the combined rubric scores at each site. Results of the ANOVA exhibit a statistically significant difference between sites (see Table 4). Therefore,

we can reject the null hypothesis that the mean combined rubric scores at each site are equal to each other and we can conclude with a 95% confidence that the differences in scores are not solely due to chance.

Source of Variation	Sum of squared differences	df	Mean Squares	F _{obs}	p-value	F _{crit}
Between Sites	17,443.7	3	5814.6	12.12	2.10x10 ⁻⁷	2.64
Within Sites	113,238.9	239	479.8			
Total	130,682.6	239				

Table 4. Results of one-way ANOVA of combined rubric scores at each site for SPN 1120.

3.1.3 Data Distribution & Longitudinal Study

3.1.3.1 Data Distribution

A histogram depicting the distribution of scores across each exam section is shown in Figure 5. Sections I, III, IV, and V exhibit peaks above 90% with the distribution trailing down with decreasing score. Section II, however, exhibit more widely distributed scores. Section II exhibits between 8% and 17% of artifacts scoring in each bin from 30-39% up through ≥ 90%.

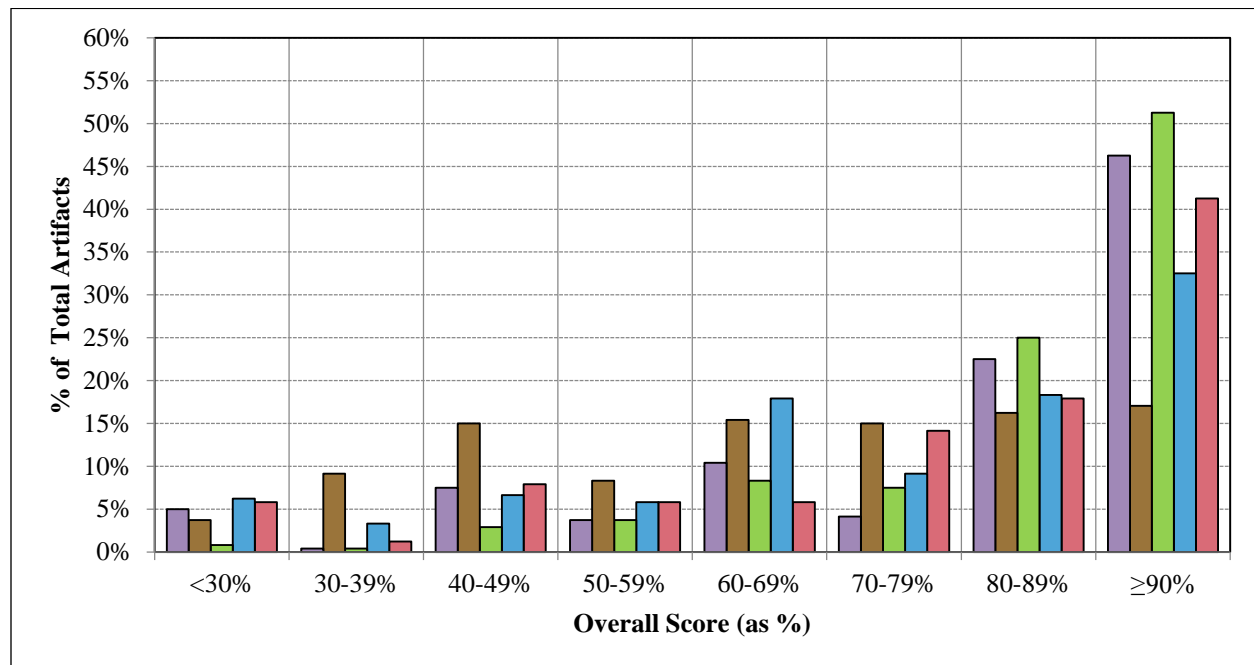


Figure 5. Histogram of SPN 1120 exam sections scores for spring 2016. Purple – Section I, Brown – Section II, Green – Section III, Blue – Section IV, and Red – Section V.

To describe the behavior of the section scores based on overall achievement, a color map, or binary raster image, was created by calculating the mean scores for each exam section as a function of combined score (Figure 6). The color represents the mean section score achieved overall score as shown in the x-axis as a percentage.

A review of the colormap in Figure 6 shows that Section II is consistently the lowest performing compared to other sections between the ranges of 60-84%. For example, in the 70-74% range, the mean score for Section II is 56%, while the other four sections range from 71-86%. Additionally, Section

I and Section III, is over performing at the lowest overall scores. At the 65-69% range, the Section I mean score is 74%, and Section III is 80%, whereas other sections range from 58%-65%.

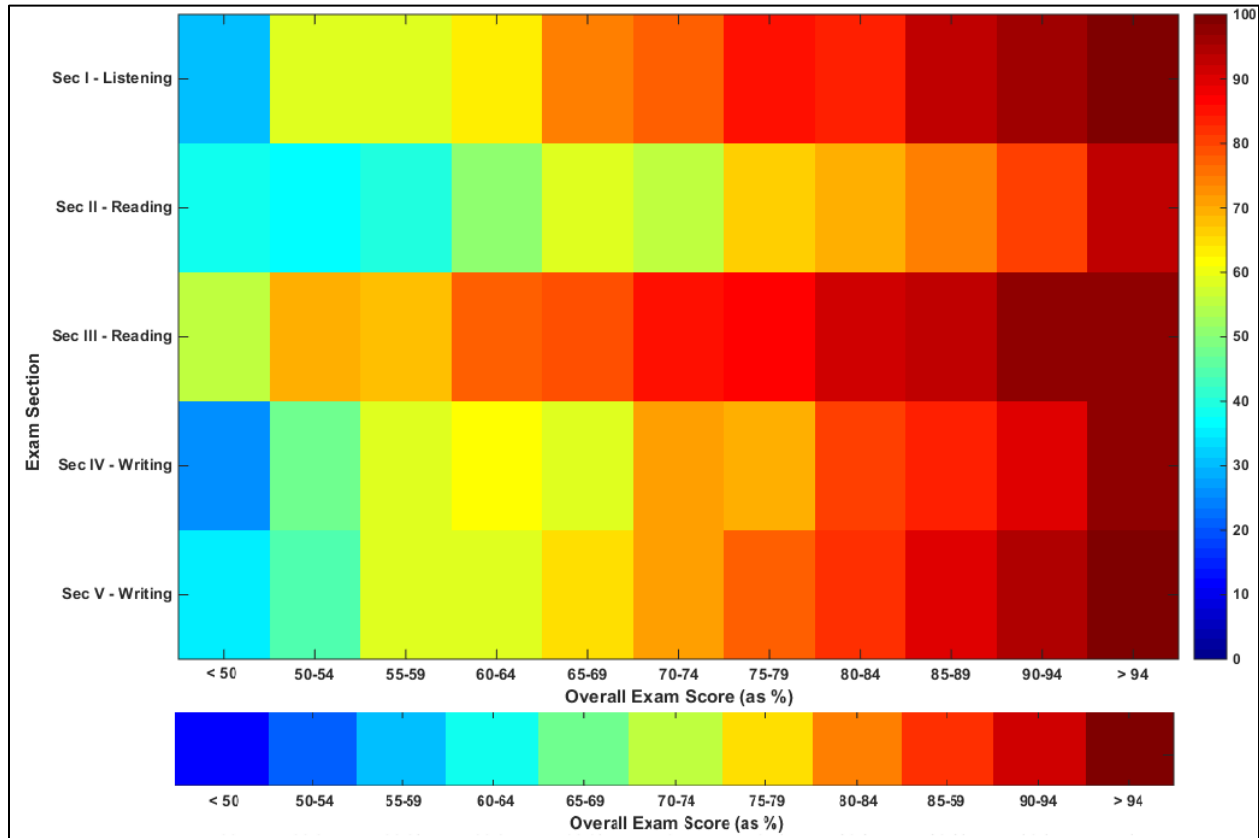


Figure 6. (Top) Colormap of mean scores for each exam section based on overall scoring bin for SPN 1120. (Bottom) Comparison exam section if section score percentage is the same as overall (i.e. artifact score is equally distributed across all sections). An exam section with hotter colors (reds/yellows) compared with the bottom bar means that section achievement exceeds the overall score and is an area of strength. An exam section with colder colors (blues/greens) compared with the bottom bar means that section achievement is lower than the overall score and is therefore an area of weakness.

3.1.3.2 Longitudinal Study

Further description of achievement over time in SPN 1120 is provided in a comparison of fall 2013 through spring 2016 data (Table 5 and Figure 7). Both demographics of students and student count vary by semester it may be more reasonable to compare like semesters (Fall vs. Fall, Spring vs. Spring). (see <http://www.fsw.edu/facultystaff/assessment/history> for further details). Because some exam sections have different maximum scores (15, 20, and 60), to see which of the five sections of the exam exhibits the strongest achievement it may be best to relate them in terms of percent. As a percentage, Sections I, III, IV, and V exhibit mean scores over time ranging from 74% to 85%. By comparison, Section II mean score over time is 68%.

	<i>Section Max</i>	Fall 2013 n=58	Spring 2014 n=90	Fall 2014 n=93	Spring 2015 n=73	Fall 2015 n=122	Spring 2016 n=141	Fall 2016 n=240
Section I (Oral)	15	12.1	12.4	11.8	11.5	10.8	11.5	11.9
Section II (Reading)	60	40.4	45.1	40.5	39.8	41.8	38.4	39.8
Section III (Reading)	15	12.0	13.2	12.8	12.8	12.4	13.3	12.8
Section IV (Written)	15	10.6	11.7	11.1	10.9	11.5	10.5	10.9
Section V (Written)	20	16.2	16.8	16.5	16.4	15.2	15.7	15.2
Combined (Overall)	125	91.3	99.2	92.8	91.4	91.6	89.5	90.6

Table 5. Comparison of mean scores for SPN 1120 for fall 2013 through fall 2016.

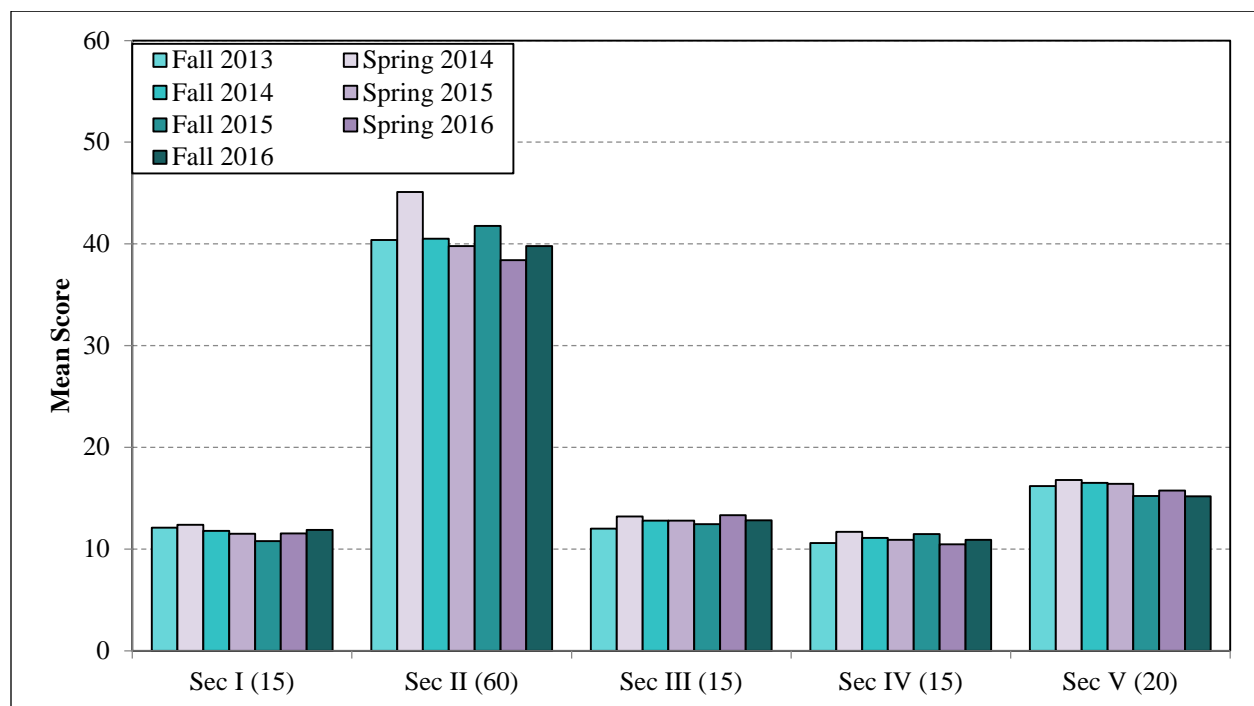


Figure 7. Comparison of mean scores for SPN 1120 through time from fall 2013 through fall 2016.

If we compare colormaps from three previous terms (spring 2015, fall 2015, and spring 2016) with fall 2016 the consistency of sections can be reviewed over time (Figure 8). Section II is consistently the lowest performing compared to other sections between the ranges of 60-84% in the last four terms. Additionally, section III is consistently the strongest performing exam section.

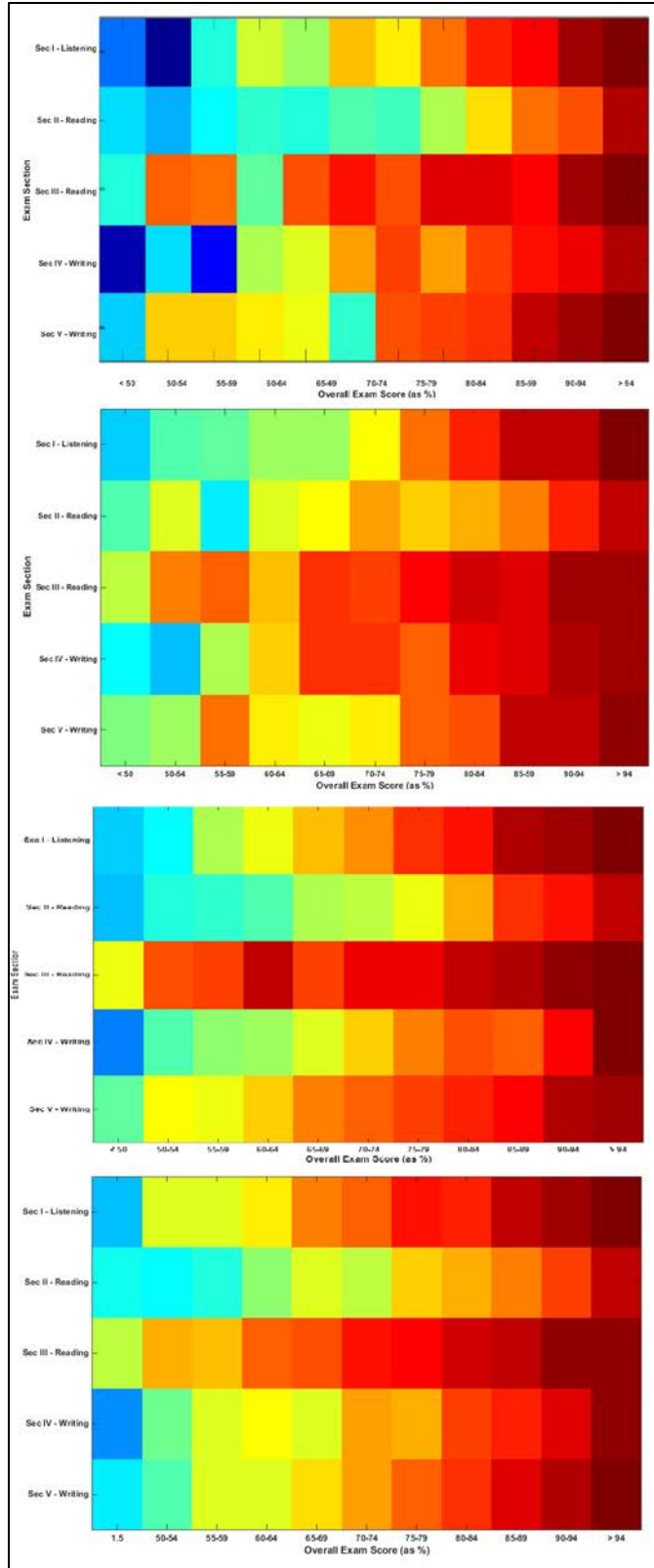


Figure 8. Comparison of spring 2015 (top), fall 2015, spring 2016, and fall 2016 (bottom) colormaps of SPN 1120.

3.2 ENTRANCE SKILLS STUDY

In the spring 2016 term, a brief assessment was piloted in two sections of SPN 1121 on the Thomas Edison campus prior to entering into any engaged study in the course. The purpose of the assess student skills and retention of materials from SPN 1120 prior to beginning SPN 1121. The assessment consisted of a 15-minute reading comprehension quiz mirroring that which is seen in Section II of the SPN 1120 common final exam. The study compared study skill level based on the instructor they had for the previous course (SPN 1120) in an effort to align student skill level upon entry into SPN 1121. The pilot program for this study was first included in the fall 2015 assessment report. This program was continues and was most recently administered at the beginning of spring 2017, before the writing of this report and is included here.

The assessment has now been administered in all traditional sections of SPN 1121 beginning with summer 2016 through spring 2017 on the Charlotte, Collier, and Thomas Edison campuses. Results of the cumulative study are shown in Figure 7. Note that instructor numbers have been shuffled since the most recent report to protect instructor identity.

In concept, upon entry to SPN 1121, all students should have at least a passing score (or nearly so) of the final exam from SPN 1120. The entrance skills study exhibits a wide range of mean scores across instructor (Figure 7). Results exhibit achievement levels based on previous instructor spanning as low as 7.2/30 to as high as 25.3/30.

One attribute to consider is the relationship of the mean scores displayed here by instructor in relation to the mean score for Section II of SPN 1120 (section of exam the entrance skills assessment is based) denoted by the green dashed line. In only 3 of 11 cases do mean scores for the entrance skills study exceed the mean score from the final exam in the most recent semester. From a success rate perspective:

- 67% of students from Instructors 1, 2, and 3 score higher than the final exam mean score
- 24% of students from Instructors 4 through 11 score higher than the final exam mean score

Note that while in some cases a limited sample size may be related to low mean scores (Instructor 9 & 10), this is not always the case. Students from Instructor #8 exhibit a mean score of 11.1/30 with a sample size of n=31.

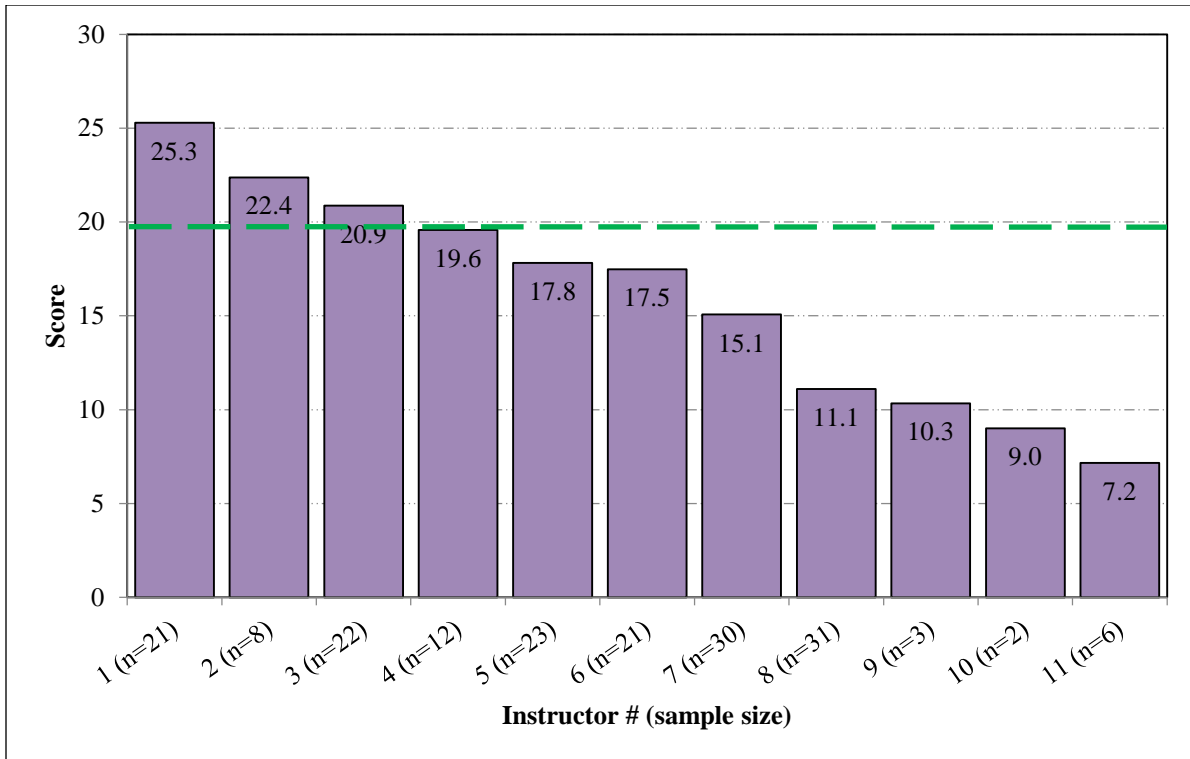


Figure 9. Comparison of achievement in entrance skills study assessment by instructor. Note that instructor numbers have been shuffled since the most recent report to protect instructor identity. Green dashed line denotes fall 2016 mean score for Section II of SPN 1120 (section of exam the entrance skills assessment is based).

3.3 SPN 1121

3.3.1 Descriptive Statistics & Learning Objectives

Using a common course assessment the FSW Spanish faculty defined the same three areas of interest for evaluation that apply to SPN 1121 as those used for SPN 1120. For details on each SLO, see 3.1.1. The only difference between SPN 1121 and SPN 1120 in terms of measuring these outcomes is that the exam sections differ slightly and are noted in Table 4 below.

The faculty established measure of success for SLO 1, 80% of students scoring 70% or higher in Section I, was not met as results exhibit 74% of artifacts score 70% or higher in the oral competency exam section (Section I) (Table 4, Figure 8). The faculty established measure of success for SLO 2, 80% of students scoring 70% or higher in reading only sections, Sections II, and VI, was not met. Results exhibit 55% of artifacts scored 70% or higher in Section II and 50% of artifacts scored 70% or higher in Section VI. The faculty established measure of success for SLO 3, 80% of students scoring 70% or higher in writing only sections, Sections V and VII, was partially met. Results exhibit 31% of artifacts scored 70% or higher in Section V and 86% of artifacts scored 70% or higher in Section VII.

n = 42	Section I (Oral)	Section II (Reading)	Section III (Read/ Write)	Section IV (Read/ Write)	Section V (Writing)	Section VI (Reading)	Section VII (Writing)	Combined (Overall)
Goal	80% of artifacts scored $\geq 70\%$ for all sections							
% above Goal	74%	55%	52%	67%	31%	50%	86%	
Mean (as %)	76%	66%	65%	71%	60%	65%	78%	68%
Median (as %)	80%	73%	70%	73%	60%	68%	80%	71%
Section Score Max Possible	15	15	40	15	12	15	20	132
Section Mean	11.5	9.8	25.9	10.7	7.2	9.7	15.6	90.3
Section Median	12	11	28	11	7.25	10.25	16	93.3

Table 6. Percentage of student achievement level as per SLOs (SPN 1121).

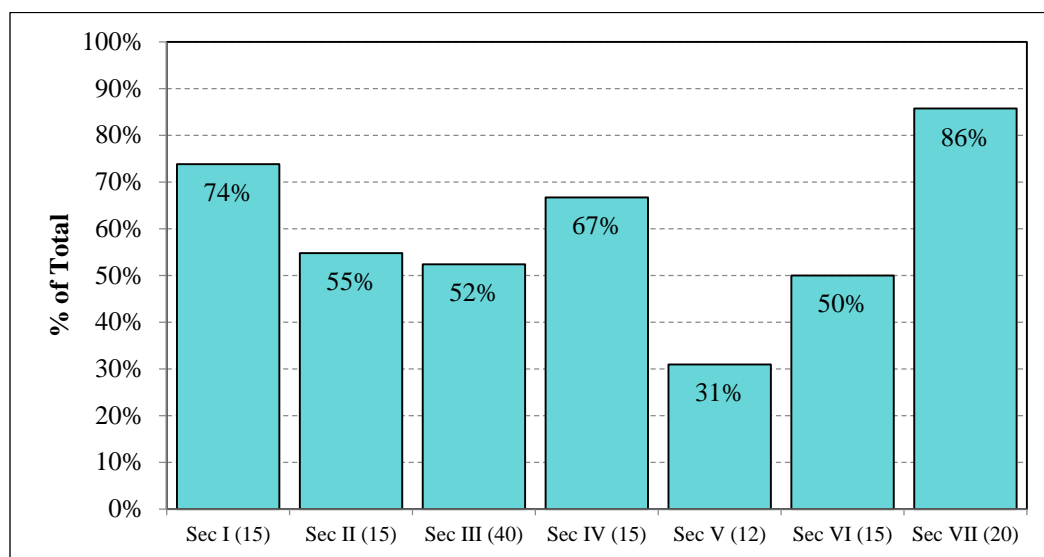


Figure 10. SLO achievement for SPN 1121 by exam section (Percentage of student achievement level as per SLOs).

3.3.2 Exploratory Analysis & Significance Testing

Multiple comparisons of artifact scores across varying formats, campuses, and student types were made, where possible, in order to add depth to the causes of the distribution of the artifacts. Each course was divided into the appropriate subgroups to perform the analysis. In cases where a subgroup is not represented in the course comparisons were not conducted and are noted for comprehensiveness.

3.3.2.1 Dual Enrollment to Non-Dual Enrollment Comparison

No dual enrollment sections of the course were run during fall 2016 so no comparison study between dual enrollment and traditional courses could be completed.

3.3.2.2 Online to Traditional Comparison

While online course sections were held in fall 2016, data was not properly recorded in the Learning Management System (LMS) shell.

3.3.2.3 Comparison by Campus/Site

Courses were offered at two sites in fall 2016, Thomas Edison (Lee) and FSW Online. However, since data was not properly recorded in the LMS data was only recorded for one site, Thomas Edison, and so no comparison study could be completed.

3.3.3 Data Distribution & Longitudinal Study

3.3.3.1 Data Distribution

A histogram depicting the distribution of scores across each exam section is shown in Figure 9. Section V exhibits scores centered on 50-59%, considerably lower than other sections, which are centered 70-79% or higher. Also, Section VII exhibits the strongest achievement with 72% scoring 80-80% or higher.

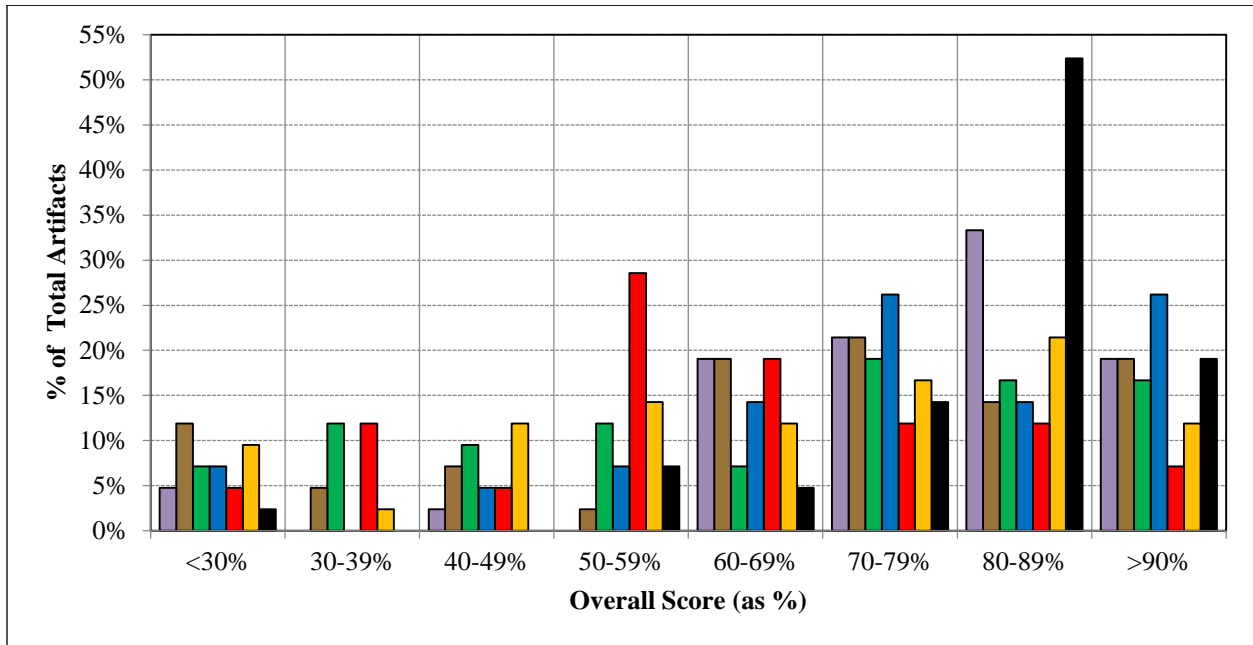


Figure 11. Histogram of SPN 1121 exam sections scores for spring 2016. Purple – Section I, Brown – Section II, Green – Section III, Blue – Section IV, Red – Section V, Orange – Section VI, and Black – Section VII.

Typically, to describe the behavior of the section scores based on overall achievement, a color map, or binary raster image, is created by calculating the mean scores for each exam section as a function of combined score. However, because sample size is smaller for fall terms for SPN 1121, no colormap could be completed due to limited sample size.

3.3.3.2 Longitudinal Study

Further description of achievement over time in SPN 1121 is provided in a comparison of fall 2013 through fall 2016 data (Table 7 and Figure 10). Both demographics of students and student count vary by semester. It may be more reasonable to compare like semesters (Fall vs. Fall, Spring vs. Spring). (see <http://www.fsw.edu/facultystaff/assessment/history> for further details). Through time, Section I remains the most consistent with a range of only 0.4 in the last four fall terms. Sections II, IV, V, VI, and VII exhibit high variability over time. Lastly, Section III has slowly been declining over time. In fall 2013, Section III mean score was at its highest, 34.2/40. In fall 2016, Section III has dropped to 25.9/40. Fall 2016 includes the highest number of samples for a fall term since longitudinal studies began at n=42. It is possible that the high variability exhibited in Sections II, IV, V, VI, and VII may be related of sample size.

	<i>Section Max</i>	Fall 2013 n=10	Spring 2014 n=115	Fall 2014 n=25	Spring 2015 n=58	Fall 2015 n=17	Spring 2016 n=109	Fall 2016 n=42
Section I (Oral)	15	11.5	12.3	11.9	12.2	11.5	10.7	11.5
Section II (Reading)	15	9.5	9.6	10.7	10.6	10.6	9.5	9.8
Section III (Read/Write)	40	34.2	32.3	30.0	31.1	29.9	30.8	25.9
Section IV (Read/Write)	15	9.5	11.4	10.6	11.4	11.3	10.5	10.7
Section V (Writing)	12	7.5	5.7	9.5	8.5	8.1	8.3	7.2
Section VI (Reading)	15	9.6	10.3	11.6	10.7	9.9	9.0	9.7
Section VII (Writing)	20	14.2	15.4	16.1	16.4	16.4	14.6	15.6
Combined (Overall)	132	96.0	97.0	100.5	100.9	97.7	93.5	90.3

Table 7. Comparison of mean scores for SPN 1121 for fall 2013 through fall 2016.

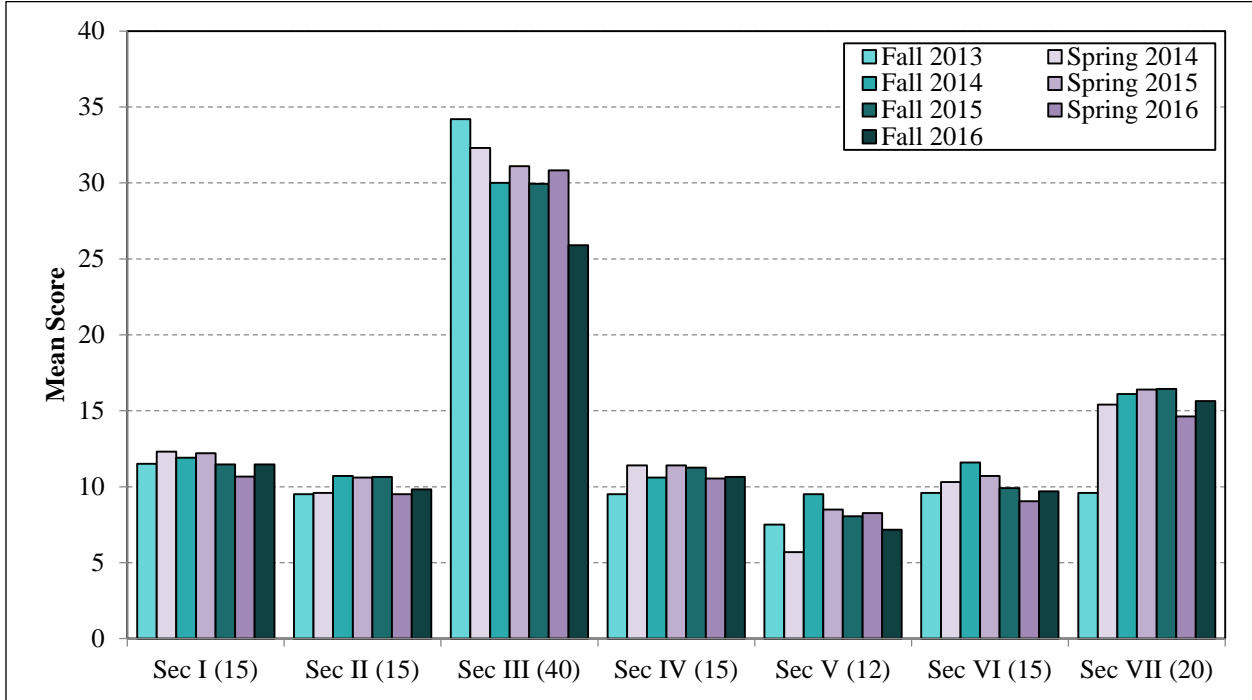


Figure 12. Comparison of mean scores for SPN 1121 through time.

4 CONCLUSIONS

Florida SouthWestern’s Foreign Language Department employs a common course assessment in both French and Spanish courses to measure student progress in course level objectives in an effort to improve instruction. What follows is a drilldown of findings for both disciplines (French and Spanish) for the fall 2016 assessment.

4.1 FRENCH

The lead professor (and sole full-time faculty member) of the French Department departed Florida SouthWestern State College at the end of AY 2015-16. The new incoming professor elected to start fresh with a new assessment tool. The AY 2016-17 is currently being used to develop and/or pilot a new tool for implementation in the fall 2017 term. As a result, no analyses for AY 2016-17 are included herein.

4.2 SPANISH

A drill-down of SPN 1120 results are as follows:

1. Achievement of 80% of artifacts scoring 70% or better (SLO 1): Achievement was nearly met as results exhibit 73% of artifacts score 70% or higher in the oral competency exam section (Section I).
2. Achievement of 80% of artifacts scoring 70% or better (SLO 2): Achievement was partially met. Results exhibit 48% of artifacts scored 70% or higher in Section II and 84% of artifacts scored 70% or higher in Section III.
3. Achievement of 80% of artifacts scoring 70% or better (SLO 3): Achievement was not met. Results exhibit 60% of artifacts scored 70% or higher in Section IV and 73% of artifacts scored 70% or higher in Section V.
4. No comparison of dual enrollment to traditional artifacts was completed because no dual enrollment sections were offered during fall 2016.
5. In a comparison of online to traditional artifacts, online artifacts score 16.1 points higher than traditional. Results were statistically significantly different.
6. In a cross-campus comparison, Collier campus exhibits higher scores in all sections of the exam. Thomas Edison consistently exhibits the second highest scores across sections. FSW Online consistently exhibits the third highest, and Charlotte is consistently the lowest scoring on all exam sections. Results of a one-way analysis of variance of combined rubric scores at each site exhibits a statistically significant difference between sites
7. In a study of score distribution by section, Sections I, III, IV, and V exhibit peaks above 90% with the distribution trailing down with decreasing score. Section II, however, exhibit more widely distributed scores. Section II exhibits between 8% and 17% of artifacts scoring in each bin from 30-39% up through $\geq 90\%$.
8. In a study of section score distribution based on overall score, Section II is consistently the lowest performing compared to other sections between the ranges of 60-84%. Also, Section I and Section III, is over performing at the lowest overall scores.
9. In a longitudinal study of data distribution, through time, Sections I, III, IV, and V exhibit mean scores over time ranging from 74% to 85%. By comparison, Section II mean score over time is 68%.
10. In a study assessing student skills and retention of materials from SPN 1120 prior to beginning SPN 1121, results exhibit a wide range of mean scores across instructor. Results exhibit achievement levels based on previous instructor spanning as low as 7.2/30 to as high as 25.3/30.

A drill-down of SPN 1121 results are as follows:

1. Achievement of 80% of artifacts scoring 70% or better (SLO 1): Achievement was not met as results exhibit 74% of artifacts score 70% or higher in the oral competency exam section (Section I).
2. Achievement of 80% of artifacts scoring 70% or better (SLO 2): Achievement was not met. Results exhibit 55% of artifacts scored 70% or higher in Section II and 50% of artifacts scored 70% or higher in Section VI.
3. Achievement of 80% of artifacts scoring 70% or better (SLO 3): Achievement was partially met. Results exhibit 31% of artifacts scored 70% or higher in Section V and 86% of artifacts scored 70% or higher in Section VII.
4. No comparison of dual enrollment to traditional artifacts was completed because no dual enrollment sections were offered during fall 2016.

5. While online course sections were held in fall 2016, data was not properly recorded in the Learning Management System (LMS) shell and so no comparison between online sections and traditional sections could be made.
6. No cross-campus comparison was made because while courses were offered at two sites in fall 2016, Thomas Edison (Lee) and FSW Online, data was not properly recorded in the LMS for one of the sites.
7. In a study of score distribution by section, Section V exhibits scores centered on 50-59%, considerably lower than other sections, which are centered 70-79% or higher. Also, Section VII exhibits the strongest achievement with 72% scoring 80-80% or higher.
8. No study of section score distribution based on overall score was completed because sample size is smaller for fall terms for SPN 1121.
9. In a longitudinal study of data distribution, through time, Section I remains the most consistent with a range of only 0.4 in the last four fall terms. Sections II, IV, V, VI, and VII exhibit high variability over time. Lastly, Section III has slowly been declining over time. In fall 2013, Section III mean score was at its highest, 34.2/40.

5 REFERENCES

- Cohen, J. 1988. *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates, Hillsdale, NJ.
- Davis, J.C. 1973. *Statistics and Data Analysis in Geology*. John Wiley & Sons, New York, New York, 564 pp.
- Lipsey, M.W. and Wilson, D.B. 1993. The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48, 1181-1209.
- McDonald, J.H. 2009. *Handbook of Biological Statistics* (2nd ed.). Sparky House Publishing, Baltimore, Maryland.
- Rosenthal, R. and Rosnow, R.L. 1991. *Essentials of behavioral research: Methods and data analysis* (2nd ed.). McGraw Hill, New York, NY.
- Wilkinson, L. 1999. APA Task Force on Statistical Inference. *Statistical Methods in Psychology Journals: Guidelines and Explanations*. *American Psychologist* 54 (8), 594–604.