

# Computer Hardware/Software & Security Assessment Report Fall 2018

Author: Joseph F. van Gaalen, Ph.D., Asst. VP of Institutional Research, Assessment & Effectiveness

## 1 INTRODUCTION

---

Florida SouthWestern State College's Business Department gathers a multitude of data from various courses as assessment tools in support of the Florida Department of Education Curriculum Framework. These courses included in assessment are CTS 1131 *Computer Hardware*, CTS 1133 *Computer Software*, CTS 2120 *Computer and Network Security*, and CTS 2334 *Microsoft Windows Server*. The assessment outcomes are intended to provide a baseline and measurement of achievement moving forward as well as investigate the strength and performance of items in the exam. The assessment plan also provides comparisons between dual Enrollment and non-dual enrollment students, online versus traditional students, and by site, where possible. Where data is sufficient, additional analyses are provided including distribution studies and longitudinal studies.

For additional detail or further analysis not provided in this report, please contact Dr. Joseph F. van Gaalen, Asst. Vice President of Institutional Research, Assessment & Effectiveness, Academic Affairs ([jfvangaalen@fsw.edu](mailto:jfvangaalen@fsw.edu); x16965).

## 2 CTS 1131

---

### 2.1 LEARNING OUTCOMES, OBJECTIVES, AND DESCRIPTIVE STATISTICS

The FSW Business faculty defined six areas of interest for evaluation in support of the state framework for the fall 2018 term. The outcomes related to CTS 1131 are:

- LO-1 Describe common tools and diagnostic devices.
- LO-2 Describe the primary hardware components.
- LO-3 Develop hardware troubleshooting methodologies.
- LO-4 Explain functionality of hard drive devices.
- LO-5 Formulate customer support procedures.
- LO-6 Summarize legacy and current hardware technologies.

During the fall 2018 semester, an enrollment of 24 contributed to scores tallied from 1 of 1 sections of CTS 1131. Descriptive statistics for achievement of outcomes are shown in Table 1. Note that the "% Meets Expectations" is the percentage of students whose average learning mastery score is equal to '3' or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments. The graphical representation of the percentage meeting expectations is shown in Figure 1. The highest "% Meets Expectations" is LO 6 at 33%. The lowest "% Meets Expectations" is LO 4 at 5%.

| <i>Outcomes</i>  | <i>n</i> | <i>Mean</i> | <i>% Meets Expectations</i> |
|--|----------|-------------|-----------------------------|
| LO-1 Describe common tools and diagnostic devices result       | 21       | 2.0         | 14%                         |
| LO-2 Describe the primary hardware components. result          | 21       | 2.4         | 24%                         |
| LO-3 Develop hardware troubleshooting methodologies result     | 21       | 2.3         | 10%                         |
| LO-4 Explain functionality of hard drive devices result        | 21       | 1.5         | 5%                          |
| LO-5 Formulate customer support procedures result              | 21       | 2.0         | 14%                         |
| LO-6 Summarize legacy and current hardware technologies result | 21       | 2.0         | 33%                         |

Table 1. Student achievement level by outcome for CTS 1131.

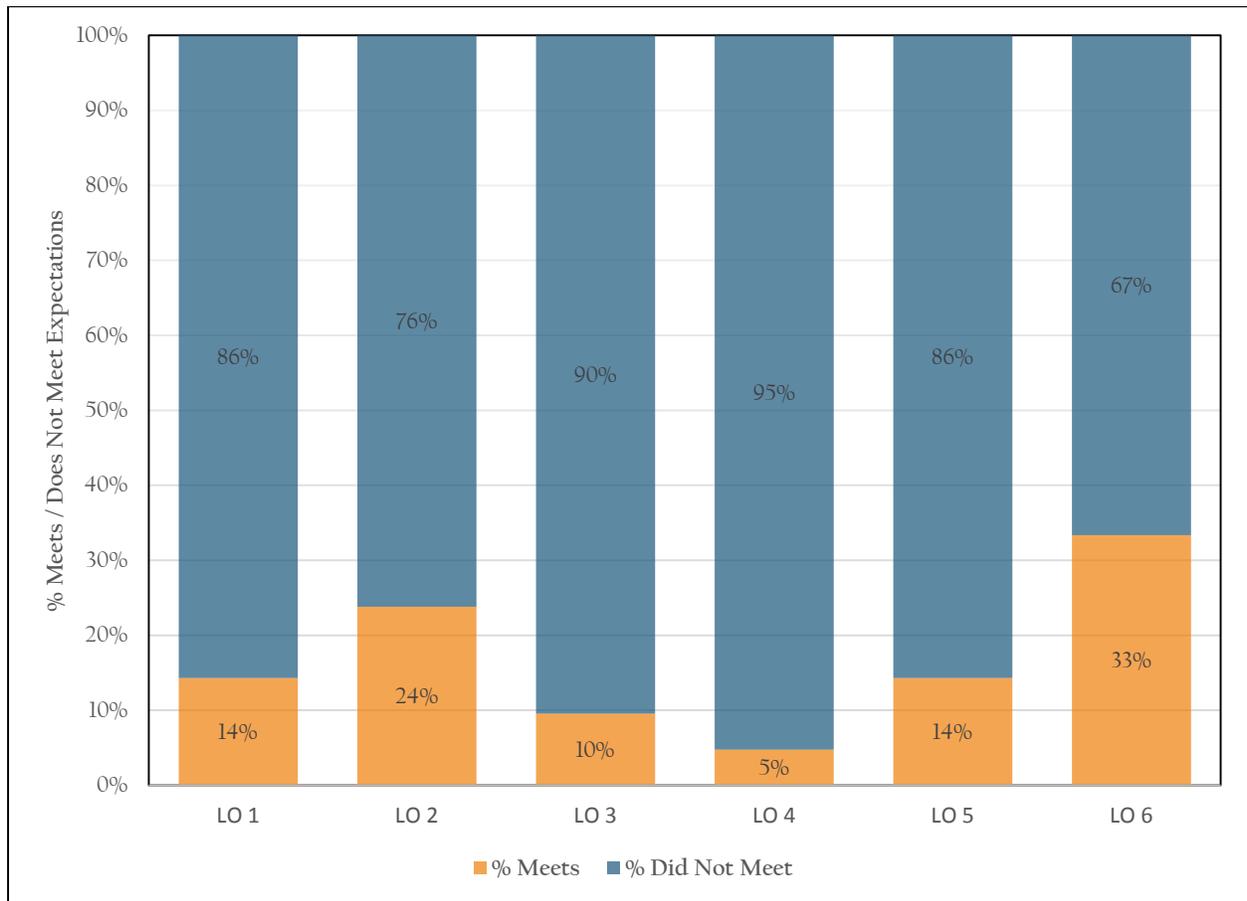


Figure 1. Bar graph of percentage of students (average learning mastery scores) meeting expectations of 3 or higher.

## 2.2 EXPLORATORY ANALYSIS AND 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.

### 2.2.1 Dual Enrollment (Concurrent) to Non-Dual Enrollment Comparison

No dual enrollment (concurrent) sections of the course were run during fall 2018 so no comparison study between dual enrollment and non-dual enrollment could be completed.

### 2.2.2 Online to Traditional Comparison

Only one section of the course was run during fall 2018 and so no comparison between online artifacts and traditional artifacts could be completed.

### 2.2.3 Comparison by Campus/Site

Only one section of the course was run during fall 2018 so no cross-campus comparison could be completed.

## 2.3 LONGITUDINAL STUDY

As further data is collected in coming terms, this section will track achievement through time and highlight strengths, weaknesses and any long term trends, beginning fall 2019.

# 3 CTS 1133

---

## 3.1 LEARNING OUTCOMES, OBJECTIVES, AND DESCRIPTIVE STATISTICS

The FSW Business faculty defined six areas of interest for evaluation in support of the state framework for the fall 2018 term. The outcomes related to CTS 1133 are:

- LO-1 Choose a Windows installation.
- LO-2 Configure Windows networking and resources.
- LO-3 Describe desktop virtualization.
- LO-4 Describe function of operating system.
- LO-5 Formulate maintenance and security procedures for Windows clients.
- LO-6 Summarize troubleshooting procedures.

During the fall 2018 semester, an enrollment of 38 contributed to scores tallied from 3 of 3 sections of CTS 1133. Descriptive statistics for achievement of outcomes are shown in Table 3. Note that the “% Meets Expectations” is the percentage of students whose average learning mastery score is equal to ‘3’ or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments. The graphical representation of the percentage meeting expectations is shown in Figure 3. The highest “% Meets Expectations” is LO 1 at 47%. The lowest “% Meets Expectations” is LO 4 at 21%.

| <i>Outcomes</i>  | <i>n</i> | <i>Mean</i> | <i>% Meets Expectations</i> |
|--|----------|-------------|-----------------------------|
| LO-1 Choose a Windows installation                                     | 38       | 3.1         | 47%                         |
| LO-2 Configure Windows networking and resources                        | 38       | 2.5         | 29%                         |
| LO-3 Describe desktop virtualization                                   | 38       | 2.3         | 42%                         |
| LO-4 Describe function of operating system                             | 38       | 2.1         | 21%                         |
| LO-5 Formulate maintenance and security procedures for Windows clients | 38       | 2.1         | 26%                         |
| LO-6 Summarize troubleshooting procedures                              | 38       | 2.5         | 34%                         |

Table 2. Student achievement level by Outcome for CTS 1133.

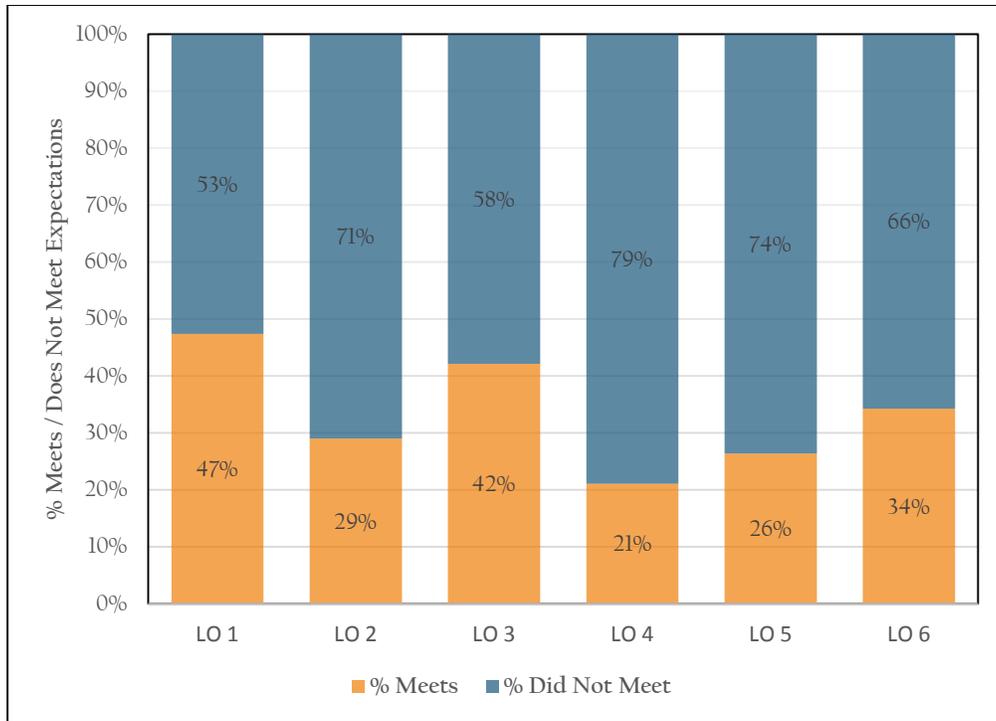


Figure 2. Bar graph of percentage of students (average learning mastery scores) meeting expectations of 3 or higher.

### 3.2 EXPLORATORY ANALYSIS AND 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.

#### 3.2.1 Dual Enrollment (Concurrent) to Non-Dual Enrollment Comparison

No dual enrollment (concurrent) sections of the course were run during fall 2018 so no comparison study between dual enrollment and non-dual enrollment could be completed.

#### 3.2.2 Online to Traditional Comparison

During the fall 2018 semester, two course sections were offered online while one was offered traditionally. Mean scores for traditional sections ranged from 2.1 to 3.5 (Table 4, Figure 4). Mean scores for online sections ranged from 1.8 to 2.6. The “% Meets Expectations” for traditional sections range from 29% to 62%. The “% Meets Expectations” for online sections range from 6% to 41%. Differences in the “% Meets Expectations” were tested for significance using a Fisher’s Exact Test according to standard methods (McDonald, 2009; Wilkinson, 1999). LO 1 and LO 5 are found to be statistically significant difference.

| Outcomes   | Traditional |      |                      | Online |      |                      |
|--|-------------|------|----------------------|--------|------|----------------------|
|  | n           | Mean | % Meets Expectations | n      | Mean | % Meets Expectations |
| LO-1 Choose a Windows installation                                     | 21          | 2.6  | 33%                  | 17     | 2.3  | 35%                  |
| LO-2 Configure Windows networking and resources                        | 21          | 2.4  | 43%                  | 17     | 1.8  | 6%                   |
| LO-3 Describe desktop virtualization                                   | 21          | 2.3  | 29%                  | 17     | 1.9  | 12%                  |
| LO-4 Describe function of operating system                             | 21          | 2.1  | 43%                  | 17     | 2.5  | 41%                  |
| LO-5 Formulate maintenance and security procedures for Windows clients | 21          | 2.6  | 33%                  | 17     | 2.4  | 24%                  |
| LO-6 Summarize troubleshooting procedures                              | 21          | 3.5  | 62%                  | 17     | 2.6  | 29%                  |

Table 3. Comparison of basic statistics of student achievement level by Outcome for online and traditional. Statistically significant differences in the ‘% Meets Expectations’ between online and traditional sections is in **bold/italics**.

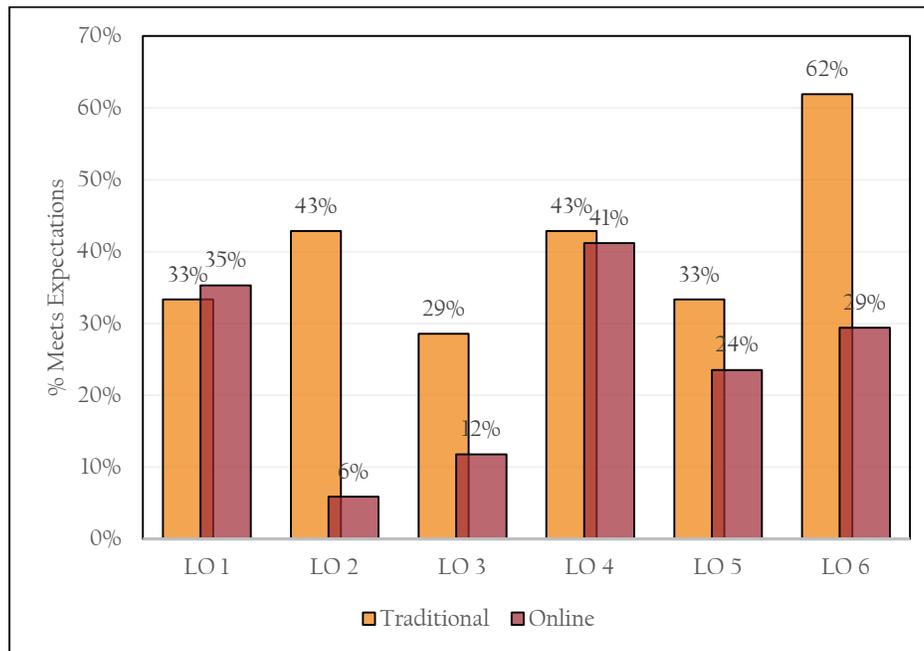


Figure 3. Comparison of ‘% Meets Expectations’ between online and traditional sections.

### 3.2.3 Comparison by Campus/Site

Since the only two sites in which courses were offered was Thomas Edison (Lee) and FSW Online, results of this comparison are exhibited in 3.2.2 (see above).

## 3.3 LONGITUDINAL STUDY

As further data is collected in coming terms, this section will track achievement through time and highlight strengths, weaknesses and any long term trends beginning fall 2019.

## 4 CTS 2120

No course sections were run in fall 2018, so no study could be completed.

## 5 CTS 2334

---

### 5.1 LEARNING OUTCOMES, OBJECTIVES, AND DESCRIPTIVE STATISTICS

The FSW Business faculty defined seven areas of interest for evaluation in support of the state framework which was clarified for the fall 2018 term. The outcomes related to CTS 2334 are:

- LO-1 Install and configure a server operating system.
- LO-2 Secure network infrastructure and explain three major concerns relate to data communications.
- LO-3 Analyze network connectivity problems using industry standard tools and procedures.
- LO-4 Describe the IEEE 802 standards.
- LO-5 Configure network IP addressing and server based support services.
- LO-6
- LO-7 Create and manage groups, resources, and security policies and install and configure firewall security and rule based access permissions.

During the fall 2018 semester, an enrollment of 24 contributed to scores tallied from 1 of 1 sections of CTS 2334. Descriptive statistics for achievement of outcomes are shown in Table 6. Note that the “% Meets Expectations” is the percentage of students whose average learning mastery score is equal to ‘3’ or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments. The graphical representation of the percentage meeting expectations is shown in Figure 6. All LOs exhibit 100% meets expectations.

| <i>Outcomes</i>  | <i>n</i> | <i>Mean</i> | <i>% Meets Expectations</i> |
|--|----------|-------------|-----------------------------|
| LO-1 Install and configure a server operating system.  | 19       | 4.9         | 100%                        |
| LO-2 Secure network infrastructure and explain three major concerns relate to data communications.   | 19       | 5.0         | 100%                        |
| LO-3 Analyze network connectivity problems using industry standard tools and procedures.   | 19       | 4.9         | 100%                        |
| LO-4 Describe the IEEE 802 standards.  | 19       | 5.0         | 100%                        |
| LO-5 Configure network IP addressing and server based support services.  | 19       | 4.9         | 100%                        |
| LO-6   | 19       | 4.9         | 100%                        |
| LO-7 Create and manage groups, resources, and security policies and install and configure firewall security and rule based access permissions. | 19       | 5.0         | 100%                        |

Table 4. Student achievement level by Outcome for CTS 2334.

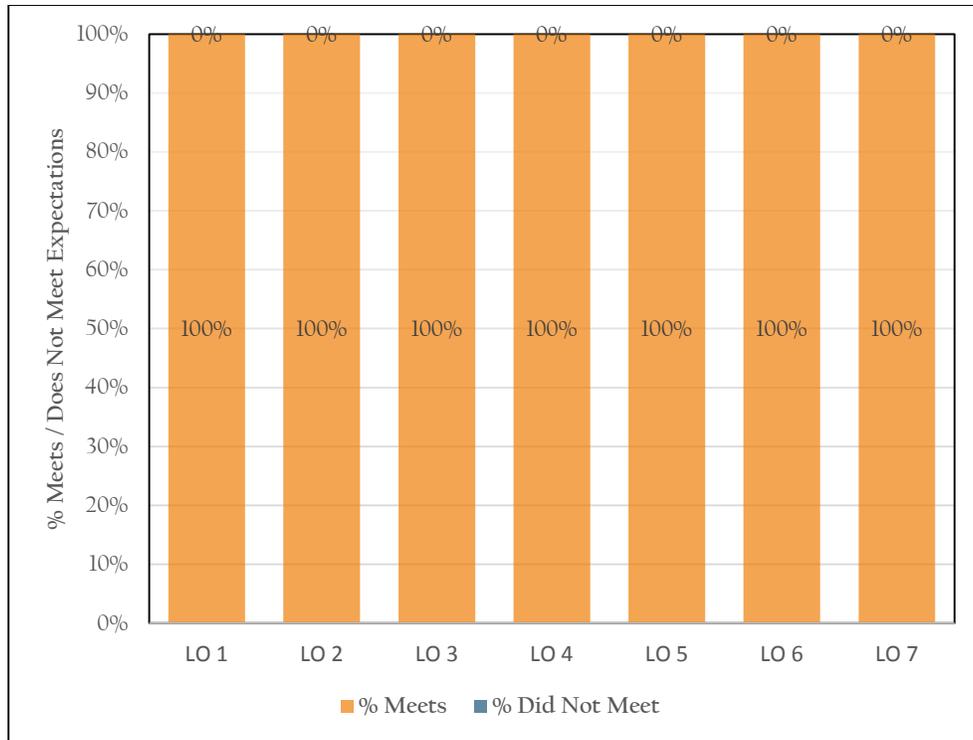


Figure 4. Bar graph of percentage of students (average learning mastery scores) meeting expectations of 3 or higher.

## 5.2 EXPLORATORY ANALYSIS AND 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.

### 5.2.1 Dual Enrollment to Non-Dual Enrollment Comparison

No dual enrollment sections of the course were run during fall 2018 so no comparison study between dual enrollment and non-dual enrollment could be completed.

### 5.2.2 Online to Traditional Comparison

Only one section of the course was offered in fall 2018, so no online to traditional comparison could be completed.

### 5.2.3 Comparison by Campus/Site

Only one section of the course was offered in fall 2018, so no cross-campus comparison could be completed.

## 5.3 LONGITUDINAL STUDY

Description of achievement over time in CTS 2334 is presented in Figure 6. Both mean score and percentage achieving goal has increased over time. The percentage achieving goal has increased to perfect (100%) scores in the most recent term. Note that comparison from fall terms to spring terms is less useful as assessment reports across multiple course level and program level assessments at FSW

typically exhibit substantial differences from fall to spring term and are better interpreted from fall-to-fall and spring-to-spring (see <http://www.fsw.edu/facultystaff/assessment/history> for further details).

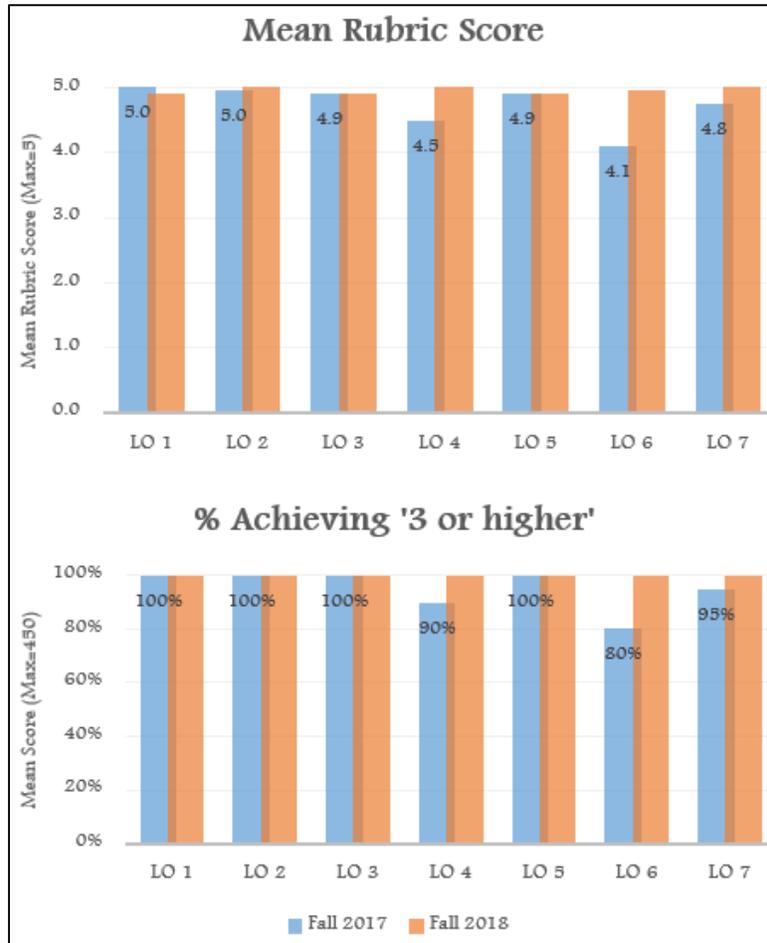


Figure 5. Comparison of mean score (top) and % achieving goal (bottom) over time (longitudinal study began Fall 2017).

## 6 CONCLUSIONS

FSW’s Business Department gathers a multitude of data from various courses as assessment tools in support of the Florida Department of Education Curriculum Framework. The courses included in assessment are CTS 1131 *Computer Hardware*, CTS 1133 *Computer Software*, CTS 2120 *Computer and Network Security*, and CTS 2334 *Microsoft Windows Server*. The assessment outcomes are intended to provide a baseline and measurement of achievement moving forward.

### 6.1 CTS 1131

A drill-down of CTS 1131 results are as follows:

1. In a study of outcome achievement, “LO-1 Describe common tools and diagnostic devices.” the average “% Meets Expectations” across 24 students from one course section is 14%. Note that the “% Meets Expectations” is the percentage of students whose average learning mastery score

is equal to '3' or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments.

2. In a study of outcome achievement, "LO-2 Describe the primary hardware components." the average "% Meets Expectations" across 24 students from one course section is 24%.
3. In a study of outcome achievement, "LO-3 Develop hardware troubleshooting methodologies." the average "% Meets Expectations" across 24 students from one course section is 10%.
4. In a study of outcome achievement, "LO-4 Explain functionality of hard drive devices." the average "% Meets Expectations" across 24 students from one course section is 5%.
5. In a study of outcome achievement, "LO-5 Formulate customer support procedures." the average "% Meets Expectations" across 24 students from one course section is 14%.
6. In a study of outcome achievement, "LO-6 Summarize legacy and current hardware technologies." the average "% Meets Expectations" across 24 students from one course section is 33%.
7. No comparison between online and traditional course sections was completed because only one section of the course was offered.
8. No cross-campus comparison could be completed because course data was only collected from one site.

## 6.2 CTS 1133

A drill-down of CTS 1133 results are as follows:

1. In a study of outcome achievement, "LO-1 Choose a Windows installation." the average "% Meets Expectations" across 38 students from two course sections is 47%. Note that the "% Meets Expectations" is the percentage of students whose average learning mastery score is equal to '3' or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments.
2. In a study of outcome achievement, "LO-2 Configure Windows networking and resources." the average "% Meets Expectations" across 38 students from two course sections is 29%.
3. In a study of outcome achievement, "LO-3 Describe desktop virtualization." the average "% Meets Expectations" across 38 students from two course sections is 42%.
4. In a study of outcome achievement, "LO-4 Describe function of operating system." the average "% Meets Expectations" across 38 students from two course sections is 21%.
5. In a study of outcome achievement, "LO-5 Formulate maintenance and security procedures for Windows clients." the average "% Meets Expectations" across 38 students from two course sections is 26%.
6. In a study of outcome achievement, "LO-6 Summarize troubleshooting procedures." the average "% Meets Expectations" across 38 students from two course sections is 34%.
7. In a study comparing Online with Traditional course sections, the "% Meets Expectations" for traditional sections range from 29% to 62%. The "% Meets Expectations" for online sections range from 6% to 41%. LO 1 and LO 5 are found to be statistically significant difference.
8. No cross-campus comparison could be completed because course data was only collected from online and one site, a study completed in #7 above.

## 6.3 CTS 2120

A drill-down of CTS 2120 results are as follows:

1. No course sections were run in fall 2018, so no study could be completed.

## 6.4 CTS 2234

A drill-down of CTS 2234 results are as follows:

1. In a study of outcome achievement, “LO-1 Install and configure a server operating system.” the average “% Meets Expectations” across 19 students from one course section is 100%. Note that the “% Meets Expectations” is the percentage of students whose average learning mastery score is equal to ‘3’ or higher since the count (n) refers to the number of averages of learning masteries (i.e., # of students), not the number of assessments.
2. In a study of outcome achievement, “LO-2 Secure network infrastructure and explain three major concerns relate to data communications.” the average “% Meets Expectations” across 19 students from one course section is 100%.
3. In a study of outcome achievement, “LO-3 Analyze network connectivity problems using industry standard tools and procedures.” the average “% Meets Expectations” across 19 students from one course section is 100%.
4. In a study of outcome achievement, “LO-4 Describe the IEEE 802 standards.” the average “% Meets Expectations” across 19 students from one course section is 100%.
5. In a study of outcome achievement, “LO-5 Configure network IP addressing and server based support services.” the average “% Meets Expectations” across 19 students from one course section is 100%.
6. In a study of outcome achievement, for LO-6 the average “% Meets Expectations” across 19 students from one course section is 100%.
7. In a study of outcome achievement, “LO-7 Create and manage groups, resources, and security policies and install and configure firewall security and rule based access permissions.” The average “% Meets Expectations” across 19 students from one course section is 100%.
8. No comparison between online and traditional course sections was completed because only one section of the course was offered.
9. No cross-campus comparison could be completed because course data was only collected from one site.

## 7 REFERENCES

---

McDonald, J.H. 2009. Handbook of Biological Statistics (2nd ed.). Sparky House Publishing, Baltimore, Maryland.

Wilkinson, L. 1999. APA Task Force on Statistical Inference. Statistical Methods in Psychology Journals: Guidelines and Explanations. American Psychologist 54 (8), 594–604.