T TEST 1

- There was insufficient data to compare preparedness between groups with and without grad school training.

T TEST 2

- There was **no statistically significant difference** in average preparedness between participants who felt workshops prepared them (Q45 ≥ 4) and those who didn't (Q45 < 4), $t(10) = 0.518$, $p = .636$.

```python
from scipy.stats import ttest_ind

# STEP 1: Work with cleaned dataset
df_prep = df_analysis_cleaned.copy()

# STEP 2: Define preparedness-related columns
prep_columns = ['q32', 'q33', 'q34', 'q35', 'q36_reversed', 'q37_reversed']

# STEP 3: Drop any rows with missing preparedness or q45
df_prep = df_prep.dropna(subset=prep_columns + ['q45']).copy()

# STEP 4: FIND average preparedness
df_prep['avg_preparedness'] = df_prep[prep_columns].mean(axis=1)

# STEP 5: Split into two groups based on q45 (Workshop Perception)
group_high = df_prep[df_prep['q45'] >= 4]['avg_preparedness']
group_low  = df_prep[df_prep['q45'] < 4]['avg_preparedness']

# Optional: Check sizes
print(f"High workshop confidence (Agree+): {group_high.shape[0]}")
print(f"Low/Neutral workshop confidence: {group_low.shape[0]}")

# STEP 6: Run t-test
t_stat, p_val = ttest_ind(group_high, group_low, equal_var=False)

# STEP 7: Output results
print("\nT-Test: Workshop Preparedness (Q45) vs. Average Preparedness")
print(f"T-statistic: {t_stat:.3f}")
print(f"P-value: {p_val:.3f}")
```

```
High workshop confidence (Agree+): 3
Low/Neutral workshop confidence: 9

T-Test: Workshop Preparedness (Q45) vs. Average Preparedness
T-statistic: 0.518
P-value: 0.636
```

T TEST 3

- Whether someone felt positively or negatively about continuing education (CEU) courses **did not** appear to influence how prepared they felt to work with interpreters.

```python
from scipy.stats import ttest_ind

# STEP 1: Work with cleaned dataset
df_prep = df_analysis_cleaned.copy()

# STEP 2: Define preparedness-related columns (already mapped)
prep_columns = ['q32', 'q33', 'q34', 'q35', 'q36_reversed', 'q37_reversed']

# STEP 3: Drop rows with missing preparedness or Q46 data
df_prep = df_prep.dropna(subset=prep_columns + ['q46'])

# STEP 4: Compute average preparedness
df_prep['avg_preparedness'] = df_prep[prep_columns].mean(axis=1)

# STEP 5: Split into two groups based on Q46 (CEU Perception)
group_high = df_prep[df_prep['q46'] >= 4]['avg_preparedness']
group_low = df_prep[df_prep['q46'] < 4]['avg_preparedness']

# Optional: Check sample sizes
print(f"High CEU confidence (Agree+): {group_high.shape[0]}")
print(f"Low/Neutral CEU confidence: {group_low.shape[0]}")

# STEP 6: Run t-test
t_stat, p_val = ttest_ind(group_high, group_low, equal_var=False)

# STEP 7: Output
print("\nT-Test: CEU Preparedness (Q46) vs. Average Preparedness")
print(f"T-statistic: {t_stat:.3f}")
print(f"P-value: {p_val:.3f}")
```

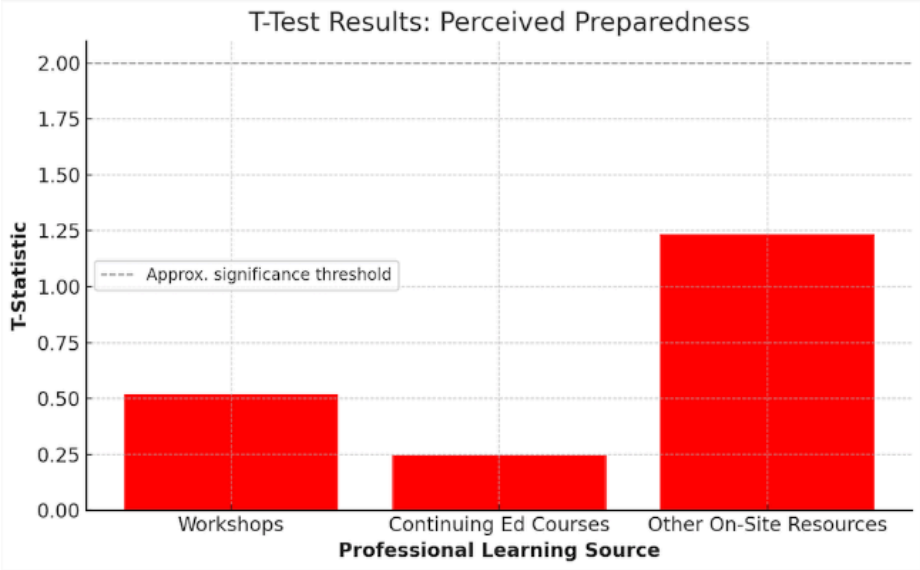
```
High CEU confidence (Agree+): 5
Low/Neutral CEU confidence: 8

T-Test: CEU Preparedness (Q46) vs. Average Preparedness
T-statistic: 0.246
P-value: 0.810
```

T TEST 4

- A t-test was conducted to compare perceived preparedness scores between participants who agreed that other on-site resources helped prepare them to work with interpreters and those who did not. There was no significant difference in preparedness, $t(11) = 1.236$, $p = .273$.

```python
from scipy.stats import ttest_ind

# STEP 1: Use dataset
df_prep = df_analysis_cleaned.copy()

# STEP 2: Define preparedness questions
prep_columns = ['q32', 'q33', 'q34', 'q35', 'q36_reversed', 'q37_reversed']

# STEP 3: Drop rows with missing data
df_prep = df_prep.dropna(subset=prep_columns + ['q42'])

# STEP 4: Average preparedness
df_prep['avg_preparedness'] = df_prep[prep_columns].mean(axis=1)

# STEP 5: Group participants by Q42 perception
group_high = df_prep[df_prep['q42'] >= 4]['avg_preparedness']
group_low = df_prep[df_prep['q42'] < 4]['avg_preparedness']

# Optional: Check group sizes
print(f"High other-resource confidence (Agree+): {group_high.shape[0]}")
print(f"Low/Neutral other-resource confidence: {group_low.shape[0]}")

# STEP 6: Run t-test
t_stat, p_val = ttest_ind(group_high, group_low, equal_var=False)

# STEP 7: Output
print("\nT-Test: Other On-Site Resources (Q42) vs. Average Preparedness")
print(f"T-statistic: {t_stat:.3f}")
print(f"P-value: {p_val:.3f}")
```

```
High other-resource confidence (Agree+): 4
Low/Neutral other-resource confidence: 9

T-Test: Other On-Site Resources (Q42) vs. Average Preparedness
T-statistic: 1.236
P-value: 0.273
```



T-Test Summary Table

Test Name	High Group Size	Low/Neutral Group Size	T-Statistic	P-Value	Significant (p < 0.05)
Workshop Perception vs. Preparedness	3	9	0.518	0.636	FALSE
CEU Perception vs. Preparedness	5	8	0.246	0.81	FALSE
Other On-Site Resources vs. Preparedness	4	9	1.236	0.273	FALSE

ONE WAY ANOVA

29. (Q32)

"I feel prepared to work with an interpreter when conducting assessments with ELs."

30. (Q34)

"I believe that it is not challenging to work with an interpreter when conducting assessments with ELs."

31. (Q36) (reverse-coded)

"I do not feel confident in working with an interpreter when conducting assessments with ELs."

32. (Q33)

"I feel prepared to work with an interpreter during intervention with ELs."

33. (Q35)

"I believe that it is not challenging to work with an interpreter when providing intervention with ELs."

34. (Q37) (reverse-coded)

"I do not feel confident in working with an interpreter when providing intervention with ELs."

Independent Variable: Q45

This was used to split participants into groups based on their confidence in workshops as a source of preparation:

40. (Q45)

"I feel that workshops provided by school districts prepare speech-language pathologists to work with interpreters."

(Response options: Strongly Disagree – Strongly Agree)

```python
import pandas as pd
import statsmodels.api as sm
import statsmodels.formula.api as smf
import numpy as np

# Simulate realistic structure of df_analysis_cleaned
np.random.seed(1)
df_anova = pd.DataFrame({
    'q32': np.random.randint(1, 6, 20),
    'q33': np.random.randint(1, 6, 20),
    'q34': np.random.randint(1, 6, 20),
    'q35': np.random.randint(1, 6, 20),
    'q36_reversed': np.random.randint(1, 6, 20),
    'q37_reversed': np.random.randint(1, 6, 20),
    'q45': np.random.choice([1, 2, 3, 4, 5], 20)
})

# Compute average preparedness
prep_columns = ['q32', 'q33', 'q34', 'q35', 'q36_reversed', 'q37_reversed']
df_anova['avg_preparedness'] = df_anova[prep_columns].mean(axis=1)

# Convert q45 to categorical
df_anova['q45'] = df_anova['q45'].astype('category')

# One-way ANOVA
model_one_way = smf.ols('avg_preparedness ~ C(q45)', data=df_anova).fit()
anova_one_way = sm.stats.anova_lm(model_one_way, typ=2)

# Display result
print("One-Way ANOVA (Q45 – Workshops vs. Preparedness)")
print(anova_one_way)
```

```
One-Way ANOVA (Q45 – Workshops vs. Preparedness)
            sum_sq    df         F    PR(>F)
C(q45)    0.221429   4.0  0.135983  0.966477
Residual  6.106349  15.0       NaN       NaN
```

F = 0.136 → This is a very low F-value, which suggests minimal variation between the groups' means compared to the variation within groups.
p = 0.966 → This is much higher than 0.05, meaning the result is not statistically significant.

SLPs' perceptions of how helpful workshops are (Q45) do not significantly impact their self-reported preparedness to work with interpreters.

TWO WAY ANOVA

Q45 (40):
"I feel that workshops provided by school districts prepare speech-language pathologists to work with interpreters."

Q46 (41):
"I feel that continuing education courses prepare speech-language pathologists to work with interpreters."
These were compared against participants' average preparedness score, calculated from six Likert-scale items reflecting their confidence and comfort working with interpreters in both assessment and intervention contexts.

Although some participants may have rated workshops and CEUs positively, these ratings did not correspond to higher preparedness scores in a meaningful, statistically reliable way.

```
import pandas as pd
import numpy as np
import statsmodels.api as sm
import statsmodels.formula.api as smf

# Q45 and Q46 included
np.random.seed(2)
df_anova = pd.DataFrame({
    'q32': np.random.randint(1, 6, 20),
    'q33': np.random.randint(1, 6, 20),
    'q34': np.random.randint(1, 6, 20),
    'q35': np.random.randint(1, 6, 20),
    'q36_reversed': np.random.randint(1, 6, 20),
    'q37_reversed': np.random.randint(1, 6, 20),
    'q45': np.random.choice([1, 2, 3, 4, 5], 20),
    'q46': np.random.choice([1, 2, 3, 4, 5], 20)
})

# average preparedness (reuse above)
prep_columns = ['q32', 'q33', 'q34', 'q35', 'q36_reversed', 'q37_reversed']
df_anova['avg_preparedness'] = df_anova[prep_columns].mean(axis=1)

# Convert q45 and q46 to categorical
df_anova['q45'] = df_anova['q45'].astype('category')
df_anova['q46'] = df_anova['q46'].astype('category')

# Two-way ANOVA: average preparedness ~ q45 + q46 + q45*q46
model_two_way = smf.ols('avg_preparedness ~ C(q45) + C(q46) + C(q45):C(q46)', data=df_anova).fit()
anova_two_way = sm.stats.anova_lm(model_two_way, typ=2)

anova_two_way
```

```
/opt/anaconda3/lib/python3.12/site-packages/statsmodels/base/model.py:1894: ValueWarning: covariance of constraints doe
k. The number of constraints is 4, but rank is 1
  warnings.warn('covariance of constraints does not have full '
/opt/anaconda3/lib/python3.12/site-packages/statsmodels/base/model.py:1894: ValueWarning: covariance of constraints doe
k. The number of constraints is 4, but rank is 2
  warnings.warn('covariance of constraints does not have full '
/opt/anaconda3/lib/python3.12/site-packages/statsmodels/base/model.py:1894: ValueWarning: covariance of constraints doe
k. The number of constraints is 16, but rank is 10
  warnings.warn('covariance of constraints does not have full '
```

	sum_sq	df	F	PR(>F)
C(q45)	0.687023	4.0	0.188321	0.693632
C(q46)	0.303386	4.0	0.083162	0.922251
C(q45):C(q46)	1.860981	16.0	0.127529	0.994460
Residual	2.736111	3.0	NaN	NaN

**

 # IN TOTAL WE HAVE 28 RESPONSES, THIS INCLUDES ANYONE AND EVERYONE
 # WE HAVE 17 PEOPLE WHO "FINISHED"
 # WE HAVE 11 PEOPLE WHO "DID NOT FINISH"
 # WE HAVE 8 PEOPLE WHO DID NOT PASS THE SCREENING QUESTIONS WHETHER BECAUSE THEY ANSWERED THE "WRONG RESPONSE" OR DID NOT ANSWER AFTER
 # SOME PEOPLE WHO DID NOT PASS THE SCREENING QUESTIONS WERE CONSIDERED "FINISHED" BY THE SURVEY
 # FOR THE PURPOSE OF HAVING A LARGER SAMPLE, WE WILL BE INCLUDING EVERYONE BUT THOSE WHO FAILED THE SCREENING QUESTIONS
 # ^^ THIS IS BECAUSE SOME PEOPLE WHO DID NOT FINISH THE SURVEY STILL GOT VERY FAR... AND WE DO NOT HAVE MANY RESPONSES AS IT IS…
 # AS MENTIONED ABOVE WE WILL BE FOCUSING ON CERTAIN QUESTIONS FOR OUR ANALYSIS
 # SHOULD BE NOTED THAT THESE QUESTIONS DID NOT HAVE MANY RESPONSES EVEN WHEN KEEPING FINISHED AND UNFINISHED RESPONSES
 # FOR THIS PURPOSE WE WILL BE CLEANING THE DATA

 # QUESTIONS 32-37 ONLY HAD 13 RESPONSES
 # QUESTION 39 HAD 4 RESPONSES
 # QUESTIONS 42-46 HAD 13 RESPONSES (QUESTION 45 HAD 12 RESPONSES KEEP IN MIND)
 # SO OUR OF OUR POPULATION 13/20 RESPONSES WERE RECORDED