greatlearning
Power Ahead

E-News Express Business Presentation

Business Problem Overview and Solution Approach

- Core business idea: E-News Express would like to determine if design changes to their website will increase customer sign-ups.
- Problem to tackle: E-News Express design team has created a new online landing page and would like to determine if it is more effective than the old landing page.
  - Decide whether the new landing page is more effective to gather new subscribers
  - Randomly selected 100 users and divided them equally into two groups. The old landing page is served to the first group (control group) and the new landing page is served to the second group (treatment group)
- Financial implications: Increased customer sign-ups will increase revenue, and expand company business.

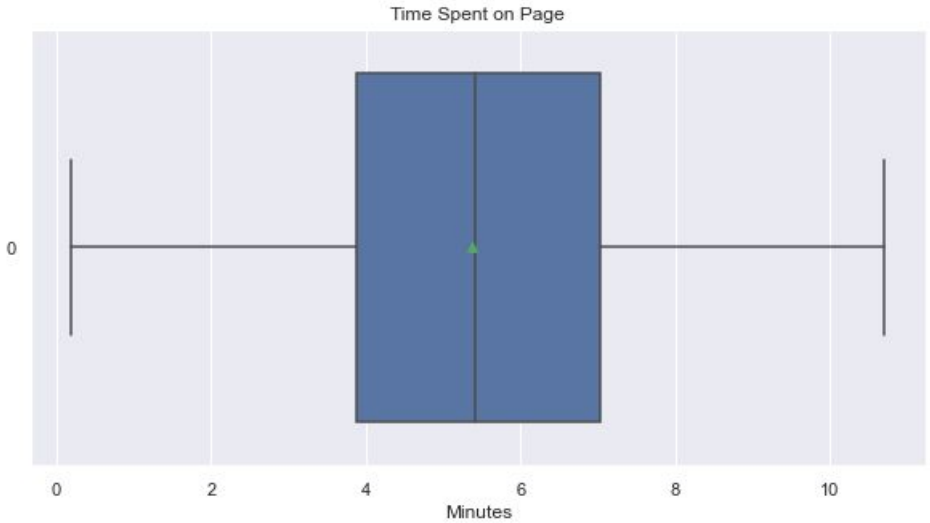
Data Overview

Variable	Description
user_id	User ID of person visiting site
group	Control or treatment
landing_page	Whether landing page is old or new
time_spent_on_the_page	Time (in minutes) spent on landing page
converted	Whether user became a subscriber
language_preferred	Language chosen by the user

Data Breakdown:

100 rows x 6 columns
- 2 Columns of Numbers
- 4 Columns of Categorical

EDA: Time Spent on Landing Page (Old and New)



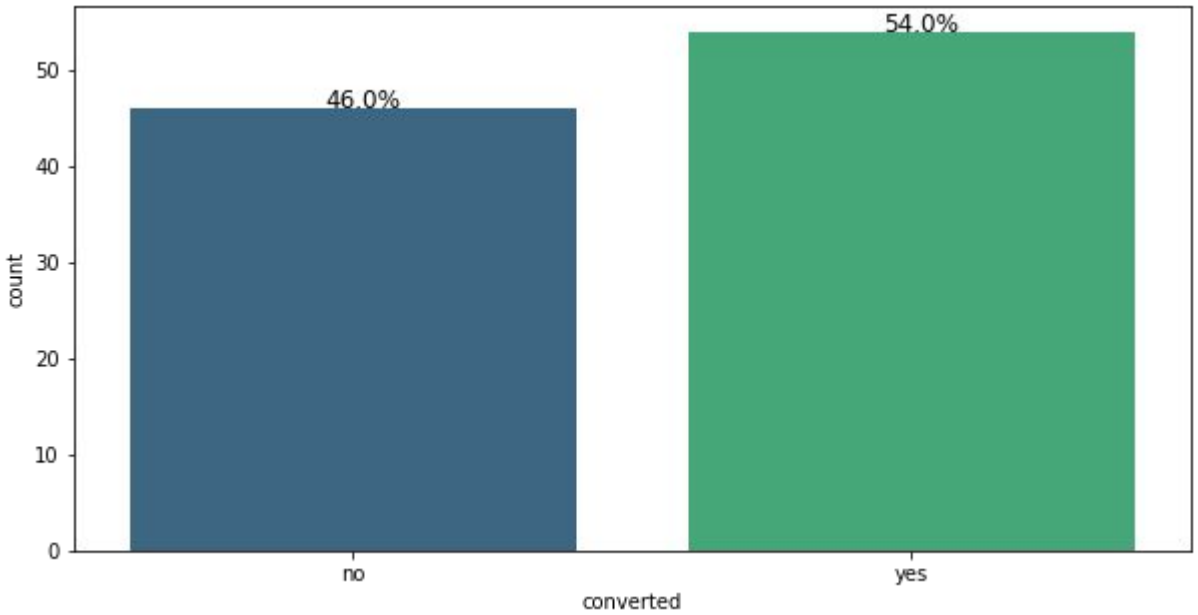
The average customer spent 5.38 minutes on the landing page.

The minimum time spent on the landing page was 0.19 minutes.

The maximum time spent on the landing page was 10.71 minutes.

EDA: Overall Conversion Numbers

Overall Customer Conversion

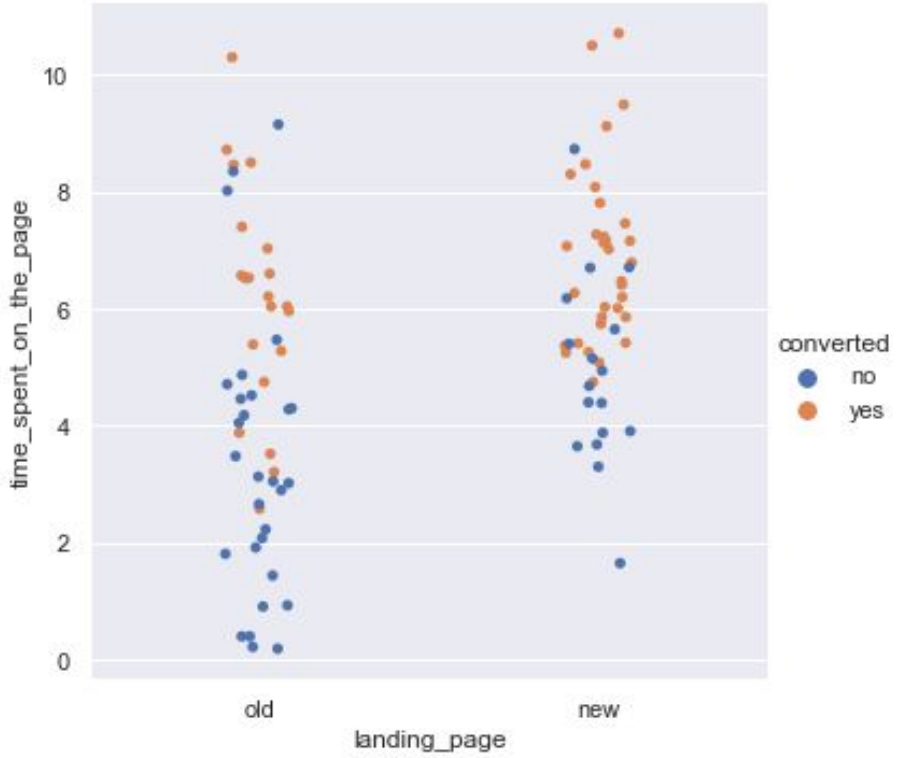


Across both old and new landing pages, 54% of the customers became new subscribers

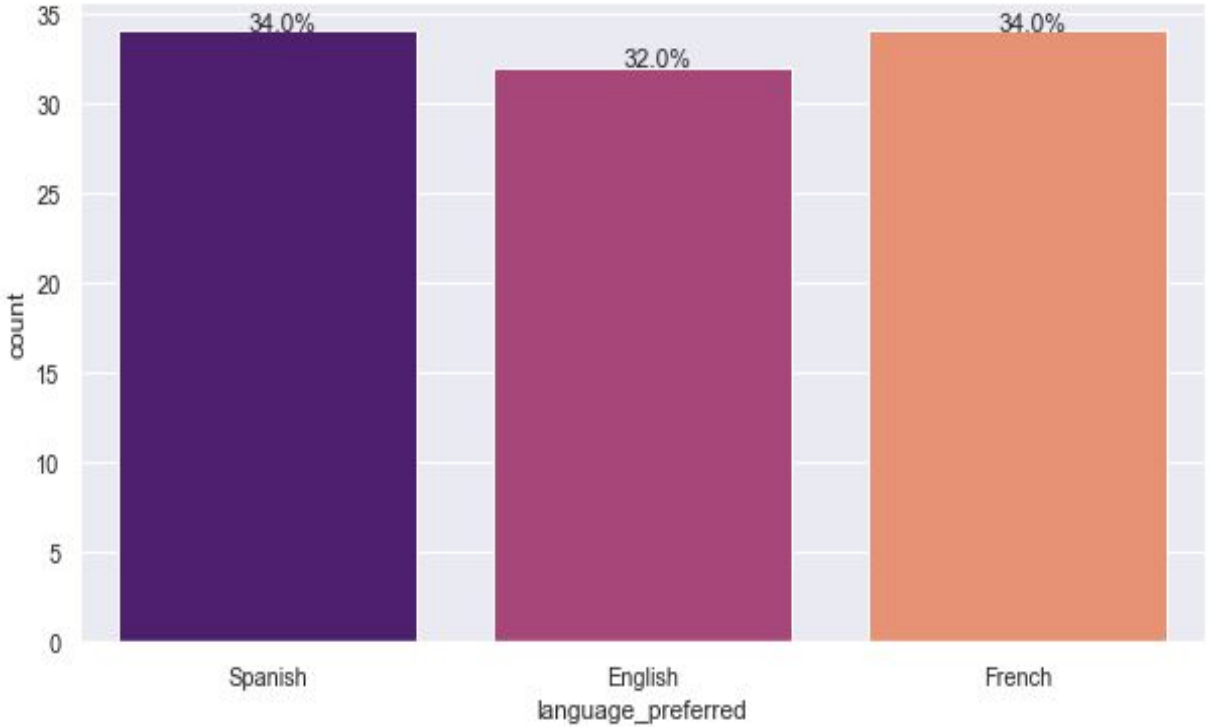
EDA: Landing Page Preference

Customers sent to the new landing page spent more time on it overall when compared to those that went to the old landing page.

The new landing page converted more customers (33) vs. the old landing page (21).

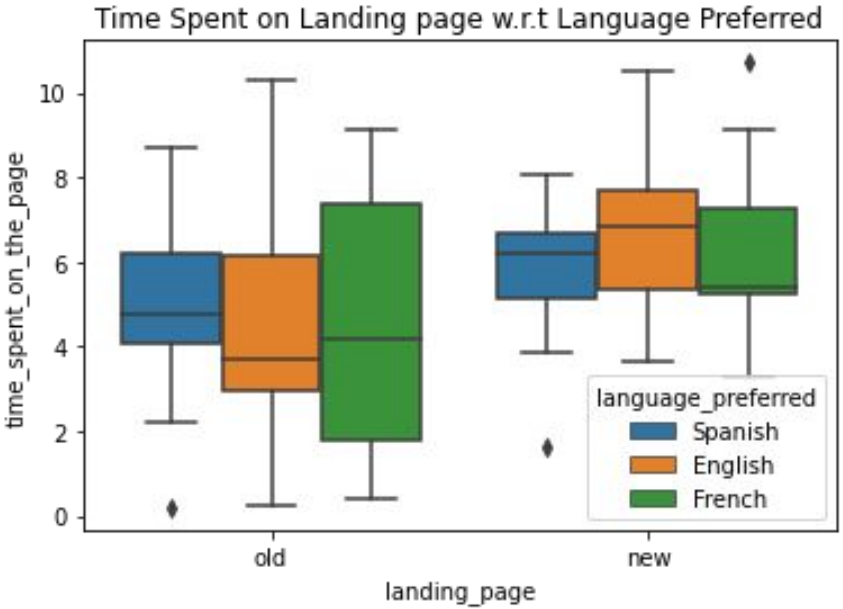


EDA: Customer Breakdown by Language Preferred



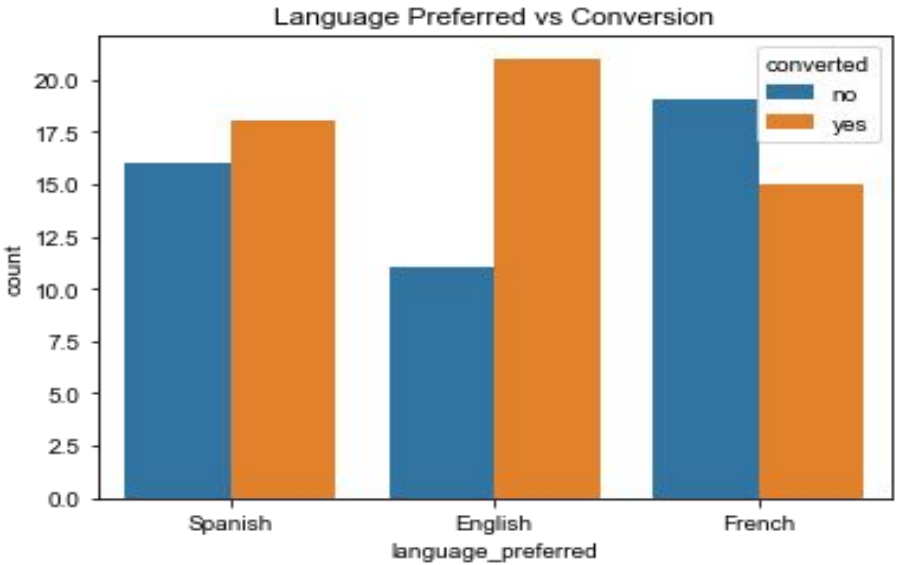
The three languages; Spanish, English and French are all almost equally represented among the customers with Spanish and French at 34% and English at 32%.

EDA: Language and Time spent on the page



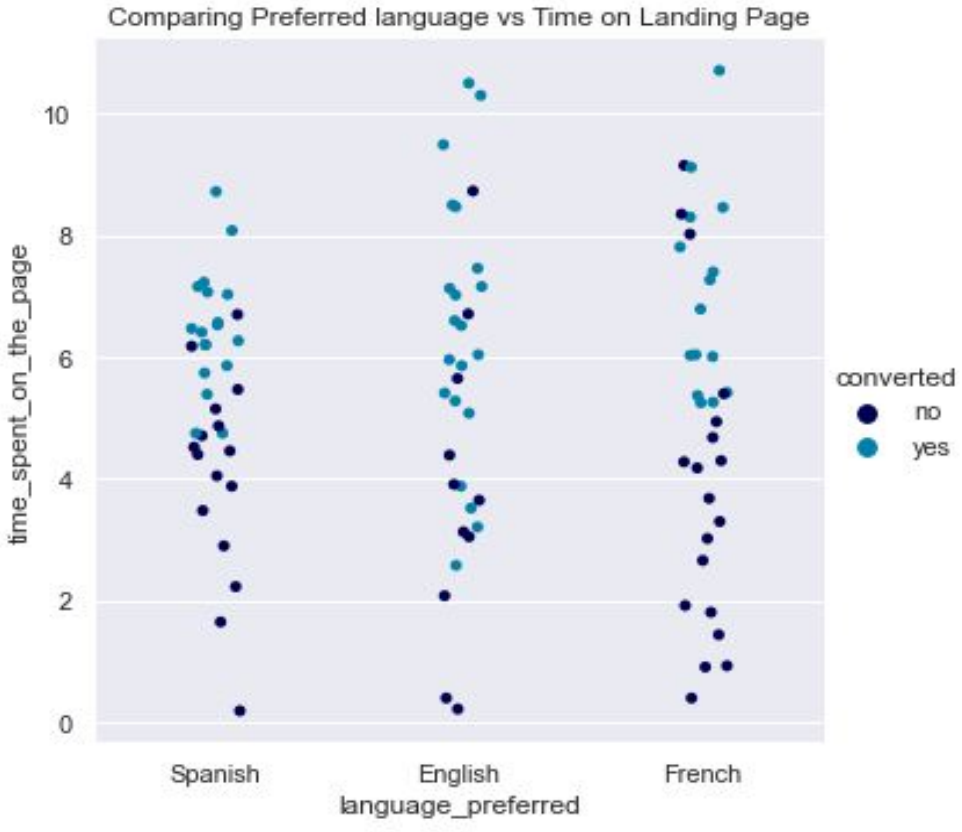
- Mean times spent on new landing page is higher for all three languages compared to old landing page
- Distribution is much smaller for the new landing page across all languages
- For new landing page English has the highest mean, followed by Spanish then French

EDA: Language effect on Converting



- Spanish and English have higher conversion numbers than French.
- English has 50% more converted customers than not converted.

EDA: Language vs Landing Page Time



- Across all languages, the customers that spent the most time on the landing page converted
- English and French customers spent the longest on the landing page, compared to Spanish customers

EDA: Time vs Language

		time_spent_on_the_page		
		mean	min	max
converted	language_preferred			
no	English	3.810909	0.22	8.73
	French	3.861579	0.40	9.15
	Spanish	4.052500	0.19	6.70
yes	English	6.474762	2.58	10.50
	French	7.016000	5.25	10.71
	Spanish	6.468889	4.75	8.72

For all Languages the customers that converted spent the most time on the landing page

French converted customers spent the most time on the landing page, followed by English and Spanish

EDA: Mean Time on New Landing Page vs Language

The mean time spent on the new landing page is very close across all languages:

English at 6.7 minutes
French at 6.2 minutes
Spanish at 5.8 minutes

Customers spent more time on the new landing page over the old landing page across all languages

		time_spent_on_the_page		
		mean	min	max
landing_page	language_preferred			
new	English	6.663750	3.65	10.50
	French	6.196471	3.30	10.71
	Spanish	5.835294	1.65	8.08
old	English	4.454375	0.22	10.30
	French	4.310000	0.40	9.15
	Spanish	4.828235	0.19	8.72

Business Questions

- Do the users spend more time on the new landing page than the old landing page?

- Is the conversion rate(the proportion of users who visit the landing page and get converted) for the new page greater than the conversion rate for the old page?

- Does the converted status depend on the preferred language?

- Is the mean time spent on the new page the same for the different languages?

Inferential Statistics Inferences

1) Time data is continuous as time is a measure on the continuous scale

2) Data is normally distributed as the sample size is >30, thus Central Limit Theorem will hold true.

3) Level of significance will be 0.05 (which was established by E-News Express)

4) Informed that the samples are of a random sampling

Time spent on old vs new landing page

Step 1: Define null and alternative hypotheses

H_0 : users spend the same time on both pages

H_a : users spend more time on the new landing page

We will test the null hypothesis

$$H_0 : \mu_1 = \mu_2$$

against the alternate hypothesis

$$H_a : \mu_1 < \mu_2$$

Average time spent on the old page: 4.53 minutes
Average time spent on the new page: 6.22 minutes

Std Deviation for the old page : 2.58 minutes
Std Deviation for the new page: 1.82 minutes

Time spent on old vs new landing page results

Initially it appears that customers spent more time on the new landing page vs. the old landing page.
The old landing page has a much higher standard deviation as the data is dispersed more.

Calculate the p-value using a 2-sample z-test::

P-value = 7.634 x10^-5

Conclusion:

As the p-value is much less than the level of significance of 0.05, we reject the null hypothesis. Thus, we have enough statistical evidence to say that users spent more time on the new landing page vs. the old landing page

Comparing Conversion Rates

Define Null and Alternative Hypothesis

- Null Hypothesis : New Page is not more effective in converting customers
- - H_0: $\mu_2 = \mu_1$
- Alternative Hypothesis: New Page has increased the conversion rate
- - H_1: $\mu_2 > \mu_1$
- Let μ1 and μ2 be the mean output from the old landing page and the mean output from the new landing page respectively.
- n= 50 # each group has an n of 50 out of 100 customers sampled
- level of significance: 0.05

Comparing Conversion Rates: Results

1) Old landing page had 21 customers convert out of 50: conversion rate of 0.42%
2) New landing page had 33 customers convert out of 50: conversion rate of 0.66%
   Initially it appears the new landing page has a higher conversion rate

Test for statistical significance will use a proportions z-test:

P-value = 0.008

Conclusion:
As the p-value is much smaller than our level of significance (0.050), we can reject the null hypothesis that the old landing page has the same conversion rate as the new landing page. Statistical proof shows that the new landing page has a much higher conversion rate than the old landing page.

Language effect on conversion:

Step 1: Define null and alternative hypotheses

H_0 : converted status is independent on preferred language

H_a : converted status is dependent on preferred language

converted	no	yes
language_preferred		
English	11	21
French	19	15
Spanish	16	18

Language Effect on Conversion: Results

We will use chi2_contingency to find the p-value

P-value = 0.213

Conclusion:

As the p-value is greater than the level of significance (0.05), we fail to reject the null hypothesis. There is not enough statistical evidence to show that customer conversion is dependent on language preference.

Time Spent on Landing Page and Language Effect:

Step 1: Define null and alternative hypotheses

H_0 : time spent on new landing page is the same for all languages

H_a : at least one language has a different mean time

Let μ_1, μ_2, μ_3 be the mean time on new landing page for English,French and Spanish.

We will test the null hypothesis

> $H_0 : \mu_1 = \mu_2 = \mu_3$

against the alternative hypothesis

> H_a : At least one language has a different mean time.

Time Spent on Landing Page and Language Effect: Results

We will use a f_oneway statistic test for p-value

P-value = 0.432

Conclusion:

Since the p-value is so large, we fail to reject the null hypothesis. There is not enough statistical evidence to conclude that at least one language mean time on the new page is statistically different from the rest at 5% significance level.

Business Insights

- Overall, we can see that there is statistical evidence to show that within this data the new landing page is a huge success

- The new landing page has a higher conversion rate, and also keeps customers on it longer than the old landing page. The increased time spent on the page could be a large selling point for companies wanting to sell advertisement space on the landing page.

- Senior Leadership will be glad to know that out of the three languages (English, Spanish, and French), there was almost equal representation and the conversion rates were shown to be statistically similar. So, there is no language bias amongst the customers which could mean that the team produced excellent landing pages and translated everything evenly across the languages.

Business Recommendations:

- The Data does present a strong case that favors a successful launch of the new landing page.
- However, more customer information would be helpful to gather a truer representation of the customer population.
    - Age (Does the new page favor younger customers with it's updates?)
    - Sex (Does the old/new landing page favor males over females?)
    - Marital Status
    - Income
    - More Languages (Increase potential client base)
    - Location(are customers only from a small area? Target other areas to increase customer pool and revenue

These suggestions for a broader testing of the landing page could dramatically increase revenue if the data shows large gaps in missing populations. These gaps could be targeted with specific Ads, or add links to the landing page on popular social media sites based upon a more in-depth data set.

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