

A/B Testing Analysis Report

Project Title: Optimizing Web Page Design for Increased Engagement and Funding for Breast Cancer Research

Client Name: AltSchool Africa

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Executive Summary:

This report presents the results of an A/B testing experiment conducted on our breast cancer NGO website to determine which web page design (Web Page A or Web Page B) performs better in terms of click-through rate, time spent on page, and more importantly, conversion rate to drive online funding to support the organization activities. The experiment was conducted over a period of two weeks, and the results show that Web Page B did not outperform Web Page A statistically in all three metrics.

Introduction:

Breast cancer is a public menace that contributes significantly to the cause of female mortality worldwide. The systems and initiatives that advance the frontiers of knowledge in development of therapeutic intervention to curb breast cancer incidence and mortality contribute to improving the health and well-being of women globally.

As a breast cancer Non-Governmental Organization, we create awareness on early detection of breast cancer by enlightening women on the need for routine checkups and also by conducting research. Our website plays a critical role in engaging with our audience, raising awareness about breast cancer, and securing funding to support our research and programs. To optimize our website's performance, we conducted an A/B testing experiment to compare the performance of two web page designs: Web Page A and Web Page B.

Business Objective:

The goal of this experiment is to compare the performance of two web page designs and determine which one should be used to maximize user engagement and conversion rates which could potentially lead to more donation via the website and better-funding for breast cancer research purposes.

Methodology:

The A/B testing experiment was conducted using a random sample of 1000 website visitors. The visitors were assigned to either Web Page A or Web Page B based on their site navigation, and their interactions with the website were tracked over a period of two weeks. The metrics tracked included:

- Click-through rate (CTR)
- Time spent on page (TSP)
- Conversion rate (CR)

The hypothesis testing summary entail:

- **Null hypothesis (H0):** The conversion rates between Web Page A and Web Page B are similar (i.e., there is no significant difference) and we keep working with Web Page A design

- **Alternative hypothesis (H1):** The conversion rates between webpage A and webpage B are not equal (i.e., there is a significant difference) and we pivot to Web Page B design.

Data Collection and Processing:

The data for this project was hypothetically collected from the Breast Cancer Research Group website over a 2-week period from the 8th of December, 2024 to 22nd of December, 2024. The following python libraries were used to analyze the data: pandas, numpy, scipy, datetime, matplotlib and

seaborn. In simulating user response data for the two web page designs in a real-world scenario, a function was defined to randomly delete 2% of the randomly generated user data to mimic missing values which are common in real world data. The following columns were considered relevant for the user response data randomly generated and include the following:

1. User ID: A unique identifier for each user.
2. Web Page ID: A unique identifier for each web page design (e.g. A or B).
3. Click-Through Rate (CTR): The percentage of users who clicked on the call-to-action (CTA) button.
4. Time Spent on Page (TSP): The amount of time users spent on the web page.
5. Page load time: The amount of time the web page loads up data
5. Conversion: A binary indicator (0 or 1) indicating whether the user completed the desired action (made a donation).
6. Browser type: The type of browser the user accessed the web page with.
7. Device Type: The type of device used to access the web page (desktop, mobile, tablet).
8. Browser Type: The type of browser used to access the web page (Chrome, Firefox, Safari).
9. Operating System: The operating system used to access the web page (Windows, macOS).
10. Age: The age of the user
11. Gender: The gender of the user
12. Country: The country where the user is accessing the web page from
13. City: The city where the user is accessing the web page from
14. Date: The date the user interacted with the web page.

Results:

The results of the A/B testing experiment are presented below:

Hypothesis Testing Results:

Metric: click_through_rate

P-Value: 0.34366270606011273

Confidence Interval: (0.47769495907030984, 0.5272442387267373)

T-Statistic: -0.9474123925727375

Statistically Significant: False

Metric: time_spent_on_page

P-Value: 0.9895837155885485

Confidence Interval: (1732.750007202326, 1905.6415822112542)

T-Statistic: 0.013058585582721856

Statistically Significant: False

Metric: conversion

P-Value: 0.6021008465000874

Confidence Interval: (0.139382037822516, 0.2024361439956658)

T-Statistic: -0.5215513239969926

Statistically Significant: False

Chi-square Result:

Conversion Rate for Webpage A: 14.6%

Conversion Rate for Webpage B: 15.52%

Chi-Square Statistic: 0.1248894069760855

p-value: 0.723790869183103

Reject Null Hypothesis: False

Fail to reject the null hypothesis. The conversion rates are not statistically significantly different.

Result inference:

A 95% confidence interval (CI) for the difference in conversion rates between Web Page B and Web Page A was (-0.5%, -0.1%), implying that the true difference in conversion rates between Web Page B and Web Page A lies within this range. Web Page A had a CR with confidence interval of 0.17 ± 0.14 ,

compared to 0.18 ± 0.20 for Web Page B. Also, the narrower CI indicates a more precise estimate, while a wider CI indicates a less precise estimate. Furthermore, the CI containing 0 suggests the difference between the two Web Page is not statistically significant. The p-value and Chi-square analysis also reveals the conversion rates are not statistically significantly different.

Insights:

1. Generally, users spent more time within the 2-weeks on Web Page A with an average of 1,819.2seconds compared to Web Page B with 1,818.3 seconds, however, that did not translate to a higher click-through rate for Web Page A, as Web Page B had an average of 0.521 clicks compared to Web Page A, 0.502 clicks. Furthermore, Web Page B had a higher conversion rate of 15.52% compared to 14.6% of Web Page A. In summary, the higher time spent by users on Web Page A did not produce a higher conversion rate for Web Page A compared to Web Page B.
2. Across the countries were users visited our NGO website, men generally had a higher conversion rate compared to women, implying men contributed more through donations as financial sponsors than women to the NGO via online funding
3. USA has the highest conversion rate, indicating the major donors/financial sponsors for the NGO are from the USA. In descending order, the UK, Canada, Germany and Australia make up our top 5 financial sponsors.
4. The data also revealed the visitors of our NGO website within the 2-week period are found between age group 41 to 75(years) which had 1,830 users, while age group 18 to 40(years) had 1,797 users visit the website.

Recommendations:

1. Adopt Web Page A as the default web page design for our breast cancer NGO website.
2. Continuously monitor and analyze the performance of Web Page A to identify areas for further optimization.
3. Consider conducting additional A/B testing experiments to further refine our web page design and improve our online engagement and fundraising efforts.
4. Analyze the performance of our website using additional metrics, such as bounce rate, average session duration, and pages per session to gain more insight on the performance of both Web Page A and Web Page B

Limitations:

1. The A/B testing experiment was conducted over a relatively short period of time (two weeks), and the results may not be representative of our website's performance over a longer period of time.
2. The experiment was conducted using a random sample of website visitors, and the results may not be generalizable to our entire audience.
3. There are internet browsers that block some tracking or all tracking by default. Firefox and Safari are examples of such browsers that protect their users, and website visitors who use these browsers, would have to activate tracking manually in order to include analytics implying data could be missing because of this.
4. Operating systems, especially iOS, are currently implementing options in their devices where users can turn off all forms of tracking by default. This limits the access to website user data needed for data collection.

Conclusion:

Based on the results of the A/B testing experiment, we can see that there are no statistically significant differences between the two web page designs for click-through rate, time spent on page and conversion rate.

Based on these results, we fail to reject the null hypothesis. We recommend choosing web page design A as our breast cancer NGO website choice.