
E-Learning

AB Testing Case Study

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Experiment design

The product manager thinks if parents are involved in their child's trial from the start, they are more likely to convert. Therefore, a 'invite your parent' form is displayed before users can choose to start trial. Note that currently users are able to link their parents during their study in both experiment and control groups.

Experiment duration: 2021-06-29 ~ 2021-10-07

Number of qualified unique users: Control (7,876) vs Experiment (7,853)

Null Hypothesis: there is no statistical difference between control and variant groups (two sided)

Statistical test: chi square test on whether users have purchased and t-test on total spend of users

alpha value: 0.05

Key metric: 1. whether users have purchased (0 or 1) 2. Total_spend 3. whether users start trial (0 or 1)

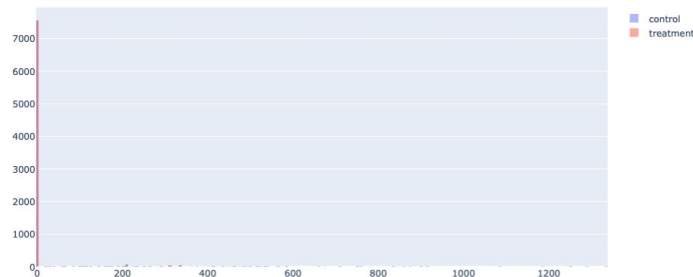
Null Hypothesis 1:

there is no statistical difference between control and variant groups in regards to **total spend**

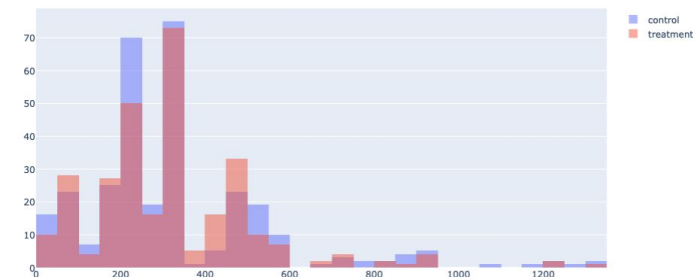
Total Spend	Base: all users
control_group	13
treatment	12
P value of T test	0.33
The treatment group performs worse in total spend but the difference is not significant	

Conclusion: users in the treatment group don't spend more than users in the control group, which is not contradictory to PM's thoughts

Total spend distribution of all users



Total spend distribution of payers



Null Hypothesis 2:

there is no statistical difference between control and variant groups in regards to **whether they purchase**

Whether users purchase	Base: all users
control_group	0.040
treatment	0.038
P value of Chi square test	0.38
The treatment group performs worse in conversion but the difference is not significant	

Conclusion: users in the treatment group don't spend more than users in the control group, which is not contradictory to PM's thoughts

Further Thoughts: it seems that treatment performs worse, however insignificant, but why?

- Would the display have an impact on whether users start their trial?
- Would the timing of linking their parents have an impact on total spend and conversion?

Null Hypothesis 3:

there is no statistical difference between control and variant groups in regards to **whether they start trial**

Whether users start trial	Base: all users
control_group	0.71
treatment	0.66
P value of Chi square test	2.6006205562176 6e-10
The treatment group performs worse in conversion but the difference is not significant	

Note: Explored the **total spend and conversion of users who have started trial** and there is no significant difference in the code. Not included in the report as it's not the key findings

Conclusion: 'invite your parent' form is discouraging users from starting the trials

Null Hypothesis 4:

there is no statistical difference between control and variant groups **who have started trial and linked parents** in regards to **total spend**

Total spend	Base: all users*
control_group	165
treatment	69
P value of t test	2.0973164385667 41e-08
The treatment group performs worse in total spend but the difference is significant	

Conclusion: linking your parents from the start discourages users to spend money

Null Hypothesis 5:

there is no statistical difference between control and variant groups **who have started trial and linked parents** in regards to **conversion**

Whether users start trial	Base: all users*
control_group	0.351
treatment	0.198
P value of Chi square test	1.3672990106502 157e-05
The treatment group performs worse in total spend but the difference is significant	

Conclusion: linking your parents from the start discourages users to purchase

Null Hypothesis 6:

there is no statistical difference between control and variant groups **who have started trial and NOT linked parents** in regards to **total spend**

Total spend	Base: all users*
control_group	13.67
treatment	10.89
P value of t test	0.0498
The treatment group performs worse in total spend but the difference is barely significant	

Null Hypothesis 7:

there is no statistical difference between control and variant groups **who have started trial and NOT linked parents** in regards to **conversion**

Whether users start trial	Base: all users*
control_group	0.047
treatment	0.036
P value of Chi square test	0.010
The treatment group performs worse in conversion but the difference is significant	

Conclusion: 'invite your parent' form is discouraging total spend and conversion even though users are not linking their parents

Null Hypothesis 8:

there is no statistical difference between control and variant groups **who have linked parents** in regards to **total spend**

Total spend	Base: all users*
Control_group who have linked parents	165.24
Treatment who have linked parents	69.11
P value of t test	2.097316438566741e-08
The treatment group performs worse in total spend but the difference is barely significant	

Null Hypothesis 9:

there is no statistical difference between control and variant groups **who linked parents** in regards to **conversion**

Whether users start trial	Base: all users*
Control_group who have linked parents	0.35
Treatment who have linked parents	0.198
P value of Chi square test	2.6315687158901293e-113
The treatment group performs worse in total spend but the difference is significant	

Conclusion: the timing of linking parents is essential as treatment is performing significantly and hugely worse

Conclusions

- 'invite your parent' form is discouraging users from starting the trials. Possible reasons could be there are more pressure for students from the beginning, the idea of parents monitoring etc
- The timing of linking parents is essential. Linking parents from the start of the trial suppress the total spend and conversion. Users who have linked their parents are core users of the product as they spend more money and are more likely to convert. Possible reasons could be students are more likely to persuade their parents if they invested time in the product etc

Further Analysis

- It would be great to have an extra column of data where the timing of linking parents is displayed. So it's possible to analyse what's the best timing to link parents
- All of the analysis presented are based on all users. Nonetheless, it could be relevant to look at only payers

Thank You