ISYS3401 – IT Evaluation

Week 4 – Tutorial

Q1. To evaluate a campaign to encourage parents to have their children study IT in their undergraduate studies, parents of 240 year 12 students were surveyed before the campaign and again six months after the end of the campaign. Before the campaign, 192 parents said their child would consider studying IT and 48 said their child would not. After the campaign 188 of the 192 parents who would previously said their child would study IT still said they would, but 4 said they would not. Of the 48 parents who previously said their child would not study IT, 37 still said their child would not, while the rest now said their child would consider studying IT in their undergraduate studies.

Did the IT promotion campaign make any differences to the parents?

a) Analyse the data to evaluate the effect of the IT promotion campaign

Null hypothesis: There was no effect of the IT promotion campaign.

- If calculated χ^2 value is lower than the Critical Value, then do not Reject
- If calculated χ^2 value is higher than the Critical Value, then Reject

		Before campaign		
		Study IT	Not study IT	Total
After Campaign	Study IT	188	11	199
	Not study IT	4	37	41
	Total	192	48	240

(b) Using McNemar's Test:

$$\chi^2 = \frac{(|r-s|-1)^2}{(r+s)}$$

To find r and s:

		Before campaign		
		Study IT	Not study IT	Total
After Campaign	Study IT	188	11	199
	Not study IT	4	37	41
	Total	192	48	240

Therefore, r = 11 and s = 4

$$\chi^2 = \frac{(|11-4|-1)^2}{(11+4)}$$

$$\chi^2 = \frac{(6)^2}{(15)}$$

$$\underline{\chi^2 = 2.40}$$

TABLE C: χ^2 CRITICAL VALUES

	Tail probability p										
df	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001
1	1.32	1.64	2.07	2.71	3.84	5.02	5.41	6.63	7.88	9.14	10.83
2	2.77	3.22	3.79	4.61	5.99	7.38	7.82	9.21	10.60	11.98	13.82
3	4.11	4.64	5.32	6.25	7.81	9.35	9.84	11.34	12.84	14.32	16.27
4	5.39	5.99	6.74	7.78	9.49	11.14	11.67	13.28	14.86	16.42	18.47
5	6.63	7.29	8.12	9.24	11.07	12.83	13.39	15.09	16.75	18.39	20.51
6	7.84	8.56	9.45	10.64	12.59	14.45	15.03	16.81	18.55	20.25	22.46

From the table, the critical value of χ^2 (1df) distribution for p=0.05 is <u>3.84</u>.

(b) Reminder…

- If calculated χ^2 value is lower than the Critical Value, then do not Reject
- If calculated χ^2 value is higher than the Critical Value, then Reject

Since, 2.40 is less than 3.84, then there was no evidence that the IT promotion campaign had an effect (χ^2 = 2.40, 1*df*). Thus, the IT promotion campaign did not really change the mind of the parents.

Q2. A study was conducted to assess whether a new website design of the University of Sydney affected student's choices in studying in the University of Sydney. Students were asked their preferences before and after the introduction of the new website. A total of 160 Year-12 students completed the online questionnaire on both occasions.

Of the 90 students who were "undecided or leaning away" from choosing to study at the University of Sydney before seeing the new website design, 45 were then "leaning towards" choosing the University of Sydney after seeing the new website. Of the 70 who were "leaning towards" the University of Sydney before seeing the new website, 60 were still "leaning towards" the University after see the new website. [Given χ2 = 3.84 (1df) for P=0.05]

(a) Analyse the data to evaluate the effect of preference between after and after seeing the IT promotion campaign

Hypothesis: H0: There is no change of preference between before and after seeing the new website.

- If calculated χ^2 value is lower than the Critical Value, then do not Reject
- If calculated χ^2 value is higher than the Critical Value, then Reject

Represent the data in a table

		After seeing new website		
		Toward	Away	Total
Before seeing new website	Toward	60	10	70
	Away	45	45	90
	Total	105	55	160

(b) **Using McNemar's Test:**

$$\chi^2 = \frac{(|r-s|-1)^2}{(r+s)}$$

		After seeing new website		
		Toward	Away	Total
Before seeing new website	Toward	60	10	70
	Away	45	45	90
	Total	105	55	160

Therefore, r = 10 and s = 45

$$\chi^2 = \frac{(|10-45|-1)^2}{(10+45)}$$

$$\chi^2 = \frac{(34)^2}{(55)}$$

$$\underline{\chi^2 = 21.018}$$

Since, 21.018 is higher than 3.84, then there is evidence that the new website design affected student's choices in studying in the University of Sydney when comparing with the old website design.

Q3. Before the NSW Election Great Debate, 100 people were surveyed regarding their opinion if traffic light sensor system will work. 70 believe it will work, and 30 do not believe it will work at all. They then listened to the debate, and the survey was repeated immediately after the debate. This time, 5 people change their mind from a believer to a non-believer. On the other hand, 11 change their mind from a non-believer to a believer. Did the Great Debate affect the people believe in the traffic light sensor system? [Given χ2 = 3.84 (1df) for P=0.05]

(b) Analyse the data to evaluate the effect of preference between after and after seeing the IT promotion campaign

Hypothesis: H0: There is no change of preference between before and after seeing the new website.

- If calculated χ^2 value is lower than the Critical Value, then do not Reject
- If calculated χ^2 value is higher than the Critical Value, then Reject

Represent the data in a table

		Before Great Debate		
		Believer	Non-Believer	Total
After Great Debate	Believer	65	11	76
	Non- Believer	5	19	24
	Total	70	30	200

(b) **Using McNemar's Test:**

$$\chi^2 = \frac{(|r-s|-1)^2}{(r+s)}$$

Therefore, r = 11 and s = 5

$$\chi^2 = \frac{(|11-5|-1)^2}{(11+5)}$$

$$\chi^2 = \frac{(5)^2}{(16)}$$

$$\underline{\chi^2 = 1.5625}$$

Since, 1.5625 is lower than 3.84, we cannot reject the null hypothesis. There is not enough evidence that the debate changes people's mind on if traffic light sensor system will work.