

Is I.B. and/or A.P. classes worth it?

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Introduction

We chose this topic because being I.B./A.P. class takers, we are wondering if taking these challenging courses are really worth it. We've all spent sleepless nights studying material from advanced classes and are these nights even helping us to learn more or just memorize information for testing?



Our question

Is there an association between the number of I.B./A.P. classes and a person's general knowledge?



Procedure

- We put together a list of classes we knew were containing a majority of seniors. We then used a randomizer and created a random order of classes and went to those classes until we ran out of all 50 surveys.
- We made sure only seniors took the survey
- Survey used:

How many I.B./A.P. classes have you taken in the last 4 years? _____

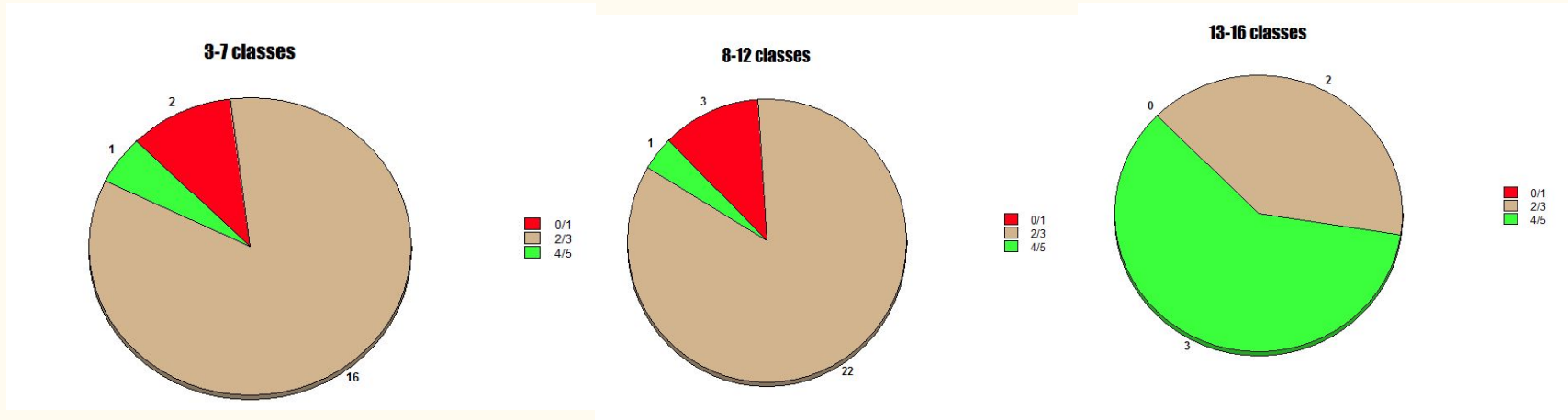
1. The ozone layer restricts
 - A. Visible light
 - B. Infrared radiation
 - C. X-rays and gamma rays
 - D. Ultraviolet radiation
2. Headquarters of U.N. (United Nations) are situated at
 - A. New York, USA
 - B. Hague (Netherlands)
 - C. Geneva
 - D. Paris
3. Which Country does NOT border Brazil?
 - A. Uruguay
 - B. Bolivia
 - C. Venezuela
 - D. Ecuador
4. If speed of rotation of the earth increases, weight of the body
 - A. increases
 - B. remains unchanged
 - C. decreases
 - D. may decrease or increase
5. What is the derivative of $4x^2$
 - A. $8x$
 - B. $16x$
 - C. $4x^3$
 - D. 16

Raw Data

# of classes	# questions right							
3	3/5	2/5						
4	4/5	3/5	2/5					
5	3/5	3/5	2/5	3/5				
6	2/5	2/5	1/5	2/5	3/5			
7	2/5	1/5	3/5	2/5	3/5			
8	3/5	3/5	4/5	1/5	3/5	3/5	3/5	
9	2/5	2/5	2/5					
10	2/5	2/5	2/5	2/5	1/5	2/5	2/5	2/5
11	2/5	2/5	3/5	3/5				
12	3/5	2/5	3/5	1/5	3/5			
13	4/5							
14	4/5							
15	3/5	4/5						
16	3/5							

Analysis of data

It appears that generally the people who take more I.B. /A.P. classes did better on the quiz than those who take less.



Observed Values	0-1 Questions right	2-3 Questions right	4-5 Questions right	Total
3-7 I.B./A.P. classes	2	16	1	19
8-12 I.B./A.P. Classes	3	22	1	26
13-16 I.B./A.P. Classes	0	2	3	5
Total	5	40	5	50

Expected Values	0-1 Questions right	2-3 Questions right	4-5 Questions right	Total
3-7 I.B./A.P. classes	1.9	15.2	1.9	19
8-12 I.B./A.P. Classes	2.6	20.8	2.6	26
13-16 I.B./A.P. Classes	0.5	4	0.5	5
Total	5	40	5	50

We will now conduct our inference procedure :)



Hypothesis

- **Null hypothesis:** There is no association between the number of I.B./A.P. classes and general knowledge.
- **Alternative hypothesis:** There is an association between the number of I.B. classes and general knowledge.

Assumptions

- **Random:** We took a random sample of senior classes and chose the first 4, randomly selected classes.
- **Independent:** $n=50$ It is safe to assume there are more than 500 seniors
- **Large Counts:** Unfortunately not all of our expected values were at least five,

WARNING NOT ALL ASSUMPTIONS ARE MET

Proceed with caution



We will use a Chi-square test of Association.

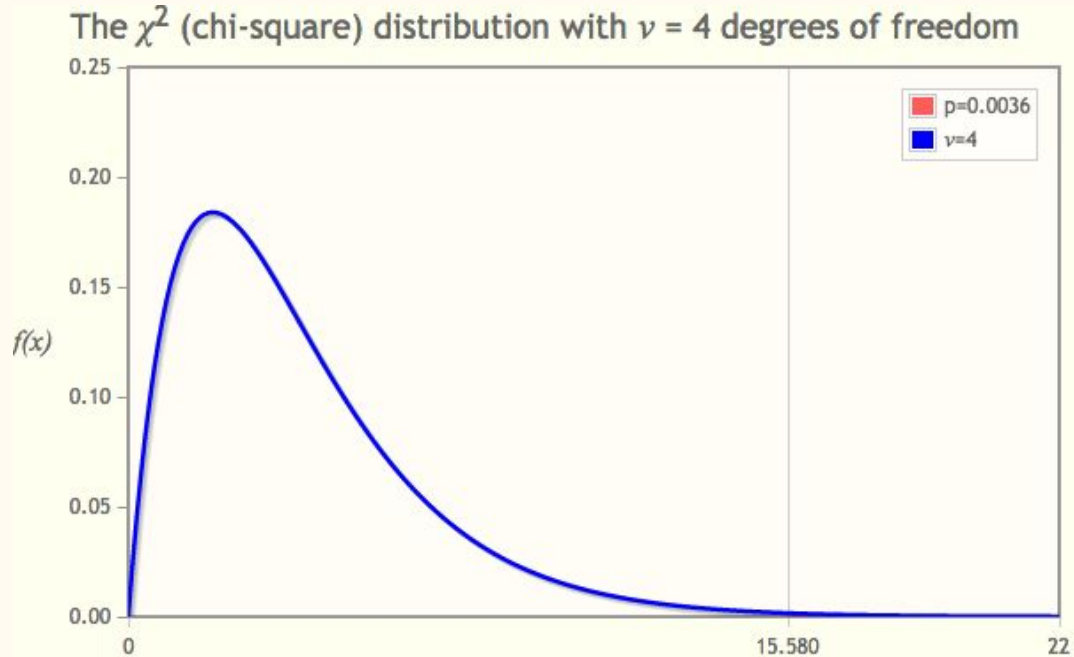
$$\chi^2 = \sum \frac{(\text{Observed}-\text{Expected})^2}{\text{Expected}}$$

$$df = (3-1)(3-1) = 4$$

$$\frac{(2-1.9)^2}{2} + \frac{(16-15.2)^2}{15.2} + \frac{(1-1.9)^2}{1.9} \dots = 15.58$$

P-Value

The P-Value, with a Chi-square value of 15.58 and degrees of freedom of 4, is .0036.



Decision!

Because $P (.0036)$ is significant at the α level $.05$ we will reject the null.



Conclusion in context



There is strong evidence that there is an association between number of I.B./A.P. classes taken and general knowledge.

Although there seems to be a strong association between the two we had a limited number of classes we could survey, so our expected values could not all be more than 5. We also only questioned I.B./A.P. classes so everyone would answer at least one for the number of classes they had taken so it may have been biased. If you were to do a similar survey, you should survey a lot more classes. Our test was only 5 questions so it may not have been the most accurate way to determine someone's general knowledge.

I AM MORGAN FREEMAN.



THANK YOU FOR LISTENING