Head for Figures and Mathematical Comprehension

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Do students have a head for figures, do they have mathematical comprehension? The difficulties that many students encounter in basic statistic courses are well known and have been widely reported. But still it is necessary to talk about it, because it should be our goal to teach students some basic skills in statistics not only for professional life, but also - and more important - for daily life.

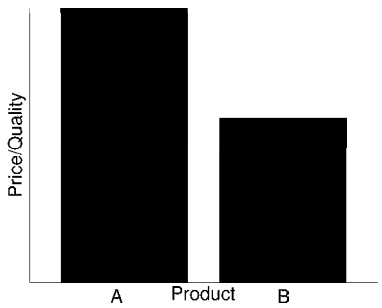
1. Survey

The data were collected from students of economics and social science at the University of Linz, Austria, in March 2001 (n = 607) and March 2003 (n = 349). The samples were no random selection, the students were chosen, because they took part in a basic courses in statistics. Therefore the results are not representative for any really interesting population, but still very meaningful. The questionnaire contained eleven questions dealing with mathematics or statistics, most of them multiple choice with six different possibilities of response. The topics were interpretation and calculation (without calculator) of percentages and fractions, interpretation of graphics and (rough) estimation of square roots and percentages.

2. Results

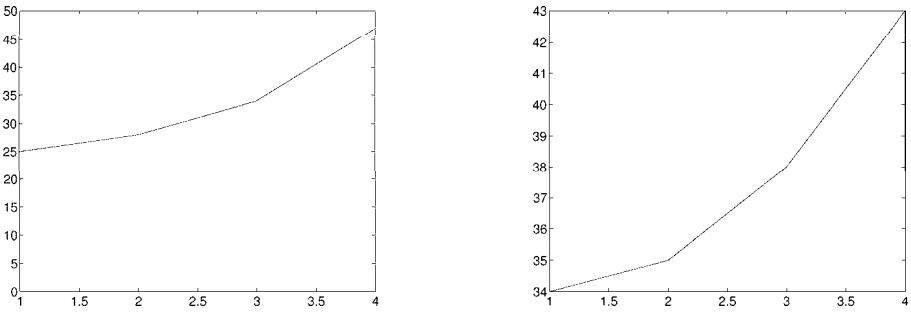
The first question about percentages was "How much is 30% of 70%?", the options for response were 3%, 17%, 21%, 30%, 37% and 70 %. Only 75.3% of the whole sample did manage this question, there were hardly any differences between the sample 2001 (75.7% correct) and the sample 2003 (74.6% correct).
Even worse was the result of the question "The fraction 1/40 can also be written as ..." with the options 0.40, 4/100, 0.25, 0.040, 1/25, 0.025. Only about two third (65.0%) did know the correct answer. Again there were hardly any differences between the group of 2001 (64.2% correct) and the group of 2003 (66.6% correct).
The result of the question "Figure 1 shows the price-quality-index of two products. Which product would you prefer?" shows us that the majority is not always right. In 2001 61.9% and in 2003 51.6% of the sample voted for product A.

Figure 1: Which product would you prefer?



Another bad highlight was the result of the question "The square root of 0.5 is ..." with the options "bigger than 0.5", "equal 0.5" and "smaller than 0.5". Only 49.1% of the whole sample chose the first option, 1.2% voted for the option "equal" and 49.7% voted for the last response. So it seems to be very difficult for the students to estimate the square root of a decimal number. Estimating the square root of 14641 with the options 11, 71, 121, 235, 550, 739 was also a big problem (55.7% correct answers).
At the last question students had to decide on which figure shows a bigger increase (with possibilities "the first", "the second" and "both are equal").

Figure 2: Which figure shows a bigger increase?



In the sample 2001 45.4% voted for the correct figure, the results of the sample 2003 were a little bit better with 51.2% correct answers.

3. Summary

Do students have a head for figures, do they have mathematical comprehension? The samples show that most of the participating students have serious difficulties in interpreting "statistical" diagrams and also problems in very basic mathematics. In my opinion especially interpreting diagrams is very important in professional and daily life. Therefore I think we have to focus not only on technical skills in statistics, but also in correct interpretations of results and diagrams.

REFERENCES

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RÉSUMÉ

Le sujet de la recherche était l'aptitude des étudiants à interpréter des chiffres et graphiques, qu'on trouve à la vie quotidienne. Et selon les résultats il reste beaucoup à faire.