REPRESENTATIONS IN PROBABILITY PROBLEMS: SOME EXAMPLES

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The students' difficulties in learning probability concepts were already discussed in previous researches. In this poster, we complement our paper presenting the problem of the test of engineering students in a Portuguese university during the school year of 2012/2013. We present one example for the grid of the representations analysis (written language, symbolic and iconic representations) by question and another one with the computed percentages of students that answered correctly/partially correctly in one of the representations and in a different one for the same question.

PROBLEM TEXT

A box contains three different types of electrical devices 25% of the box devices are of type 1, 20% of type 2 and the remaining are of type 3. The probability that a random device is used more than 100 hours is 42%. Furthermore, given that the device is the type 1, the probability that it is used more than 100 hours is 70%, and given that the device is type 2, the probability that it is used more than 100 hours is 40%. 1. Define all of the stated events (1.1) and their respective probabilities (1.2). Define a partition (1.3) to consider within data and represent it in a Venn diagram (1.4.1. and the other 1.4.2.); 2. Knowing that a device has been chosen at random is type 3, compute the probability that the device will be used more than 100 hours: compute the total probability, identifying the required probability (2.1), using a table or a tree diagram (2.2), and finally computing the probability (2.3). 3. Knowing that the device chosen at random was used more than 100 hours, compute the probability that the device is type 1 or type 2: identifying the required probability (3.1), using the Bayes' formula (3.2), and finally computing the probabilities (3.3).

EXAMPLE OF THE GRID REPRESENTATION ANALYSIS BY QUESTION

R \ Q	1.1	1.2	1.3	1.4.1	1.4.2	2.1	2.2	2.3	3.1	3.2	3.3
WL (written language)	C – M14; M22		C – M14; NR – M22			C – M14; M22	C – M14; M22	C – M14; M22	C – M14; M22	C – M14; M22	C – M14; M22
SR (symbolic rep.)	C – M14; M22	C – M14; M22	W – M14; NR – M22	C – M14; M22	C – M14; M22	C – M14; M22	C – M14; M22	C – M14; PC – M22	C – M14; PC – M22	C – M14; PC – M22	C – M14; PC – M22
IcR (iconic rep.)				C – M14; M22	C – M14; M22		C – M14; M22	C – M14; PC – M22			

Table 1: Grid of the representations (R) analysis by question (Q). Correct (C), Partially correct (PC), wrong (W), and no answer (NR) for tests of Mechanics Engineer students M14 and M22

EXAMPLE OF COMPUTATIONS FOR PERCENTAGES

In question 1 we had 12 students that answered C/PC in the symbolic representation (R2) from the 22 students that answered C/PC in the written language (R1) resulting in the 55% that appears in the 1st row and in the 2nd column.

References

Nascimento, M., Morais, E., & Martins, J. A. (2016). Representations in probability problems. Paper presented at ICME-13. Hamburg.