

# Students Skill Lacks in Accessing Scientific Degree Courses and Possible Impact on Career Development: A Case Study of Environmental Science Course at University of Salerno, Italy

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## SUPPLEMENTARY INFORMATION

| Topic category                   | % correct answers | Average % answers | SD % correct answers |
|----------------------------------|-------------------|-------------------|----------------------|
| Combinatory Calculations (CD)    | 25,0              | 50,3              | 19,6                 |
|                                  | 25,0              |                   |                      |
|                                  | 33,3              |                   |                      |
|                                  | 33,3              |                   |                      |
|                                  | 39,7              |                   |                      |
|                                  | 40,9              |                   |                      |
|                                  | 50,0              |                   |                      |
|                                  | 56,4              |                   |                      |
|                                  | 58,7              |                   |                      |
|                                  | 60,0              |                   |                      |
|                                  | 68,2              |                   |                      |
|                                  | 76,2              |                   |                      |
|                                  | 87,2              |                   |                      |
| Calculations of Probability (CP) | 4,0               | 25,8              | 14,8                 |
|                                  | 22,2              |                   |                      |
|                                  | 25,6              |                   |                      |
|                                  | 33,3              |                   |                      |
|                                  | 44,0              |                   |                      |
| Equations/Dis-equations (ED)     | 16,0              | 53,6              | 27,9                 |

|                            |      |      |      |
|----------------------------|------|------|------|
|                            | 20,0 |      |      |
|                            | 22,7 |      |      |
|                            | 25,6 |      |      |
|                            | 33,3 |      |      |
|                            | 37,5 |      |      |
|                            | 44,0 |      |      |
|                            | 59,1 |      |      |
|                            | 75,0 |      |      |
|                            | 77,3 |      |      |
|                            | 81,0 |      |      |
|                            | 81,8 |      |      |
|                            | 85,7 |      |      |
|                            | 92,0 |      |      |
|                            | 0,0  |      |      |
|                            | 4,0  |      |      |
|                            | 12,5 |      |      |
|                            | 36,0 |      |      |
|                            | 45,5 |      |      |
|                            | 55,6 |      |      |
|                            | 61,5 |      |      |
|                            | 61,9 |      |      |
|                            | 64,0 |      |      |
|                            | 68,0 |      |      |
|                            | 75,0 |      |      |
|                            | 75,0 |      |      |
|                            | 77,8 |      |      |
|                            | 79,5 |      |      |
|                            | 81,8 |      |      |
|                            | 85,7 |      |      |
| Basic logics (LOGI)        | 87,3 | 58,7 | 27,0 |
|                            | 56,4 |      |      |
|                            | 62,5 |      |      |
|                            | 66,7 |      |      |
|                            | 72,7 |      |      |
| Logarithms (LOGA)          | 84,1 | 68,5 | 10,6 |
|                            | 37,5 |      |      |
|                            | 62,0 |      |      |
|                            | 64,1 |      |      |
|                            | 66,7 |      |      |
| Monomials/Polinomials (MP) | 92,0 | 64,5 | 19,3 |

|                            |      |      |      |
|----------------------------|------|------|------|
|                            | 0,0  |      |      |
|                            | 0,0  |      |      |
|                            | 2,6  |      |      |
|                            | 2,6  |      |      |
|                            | 5,1  |      |      |
|                            | 11,1 |      |      |
|                            | 12,0 |      |      |
|                            | 13,6 |      |      |
|                            | 13,6 |      |      |
|                            | 22,2 |      |      |
|                            | 22,2 |      |      |
|                            | 25,0 |      |      |
|                            | 34,9 |      |      |
|                            | 36,0 |      |      |
|                            | 44,4 |      |      |
|                            | 48,0 |      |      |
| Problems (PR)              | 54,5 | 20,5 | 17,6 |
|                            | 0,0  |      |      |
|                            | 0,0  |      |      |
|                            | 3,2  |      |      |
|                            | 4,5  |      |      |
|                            | 5,1  |      |      |
|                            | 10,3 |      |      |
|                            | 12,0 |      |      |
|                            | 22,2 |      |      |
|                            | 22,2 |      |      |
|                            | 22,2 |      |      |
|                            | 25,0 |      |      |
|                            | 25,0 |      |      |
|                            | 25,0 |      |      |
|                            | 27,0 |      |      |
|                            | 28,2 |      |      |
|                            | 32,0 |      |      |
|                            | 32,0 |      |      |
|                            | 33,3 |      |      |
|                            | 33,3 |      |      |
|                            | 37,5 |      |      |
|                            | 37,5 |      |      |
|                            | 37,5 |      |      |
| Fractions/Percentages (FP) | 37,5 |      |      |

|  |      |  |
|--|------|--|
|  | 38,5 |  |
|  | 38,5 |  |
|  | 40,0 |  |
|  | 43,6 |  |
|  | 44,4 |  |
|  | 46,0 |  |
|  | 47,6 |  |
|  | 48,0 |  |
|  | 48,0 |  |
|  | 50,0 |  |
|  | 50,0 |  |
|  | 50,0 |  |
|  | 54,5 |  |
|  | 55,6 |  |
|  | 55,6 |  |
|  | 55,6 |  |
|  | 56,4 |  |
|  | 56,4 |  |
|  | 56,4 |  |
|  | 62,5 |  |
|  | 66,7 |  |
|  | 66,7 |  |
|  | 68,2 |  |
|  | 69,8 |  |
|  | 71,4 |  |
|  | 71,8 |  |
|  | 72,7 |  |
|  | 72,7 |  |
|  | 77,3 |  |
|  | 77,8 |  |
|  | 77,8 |  |
|  | 84,0 |  |
|  | 84,1 |  |
|  | 86,4 |  |
|  | 87,2 |  |
|  | 87,5 |  |
|  | 87,5 |  |
|  | 88,9 |  |
|  | 88,9 |  |
|  | 88,9 |  |

|                                  |      |      |      |
|----------------------------------|------|------|------|
|                                  | 88,9 |      |      |
|                                  | 88,9 |      |      |
|                                  | 88,9 |      |      |
|                                  | 89,7 |      |      |
|                                  | 90,9 |      |      |
|                                  | 92,1 |      |      |
|                                  | 93,7 |      |      |
|                                  | 44,4 |      |      |
|                                  | 52,0 |      |      |
|                                  | 52,0 |      |      |
|                                  | 53,8 |      |      |
|                                  | 58,7 |      |      |
|                                  | 59,1 |      |      |
|                                  | 66,7 |      |      |
|                                  | 71,4 |      |      |
|                                  | 76,9 |      |      |
| Functions (FU)                   | 87,5 | 62,3 | 13,2 |
|                                  | 11,1 |      |      |
|                                  | 22,2 |      |      |
|                                  | 31,8 |      |      |
|                                  | 31,8 |      |      |
|                                  | 36,4 |      |      |
|                                  | 39,7 |      |      |
|                                  | 50,0 |      |      |
|                                  | 56,0 |      |      |
|                                  | 56,0 |      |      |
|                                  | 59,1 |      |      |
|                                  | 66,7 |      |      |
|                                  | 71,4 |      |      |
| Geometry (GE)                    | 88,9 | 47,8 | 21,6 |
|                                  | 25,0 |      |      |
|                                  | 68,2 |      |      |
|                                  | 72,0 |      |      |
|                                  | 77,3 |      |      |
|                                  | 85,7 |      |      |
| Set theory/Numerical series (IN) | 88,9 | 69,5 | 23,2 |

**Table 1:** Analysis of OFA exam results: % Correct answers per single question in every topic category (Values below 50% are evidenced with grey background).

| Topic category                   | % correct answers | Average % answers | SD % correct answers |
|----------------------------------|-------------------|-------------------|----------------------|
| Combinatorics Calculations (CD)  | 37,2              | 59,6              | 16,1                 |
|                                  | 41,9              |                   |                      |
|                                  | 43,8              |                   |                      |
|                                  | 45,0              |                   |                      |
|                                  | 51,7              |                   |                      |
|                                  | 53,1              |                   |                      |
|                                  | 56,8              |                   |                      |
|                                  | 59,5              |                   |                      |
|                                  | 60,8              |                   |                      |
|                                  | 64,7              |                   |                      |
|                                  | 65,7              |                   |                      |
|                                  | 81,8              |                   |                      |
|                                  | 83,7              |                   |                      |
|                                  | 88,2              |                   |                      |
| Calculations of Probability (CP) | 26,7              | 54,6              | 19,6                 |
|                                  | 33,3              |                   |                      |
|                                  | 41,4              |                   |                      |
|                                  | 46,9              |                   |                      |
|                                  | 50,0              |                   |                      |
|                                  | 52,2              |                   |                      |
|                                  | 55,2              |                   |                      |
|                                  | 76,9              |                   |                      |
|                                  | 77,3              |                   |                      |
|                                  | 85,7              |                   |                      |
| Equations/disequations           | 60,3              | 73,5              | 7,3                  |
|                                  | 68,4              |                   |                      |
|                                  | 70,7              |                   |                      |
|                                  | 70,9              |                   |                      |
|                                  | 72,4              |                   |                      |
|                                  | 73,6              |                   |                      |
|                                  | 74,1              |                   |                      |
|                                  | 74,2              |                   |                      |
|                                  | 84,4              |                   |                      |
|                                  | 85,7              |                   |                      |
| Basic Logics (LOGA)              | 36,0              | 62,4              | 16,9                 |
|                                  | 39,6              |                   |                      |
|                                  | 50,0              |                   |                      |
|                                  | 63,6              |                   |                      |

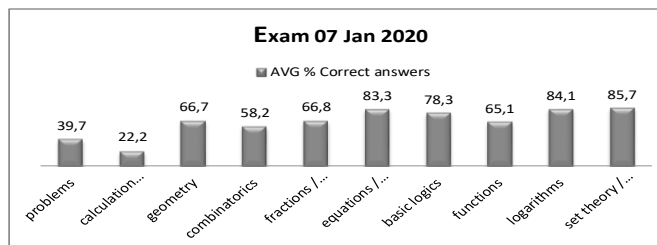
|                            |      |      |      |
|----------------------------|------|------|------|
|                            | 68,1 |      |      |
|                            | 69,3 |      |      |
|                            | 72,0 |      |      |
|                            | 81,0 |      |      |
|                            | 82,5 |      |      |
|                            | 57,9 |      |      |
|                            | 58,1 |      |      |
|                            | 62,0 |      |      |
|                            | 66,0 |      |      |
|                            | 66,7 |      |      |
|                            | 67,8 |      |      |
|                            | 74,5 |      |      |
|                            | 83,3 |      |      |
|                            | 85,7 |      |      |
| Logarithms                 | 86,4 | 70,9 | 11,0 |
|                            | 65,8 |      |      |
|                            | 69,4 |      |      |
|                            | 74,7 |      |      |
|                            | 80,7 |      |      |
|                            | 81,8 |      |      |
|                            | 84,0 |      |      |
| Monomials/Polinomials (MP) | 87,4 | 77,7 | 7,9  |
|                            | 34,0 |      |      |
|                            | 35,4 |      |      |
|                            | 42,2 |      |      |
|                            | 44,2 |      |      |
|                            | 44,3 |      |      |
|                            | 44,4 |      |      |
|                            | 47,4 |      |      |
|                            | 48,4 |      |      |
|                            | 48,4 |      |      |
|                            | 49,5 |      |      |
|                            | 51,6 |      |      |
|                            | 57,6 |      |      |
|                            | 73,1 |      |      |
|                            | 78,4 |      |      |
|                            | 83,5 |      |      |
| Problems (PR)              | 83,8 | 54,1 | 16,4 |
|                            | 27,0 |      |      |
| Fractions/Percentages      | 36,3 | 62,4 | 20,3 |

|                                  |      |      |      |
|----------------------------------|------|------|------|
|                                  | 45,6 |      |      |
|                                  | 46,4 |      |      |
|                                  | 51,5 |      |      |
|                                  | 51,7 |      |      |
|                                  | 54,0 |      |      |
|                                  | 58,6 |      |      |
|                                  | 60,2 |      |      |
|                                  | 61,0 |      |      |
|                                  | 74,4 |      |      |
|                                  | 78,3 |      |      |
|                                  | 79,5 |      |      |
|                                  | 80,3 |      |      |
|                                  | 95,0 |      |      |
|                                  | 98,9 |      |      |
|                                  | 11,3 |      |      |
|                                  | 25,4 |      |      |
|                                  | 51,6 |      |      |
| Functions (FU)                   | 57,6 | 36,5 | 21,9 |
|                                  | 17,8 |      |      |
|                                  | 22,9 |      |      |
|                                  | 30,3 |      |      |
|                                  | 38,5 |      |      |
|                                  | 46,9 |      |      |
|                                  | 48,4 |      |      |
|                                  | 50,0 |      |      |
|                                  | 61,6 |      |      |
| Geometry (GE)                    | 61,8 | 39,6 | 14,9 |
|                                  | 10,3 |      |      |
|                                  | 41,3 |      |      |
|                                  | 50,0 |      |      |
|                                  | 70,1 |      |      |
|                                  | 71,4 |      |      |
|                                  | 75,0 |      |      |
|                                  | 77,5 |      |      |
| Set Theory/Numerical series (IN) | 83,8 | 59,9 | 24,6 |

**Table 2:** Analysis of entry test simulations: % Correct answers per single question in every topic category. (Values below 50% are evidenced with grey background).

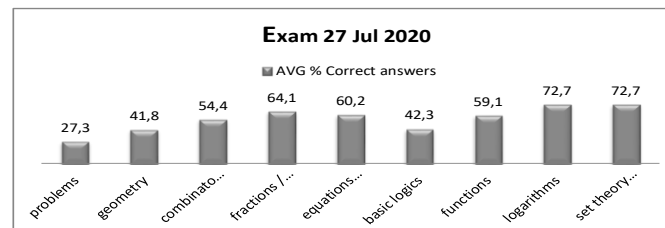
EXAM SESSION: 07-Jan-2020

| TOPIC CATEGORY                | AVG % Correct answers |
|-------------------------------|-----------------------|
| problems                      | 39,7                  |
| calculation of probability    | 22,2                  |
| geometry                      | 66,7                  |
| combinatorics                 | 58,2                  |
| fractions / percentages       | 66,8                  |
| equations / disequations      | 83,3                  |
| basic logics                  | 78,3                  |
| functions                     | 65,1                  |
| logarithms                    | 84,1                  |
| set theory / numerical series | 85,7                  |



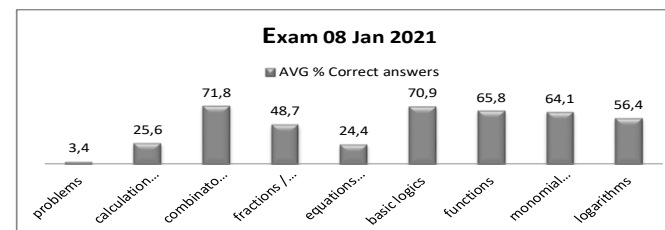
EXAM SESSION: 27-Jul-2020

| TOPIC CATEGORY                | AVG % Correct answers |
|-------------------------------|-----------------------|
| problems                      | 27,3                  |
| geometry                      | 41,8                  |
| combinatorics                 | 54,4                  |
| fractions / percentages       | 64,1                  |
| equations / disequations      | 60,2                  |
| basic logics                  | 42,3                  |
| functions                     | 59,1                  |
| logarithms                    | 72,7                  |
| set theory / numerical series | 72,7                  |



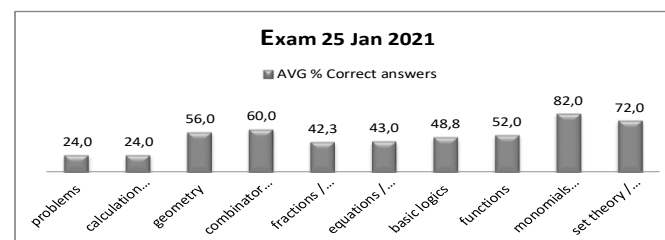
EXAM SESSION: 08-Jan-2021

| TOPIC CATEGORY             | AVG % Correct answers |
|----------------------------|-----------------------|
| problems                   | 3,4                   |
| calculation of probability | 25,6                  |
| combinatorics              | 71,8                  |
| fractions / percentages    | 48,7                  |
| equations / disequations   | 24,4                  |
| basic logics               | 70,9                  |
| functions                  | 65,8                  |
| monomials / polinomials    | 64,1                  |
| logarithms                 | 56,4                  |



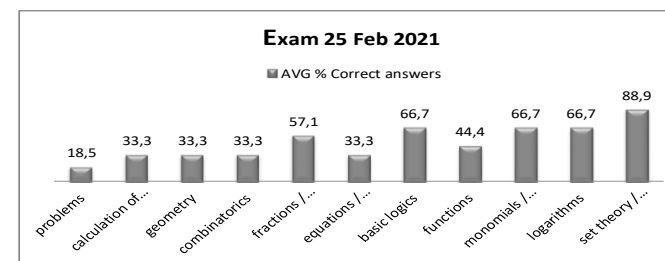
EXAM SESSION: 25-Jan-2021

| TOPIC CATEGORY                | AVG % Correct answers |
|-------------------------------|-----------------------|
| problems                      | 24,0                  |
| calculation of probability    | 24,0                  |
| geometry                      | 56,0                  |
| combinatorics                 | 60,0                  |
| fractions / percentages       | 42,3                  |
| equations / disequations      | 43,0                  |
| basic logics                  | 48,8                  |
| functions                     | 52,0                  |
| monomials / polinomials       | 82,0                  |
| set theory / numerical series | 72,0                  |



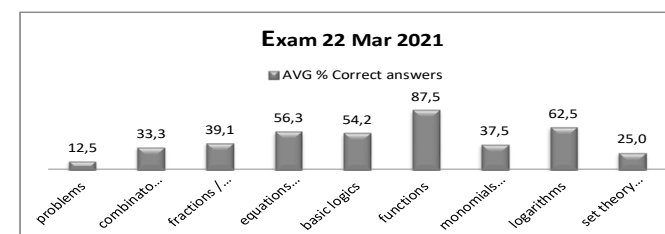
EXAM SESSION: 25/02/2021

| TOPIC CATEGORY                | AVG % Correct answers |
|-------------------------------|-----------------------|
| problems                      | 18,5                  |
| calculation of probability    | 33,3                  |
| geometry                      | 33,3                  |
| combinatorics                 | 33,3                  |
| fractions / percentages       | 57,1                  |
| equations / disequations      | 33,3                  |
| basic logics                  | 66,7                  |
| functions                     | 44,4                  |
| monomials / polinomials       | 66,7                  |
| logarithms                    | 66,7                  |
| set theory / numerical series | 88,9                  |

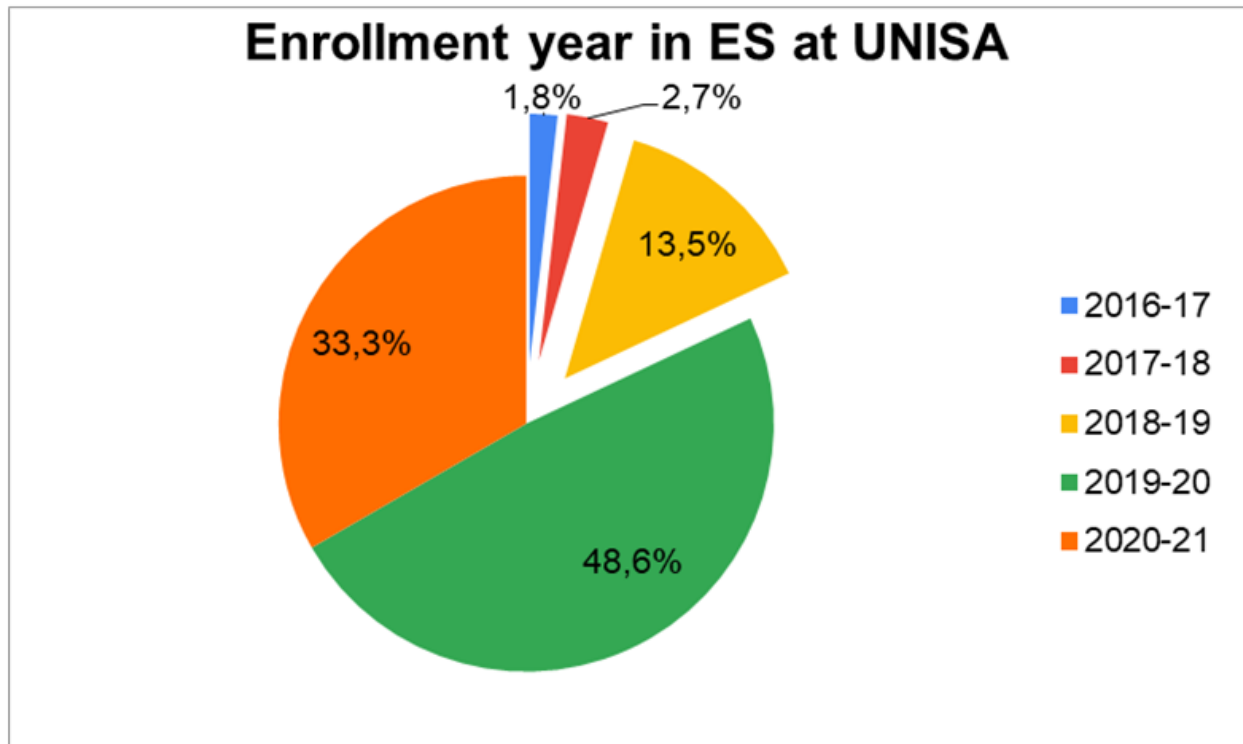


EXAM SESSION: 22/03/2021

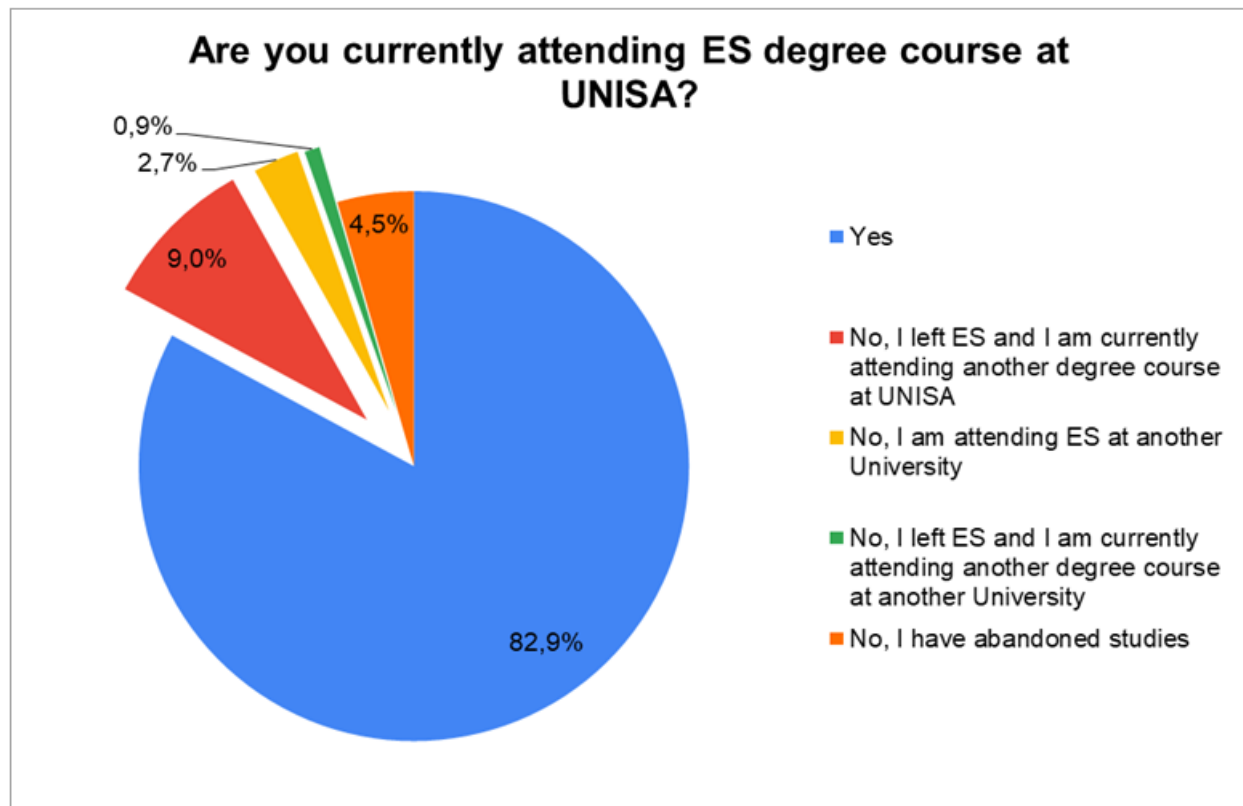
| TOPIC CATEGORY                | AVG % Correct answers |
|-------------------------------|-----------------------|
| problems                      | 12,5                  |
| combinatorics                 | 33,3                  |
| fractions / percentages       | 39,1                  |
| equations / disequations      | 56,3                  |
| basic logics                  | 54,2                  |
| functions                     | 87,5                  |
| monomials / polinomials       | 37,5                  |
| logarithms                    | 62,5                  |
| set theory / numerical series | 25,0                  |



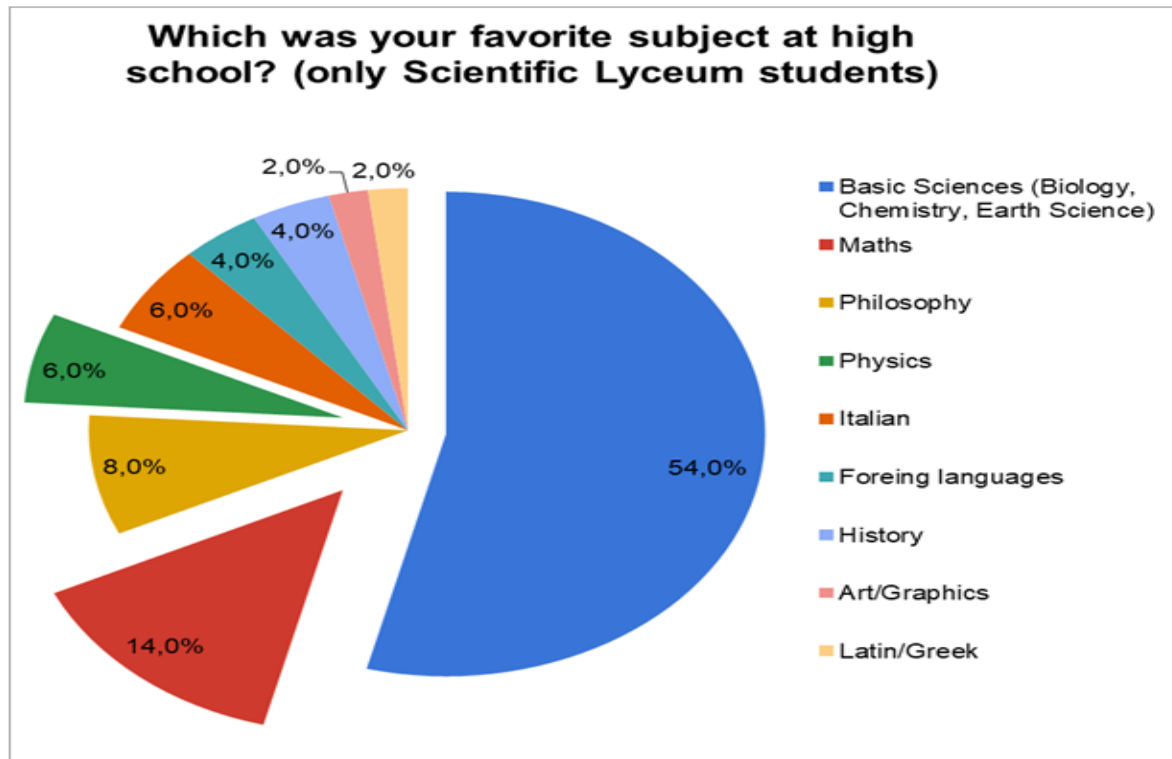
**Figure 1:** Analysis of OFA exam results: Average % correct answers per topic category in each OFA exam session.



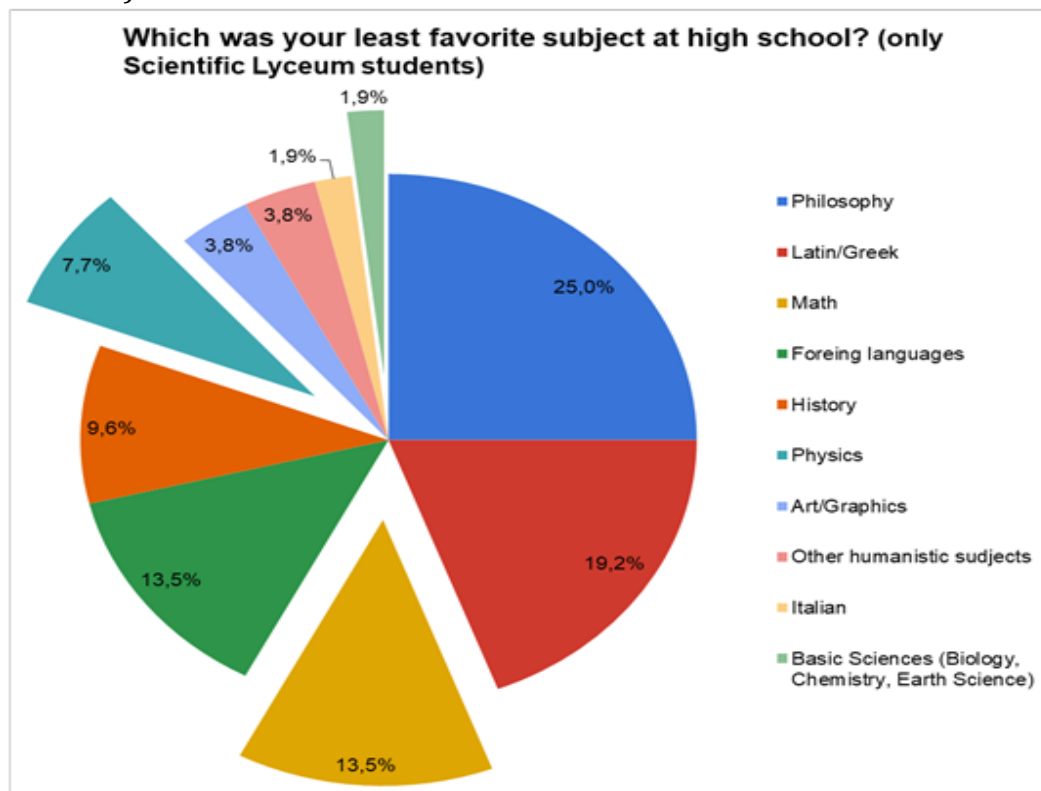
**Figure 2:** Survey questionnaire: Enrolment year in Environmental Science degree course at UNISA.



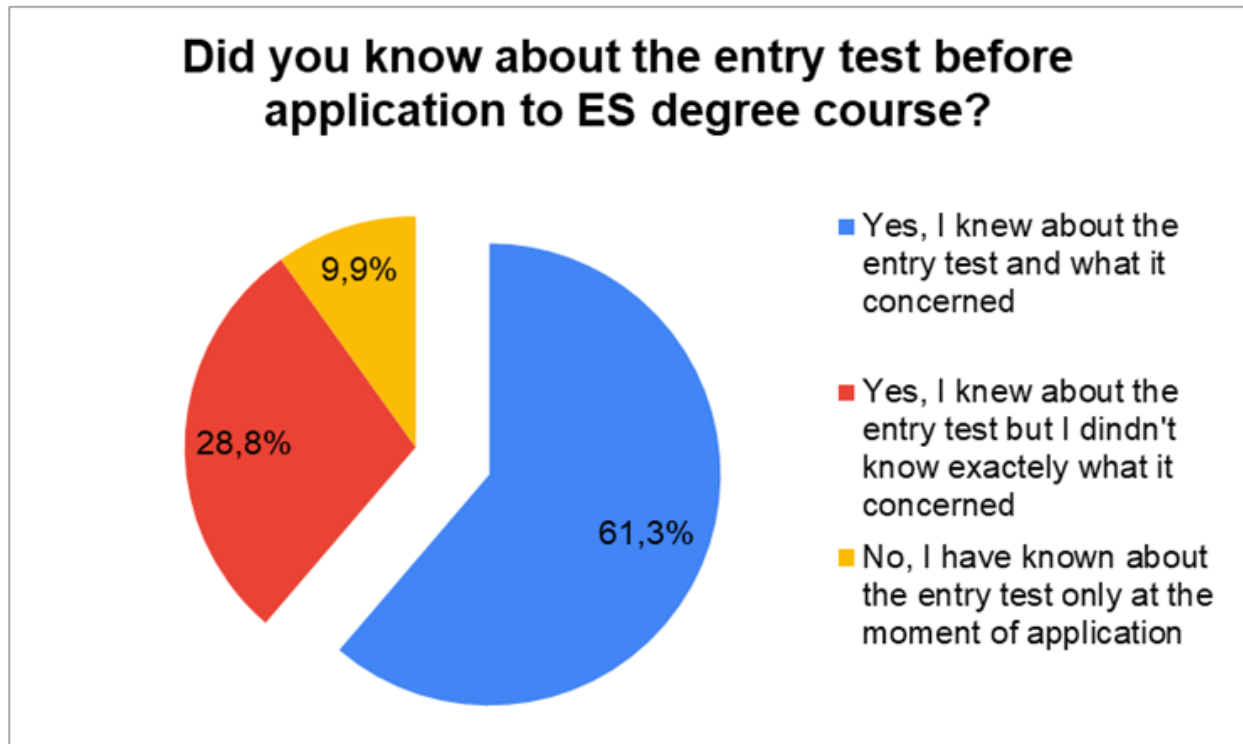
**Figure 3:** Survey questionnaire: Current student's enrolment situation at UNISA.



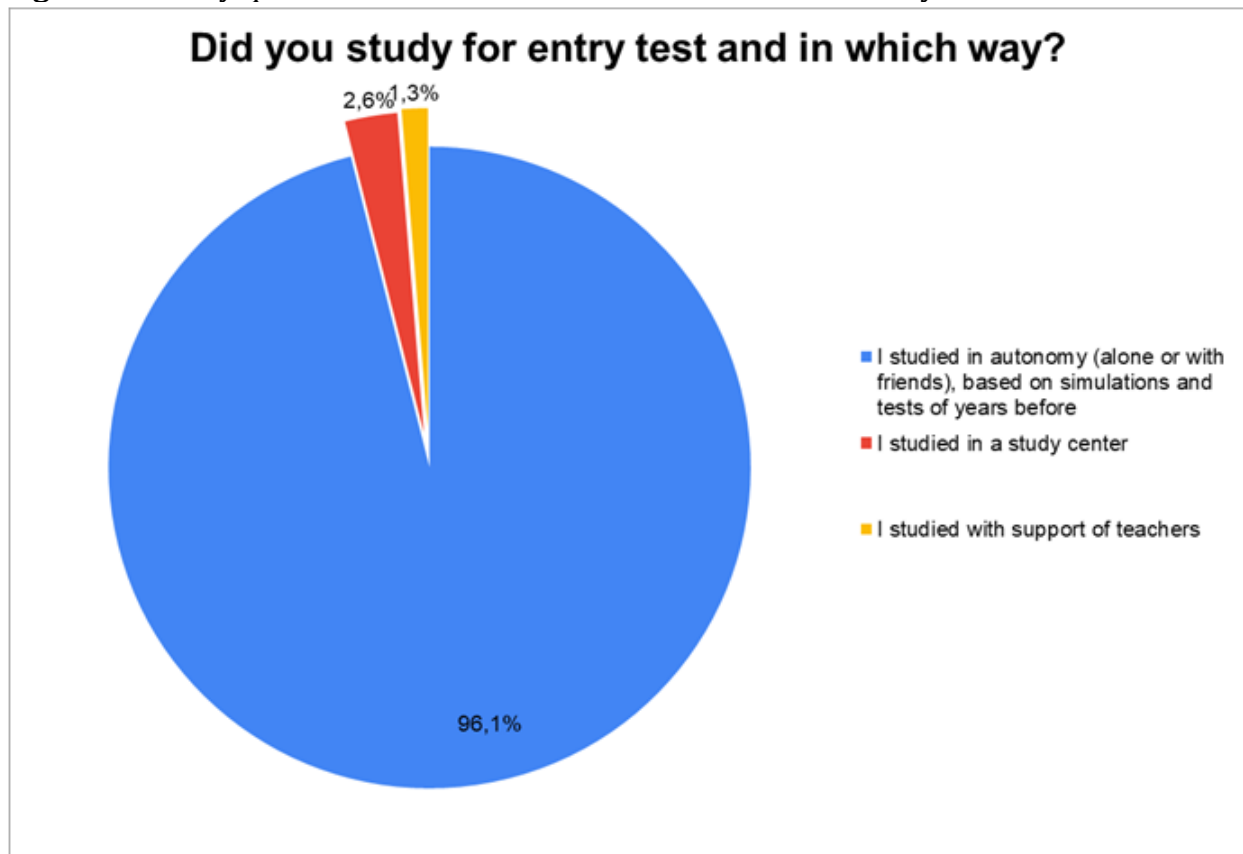
**Figure 4:** Survey questionnaire: Favorite subject at high school (only Scientific Lyceum students).



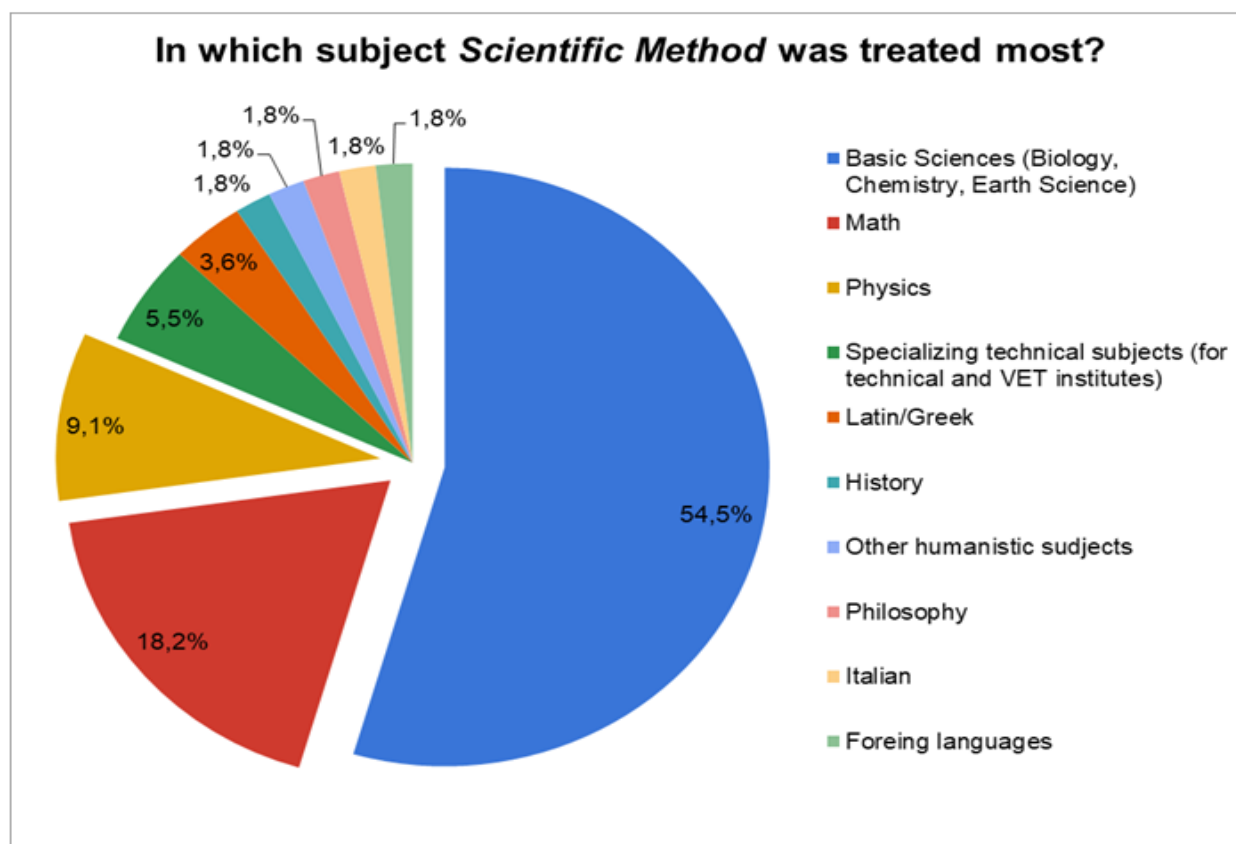
**Figure 5:** Survey questionnaire: Least favorite subject at high school (only Scientific Lyceum students).



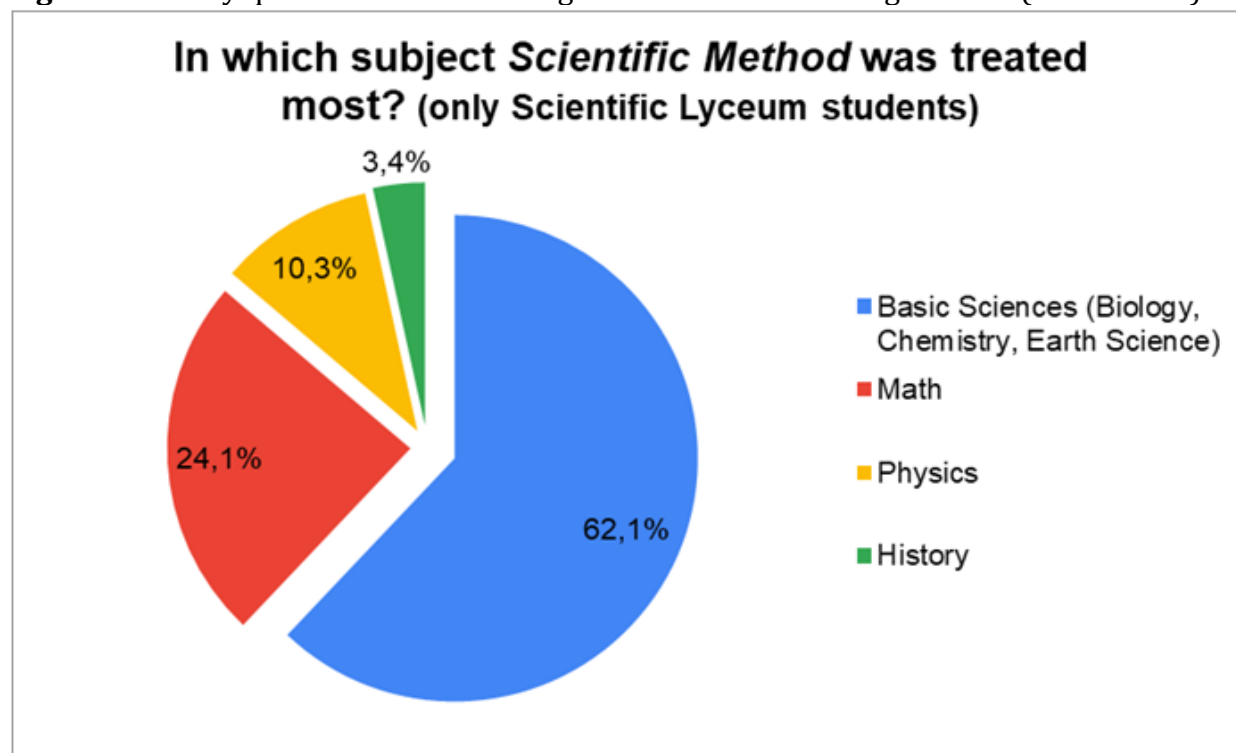
**Figure 6:** Survey questionnaire: Previous awareness about the entry test.



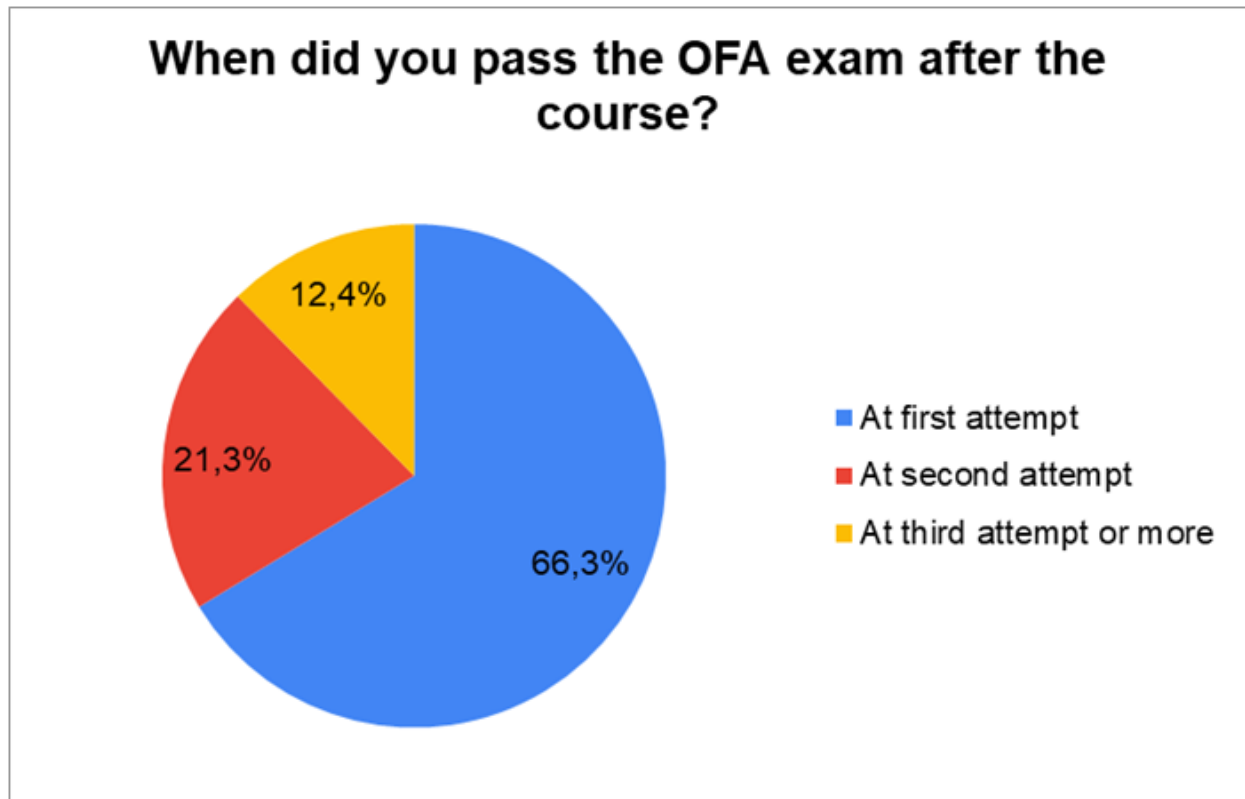
**Figure 7:** Survey questionnaire: Study for the entry test.



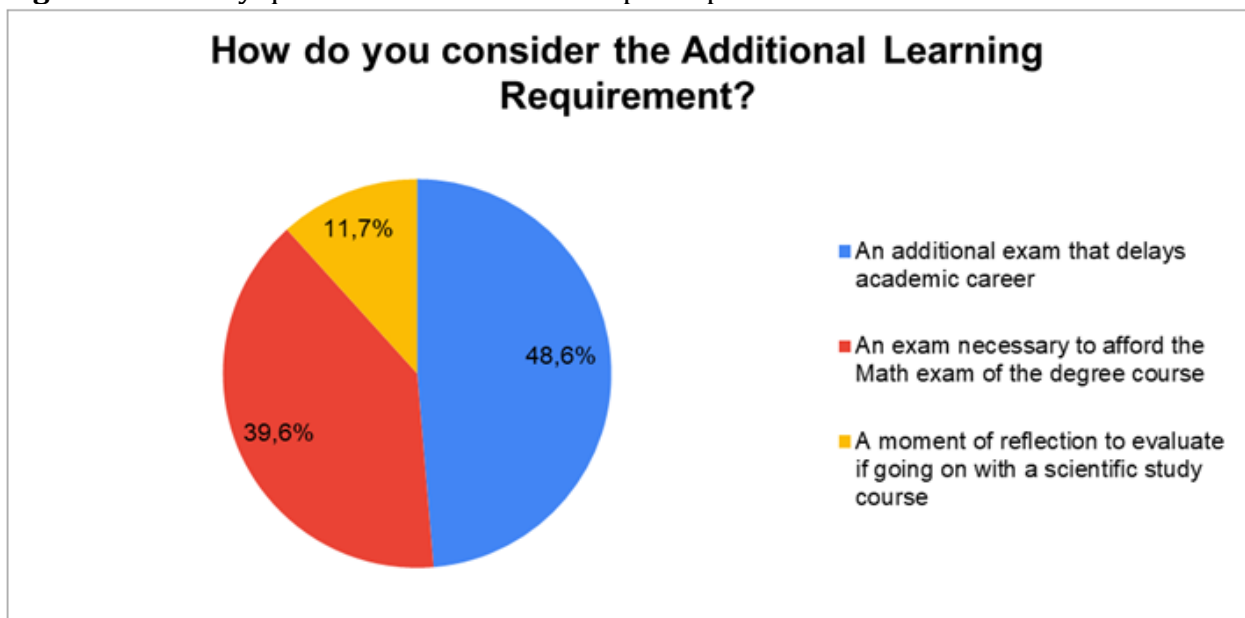
**Figure 8:** Survey questionnaire: Learning Scientific Method at high school (all students).



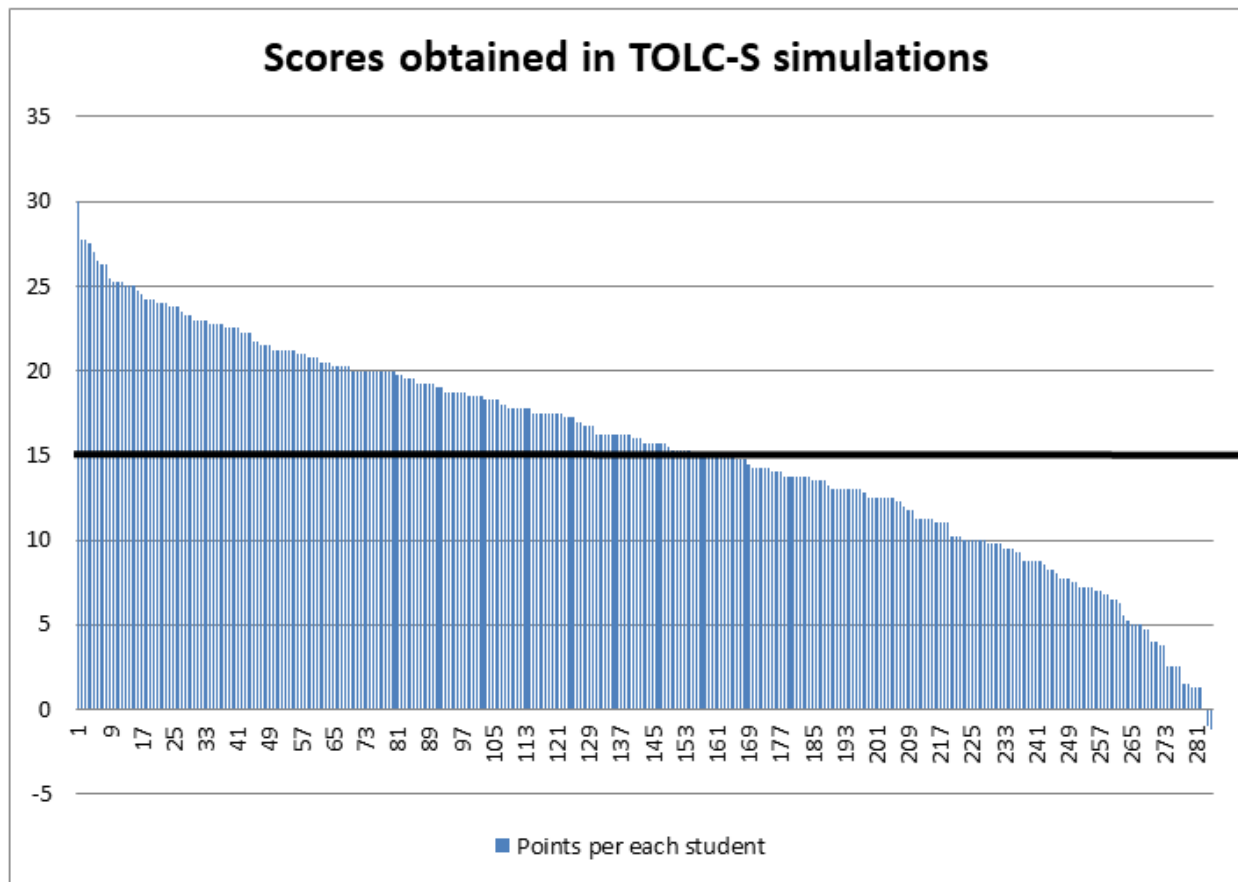
**Figure 9:** Survey questionnaire: Learning Scientific Method at high school (only Scientific Lyceum students).



**Figure 10:** Survey questionnaire: Nr of attempts to pass the OFA exam.



**Figure 11:** Survey questionnaire: Students consideration of the OFA exam.



**Figure 12:** Analysis of entry test simulations: scores obtained by the single students (the score corresponding to the ES entry requirement is marked by the thick line).