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Distance Education Course "Water as an Interdisciplinary Element of Teaching in Schools": Action in Basic Education Through a Partnership between the PROFCIAMB Network and ANA, Brazil

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Abstract. The Graduate Program in the National Network for Teaching Environmental Sciences (PROFCIAMB) in partnership with the National Water and Basic Sanitation Agency (ANA) and the Coordination for the Improvement of Higher Education Personnel (CAPES) updated the educational material of the "Water in Course – Multipliers" associated with the collection of didactic products desenvolved with the theme of Water by ANA to compose the education distance course "Water as an Interdisciplinary Element of Teaching in Schools", which is aimed at teachers of Basic Education and professionals who work with teaching in non-formal spaces and/or non-school. Its objectives were built considering the Sustainable Development Goals ODS4 Quality Education and ODS6 Potable Water and Sanitation. The course was supported by Tutors (Students from the PROFCIAMB Network) and had a workload of 80 hours, distributed over four months in 5 modules. Module 1 to 4 for the Water and Teaching Principles and Methodology disciplines: Water: sustainable consumption and its multiple uses; Situation of water resources in Brazil; All together by the water; and, Cases of success in water care. Module 5 for the Application of learning discipline (lesson plan elaboration and lesson plan report). Four classes were offered from 2018 to 2022 with 4,645 vacancies and

14,850 registered candidates, nationwide course; 4,518 students enrollments and 1,656 students approved.

Keyword: Distance Education, Teachers, Tutoring, Water Resources, Sustainability

1. Introduction

The National Water and Basic Sanitation Agency (ANA) is a Brazilian federal entity that implements the National Policy for Water Resources, a member of the National System for Water Resources Management (SINGREH) and it's responsible for the institution of reference standards for the regulation of basic sanitation public services [2]. Its goal is disseminating environmental awareness about the use of Water, the ANA has developed many didactic materials with an interdisciplinary character about the Water theme to use in Basic Education schools. To make this teaching material effectively reach the schools in Brazil, the ANA created the distance education course "Water in Course - Multipliers" aimed at teachers of Basic Education and High School.

In view of this successful experience, the coordination of the PROFCIAMB (National Network Professional Master's Degree Program for Environmental Science Teaching) proposed a partnership with the ANA to design the EaD course "Water as an interdisciplinary element for teaching in schools", also it is aimed at Basic Education teachers, of short duration, in the same distance learning way in order to have a wider coverage at a national level. The partnership consisted in the use of educational materials developed by the ANA, as well as in the contribution of resources to support the structuring of the course: scholarships for tutors, administrative and technological support, training of tutors, mobility of the tutors to participate in the events of the PROFCIAMB Network, and work missions to the tutoring coordinators [1, 4].

The PROFCIAMB Network is the general coordination of the University of São Paulo and consists of nine associated universities: University of São Paulo (USP), Federal University of Paraná (UFPR), State University of Maringá (UEM), University of Brasília (UnB), University State University of Feira de Santana (UEFS), Federal University of Pernambuco (UFPE), Federal University of Sergipe (UFS), Federal University of Pará (UFPA) and Federal University of Amazonas (UFAM) [4]. Each associate has a tutor coordinator and four tutors (Master's students). All the technological support in the virtual learning environment, on the Moodle platform, was provided by the Information Technology coordinator of the PROFCIAMB Network.

The course has a duration of four months, with a workload of 80 hours, consisting of two parts: Reasoning and Methodology in Water and Teaching (modules 1 to 4) and Application of Learning (module 5). The themes covered in the modules were: Module 1: Water: Sustainable consumption and multiple uses; Module 2: The status of water resources in Brazil; Module 3: All together for water; Module 4: Success cases on water care;

and, Module 5: Learning Application (elaboration of lesson plan and lesson plan report). lesson plan). This course differs from the ANA's "Water in Course" by the inclusion of the 5th Module, in which the students prepare a Lesson Plan, with the theme Water in Course, to improve in the schools and after that they need to present the results for the course.

The PROFCIAMB Network offered the 1st edition of this Course in 2018 and in the two subsequent years evaluated the Course from the teaching resources used, the academic background of the tutors, the performance of the tutors, the duration of the Course, the profile of the participating students, the evaluation of the participants at the end of the

Course, among other aspects. The tutoring coordinators, the tutors, played an important role in this process of reviewing the Course. In 2021, the 2nd and 3rd editions were resumed, and, in 2022, the 4th edition of this Course [5, 6, 7, 8]. The results and discussions of this experience conducted throughout Brazil will be presented below.

2. Points of Results and Discussions

The territory of Brazil is divided into 26 states and the Federal District (where the federal capital of Brazil, the city of Brasilia, is located), totaling 27 federative units [3]. The Brazilian states are grouped into five regions (FIGURE 1): a) Northern Region with seven states: Rondônia, Acre, Amazonas, Roraima, Pará, Amapá and Tocantins; b) Northeastern Region with nine states: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia; c) Center-Western Region with three states and the Federal District: (c) Mato Grosso, Mato Grosso do Sul and Goiás; d) Southeast Region with four states: Minas Gerais, São Paulo, Espírito Santo and Rio de Janeiro; e) South Region with three states: Paraná, Santa Catarina and Rio Grande do Sul.

Figure 1. Brazilian Regions [3].

2.1. Course coverage in all Brazilian regions

Graph 1 shows the territorial coverage of the Course in all Brazilian regions and the students enrolled per region. The editions in the graphs (1, 2, 3 and 4) were differentiated by color to facilitate understanding of the data: brown (1st edition), green (2nd edition), yellow (3rd edition), and orange (4th edition). In the 1st edition, the Southeast region, with 64% of the students enrolled, there was the highest representation among the other regions. In the 2nd edition, the Southeast region is still the region with the highest number of students enrolled, with 69%, and the other regions there were not much representation, but we can see an increase in the demand for the Course in the Northeast region, with 13% of students enrolled. In the 3rd edition, the Southeast region maintains the strong demand for the Course, standing out from the others with 52% of students enrolled. In the 4th edition, a certain homogeneity in the demand for the Course is observed, with a more equal distribution of enrolled students per region. The South region stands out with 35% of students enrolled, it means, 26% more than in the previous edition [5, 6, 7, 8]. The Center-West, Northeast, and North regions maintained a low demand, but balanced in relation to the previous editions. It was noted that one of the causes of the low demand for the Course

in the North, Northeast and Midwest regions is the lack of internet access in outlying rural areas from urban centers.

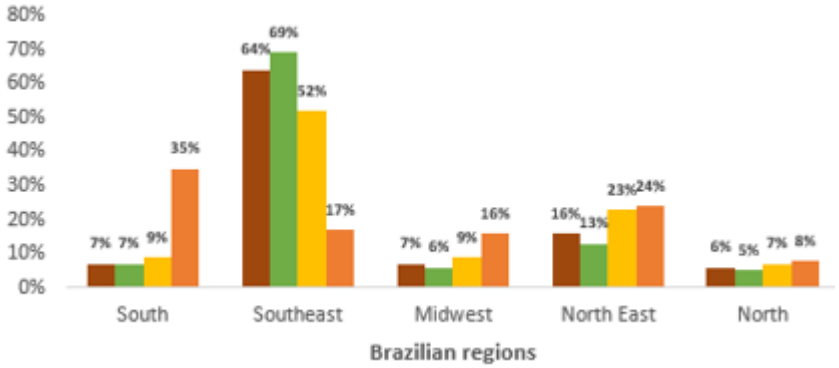

Figure 2. Percentage of students by Brazilian regions

2.2. Students' Academic Background

Table 1 shows the academic background of the students enrolled and shows the diversity of the students' backgrounds in the four editions [5, 6, 7, 8]. The following backgrounds stand out: Biological Sciences/Biology, Social Sciences, Physical education, Environmental engineering, Geography, Environmental management, History, Letters, Bachelor of Science/Science, Degree in Physics, Mathematics, Pedagogy, Chemical, others. In the four editions, students majoring in Biological Sciences/Biology were most sought the Course, standing out in the 1st edition with the representation of 36% of enrolled students [5]. In the 2nd edition, students majoring in Pedagogy stood out with 17% representation, followed by 13% of students majoring in Geography [6]. In the 3rd edition and 4th edition, it is observed that students graduated in Pedagogy have a great representativeness in the Course with 24.2% and 25.1% respectively [7, 8]. It is highlighted that students with a degree in Geography also stand out for their constant representation in the four editions, as well as students classified as others, for being from academic backgrounds with little representation.

Table 1. Students'Academic background

Students' graduation	1st edition 2018	2nd edition 2021	3rd edition 2021	4th edition 2022
Biological Sciences/Biology	36,0%	28,0%	19,1%	19,7%
Social Sciences	0,0%	0,0%	0,0%	1,5%
Physical education	2,0%	0,0%	0,0%	1,6%
environmental engineering	0,0%	0,0%	2,0%	0,0%
Geography	12,0%	13,0%	11,9%	10,7%
Environmental management	0,0%	0,0%	2,1%	0,0%
History	5,0%	2,0%	3,5%	3,6%
Letters	8,0%	3,0%	3,8%	4,0%

Students' graduation	1st edition 2018	2nd edition 2021	3rd edition 2021	4th edition 2022
Bachelor of Science/Science	0,0%	6,0%	3,6%	3,8%
Degree in Physics	0,0%	2,0%	0,0%	1,3%
Mathematics	9,0%	3,0%	2,6%	3,4%
Pedagogy	10,0%	17,0%	24,2%	25,1%
Chemical	6,0%	6,0%	5,1%	6,7%
Others	12,0%	21,0%	20,1%	16,4%

Graph 2 shows three academic backgrounds that most stand out in the four editions: students with degrees in Pedagogy, Biological Science/Biology and Geography [5, 6, 7, 8]. However, it is noted that the Course attracts professionals from the most diverse academic backgrounds, noting that the theme "Water" is interdisciplinary and the related content essential for teaching in schools.

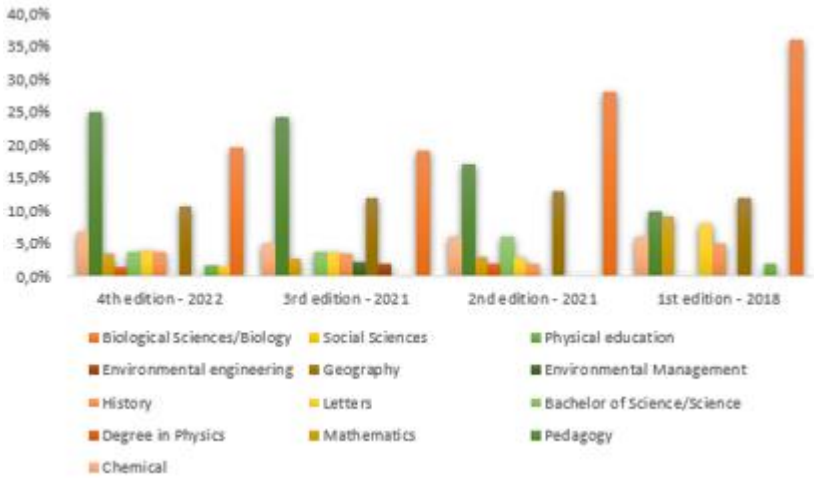

Figure 3. Students graduation course

2.3. Comparative data between the four editions of the course

Chart 3 provides an overview of the vacancies offered, enrollments, students enrolled, and approved students in the four editions of the Course. In the 1st edition, in 2018, 960 vacancies were offered for 8776 registered throughout the national territory, of the 960 students enrolled, just 326 students were approved, representing 34% of graduates in the Course [5]. In view of the great demand in the 1st edition, the number of vacancies was increased for the 2nd edition with 1225 vacancies, but the demand for the Course was lower with only 1760 registered, and just 1223 students enrolled. In this 2nd edition there were 48% of graduates, with a total of 590 approved students [6]. In the 3rd edition there was a small increase of demand for the Course, with 1996 registered for 1080 vacancies, with the same number of students enrolled. In this 3rd edition only 365 students were approved and finished the Course, corresponding to 34% of the enrolled students [7]. In the 4th edition, there were 2318 registered for 1380 vacancies, with 1255 students enrolled and 375 students approved, representing 30% of the enrolled students [8].

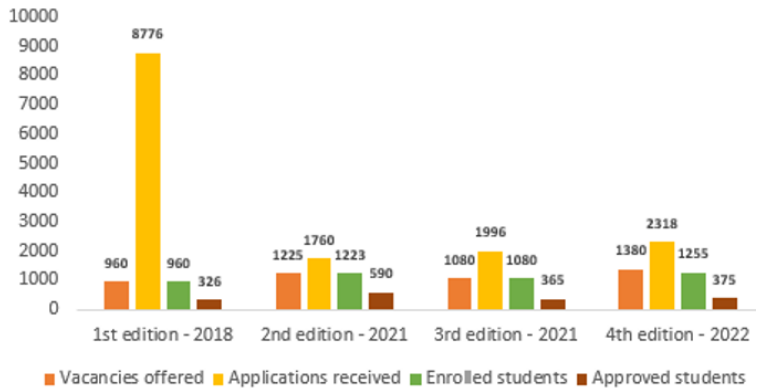

Figure 4. General data of the EaD Course

3. Conclusion

The results presented in the four editions of the Distance Education Course "Water as an interdisciplinary element of teaching in schools", with 4518 students participating and 1656 concluding students, resulted in 36.6% of the total number of enrolled students. The dropout of 2862 enrolled students, representing 63.4%, and it points to the need to evaluate this Distance Education Course, reviewing the teaching-learning methods and didactic materials that was used. However, it is important to note that one of the causes of the dropouts in the 2nd, 3rd, and 4th editions was the offering of the course at the peak of the Covid-19 pandemic and in the post-pandemic period, whose mental health of students (mostly teachers) was aggravated by the overload of school activities added to domestic chores.

On the other hand, it is clear that the topic of water is present in the daily lives of students (teachers), who teach this topic in an interdisciplinary manner in several subjects in Basic Education. The didactic resources made available during the Course provided knowledge and creativity for the students (teachers) to develop new pedagogical practices in the schools. The territorial coverage of the Course in all regions of Brazil shows the importance of the PROFCIAMB Network's work in partnership with ANA, whose credibility of the both institutions has enabled the successful implementation of this Distance Learning Course, and the promotion of environmental awareness for the preservation of the country's water resources.

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