

Mediators and Multipliers in the #Adopt Project: The Impact of Mediation in Microbiology Education

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ABSTRACT

Background: The #Adopt project combines traditional teaching with an active project-based teaching and learning methodology using social media ‘Adopt a Bacterium’ to train mediators and multipliers of knowledge in Microbiology.

Objectives: This study sought to analyze the impact of mediation on the diversity and richness of discourse among higher education students regarding the pathogenicity of *Pseudomonas aeruginosa*. **Design:** This is a mixed study focused on discourse analysis.

Setting and Participants: Through posts and interactions on Instagram, students enrolled in the Bacteriology course offered by the Institute of Biomedical Sciences at the University of São Paulo learn how to study bacteria, communicate science, collaborate with each other, and be self-employed with the support of undergraduate students who have already participated in the project and postgraduate students, known as mediators. **Data collection and analysis:** Posts from groups about *Pseudomonas*, published in 2022, 2023, 2024, and 2025 in the ‘Adopt a Bacterium’ were evaluated using word clouds, a qualitative analysis tool; and the Shannon Diversity Index adapted for teaching by the group, a quantitative analysis tool. **Results:** Variations in diversity and a linear upward trend of 0.85 in the richness of students' discourse were observed between 2022 and 2025, highlighting the impact of mediation in this process.

Conclusions: The participation of mediators enriches the educational process while creating a valuable space for pedagogical training and reinforcing the effectiveness of Instagram as a Virtual Learning Environment (VLE) for collective construction and training of knowledge multipliers in Microbiology.

Keywords: mediators; multipliers; Instagram; teaching-learning; *Pseudomonas*.

Mediadores e Multiplicadores no Projeto #Adote: O Impacto da Mediação no Ensino de Microbiologia

RESUMO

Contexto: O projeto #Adote combina o ensino tradicional com a metodologia ativa de ensino-aprendizagem baseada em projetos com mídias sociais ‘Adote uma Bactéria’ para formar mediadores e multiplicadores do conhecimento em Microbiologia. **Objetivos:** Esse trabalho buscou analisar o impacto da mediação na diversidade e riqueza do discurso de estudantes do ensino superior sobre a patogenicidade de *Pseudomonas aeruginosa*. **Design:** Trata-se de um estudo misto centrado na análise do discurso. **Ambiente e participantes:** Por meio de postagens e interações no Instagram, estudantes dos cursos de Ciências Biomédicas e Ciências Fundamentais para Saúde matriculados na disciplina Bacteriologia oferecida pelo Instituto de Ciências Biomédicas da Universidade de São Paulo aprendem a aprender a estudar bactérias, a comunicar ciência, a colaborar uns com os outros e a ser autônomos com apoio de alunos de graduação que já passaram pelo projeto e alunos de pós-graduação, os chamados mediadores. **Coleta e análise de dados:** Foram avaliadas as postagens dos grupos *Pseudomonas* spp. publicadas nos anos de 2022, 2023, 2024 e 2025 do ‘Adote uma Bactéria’ utilizando as ferramentas de análise qualitativa, nuvem de palavras; e quantitativa, Índice de Diversidade de Shannon adaptado ao ensino pelo grupo. **Resultados:** Observaram-se variações na diversidade e uma tendência linear crescente de 0,85 na riqueza do discurso dos estudantes entre 2022 e 2025, evidenciando o impacto da mediação nesse processo. **Conclusões:** A participação dos mediadores enriquece o processo educativo ao mesmo tempo em que cria um espaço valioso para capacitação pedagógica e reforça a eficácia do Instagram como Ambiente Virtual de Aprendizagem (AVA) para construção coletiva e formação de multiplicadores do conhecimento em Microbiologia.

Palavras-chave: mediadores; multiplicadores; Instagram; ensino-aprendizagem; *Pseudomonas*.

INTRODUCTION

The study of bacteria, virus, fungi, and protozoa has a great impact on various sectors of life in society, such as those related to human health, agriculture, food industry, and environmental preservation, and is therefore fundamental to understanding the past, present, and future. Considered an abstract science, whose objects of study are not visible to the naked eye, Microbiology education presents challenges that become even more difficult to overcome when associated with the traditional teaching model. Although widely questioned regarding its effectiveness, this model prevails in a large part of higher education institutions. In it, the teacher is conceived as the holder of knowledge, understood as transmissible (frequently through lectures); and the student as a blank slate, whose function is to absorb and memorize the content.

In contrast, the contemporary world demands active educational approaches, that is, centered on student protagonism; and contextualized approaches, where knowledge is articulated with the students' daily lives (UNESCO, 1996).

In the face of the new educational paradigm, active teaching-learning methodologies are gaining increasing prominence. In this sense, since 2013, the Bacteriology course (BMM0584/BMM0602), offered by the Institute of Biomedical Sciences of the University of São Paulo (ICB/USP) to first-year undergraduate students in Biomedical Sciences and Fundamental Sciences for Health, combines traditional teaching with innovative teaching-learning strategies to redefine Microbiology education in higher education (Baroni et al., 2024; Piantola et al., 2018). In 'Adopt a Bacterium', an active teaching-learning methodology based on projects using social media from the #Adopt project, students learn how to study bacteria, communicate science, collaborate with each other, and become increasingly autonomous using Instagram as a Virtual Learning Environment (VLE).

On this social network, they publish posts about the adopted bacterial genus or species, using the content of the lectures as a basis to anchor new information — collected, selected, organized, managed, and used according to their interests and creativity. Undergraduate students who have already participated in the project and postgraduate students, the so-called mediators, interact with these students through comments on the posts, identifying conceptual difficulties, verifying the accuracy of the information shared, and guiding them to an increasingly complex level of learning by promoting discussions and proposing complementary research aimed at building knowledge in Bacteriology.

At the same time, this dynamic fosters the development of pedagogical skills in students at different educational levels. Those who have already participated in the project, as well as postgraduate students, become multipliers, contributing to the dissemination of scientific knowledge and its outreach to the community. To date, eight publications support the effectiveness of the methodology by describing the metric parameters for evaluating its impact on student learning and the professional development of mediators in teaching (Tarantini et al., 2026; Picinin et al., 2025; Gozzi et al., 2025; Baroni et al., 2024; Dos Santos et al., 2024; Armellini et al., 2021; Taschner et al., 2020; Piantola et al., 2018).

This study aimed to analyze the impact of mediation on the diversity and richness of students' discourse on the pathogenicity of *Pseudomonas aeruginosa* (*P. aeruginosa*) over the past four years of the 'Adopt a Bacterium'.

The choice of this microorganism is justified by its relevance in the context of public health. According to the World Health Organization (WHO), antimicrobial resistance to antibiotics is a growing phenomenon that is emerging as one of the most complex public health challenges of the 21st century. It is estimated that it could be responsible for approximately 39 million deaths in the next 25 years (Naghavi et al., 2024). It occurs when previously treatable infectious diseases become difficult or impossible to treat with available medications, making it imperative, among other measures, to stimulate scientific research aimed at the discovery and development of new antibiotics and new therapeutic approaches.

With this objective, the WHO developed a list of priority bacterial pathogens (World Health Organization, 2024). In this list, *P. aeruginosa*, a Gram-negative bacterium from the ESKAPE group, composed of the six main bacteria commonly associated with nosocomial infections and highly efficient in resisting multiple classes of antibiotics, mainly due to the ability to combine intrinsic, acquired, and adaptive resistance mechanisms, was classified as a critical priority (Miller & Arias, 2024). Given the above, it is fundamental that students understand, from the early years of their course, the central aspects of the pathogenicity of *P. aeruginosa*. This knowledge is essential to promote a critical view of the challenges of bacterial resistance and encourage the development of scientific research aimed at discovering therapeutic alternatives to the use of antibiotics, thus contributing to addressing a global public health problem.

THEORETICAL BACKGROUND

The speed at which new information emerges while other information is reformulated or becomes obsolete, the increased access to information provided by the internet, and, more recently, the transformations in how we interact with information, driven by generative artificial intelligence, do not inaugurate but rather impose the recognition of decades of research in education that discuss the need to change the way teaching and learning processes are understood and implemented in the pedagogical practices that mediate education in higher education.

It is in this scenario that Connectivism emerges, proposed by Siemens (2005) as a theory that seeks to understand teaching and learning processes in the digital age. Among its principles, the following stand out: (i) the valuing of skills in searching, evaluating, filtering, and integrating information, that is, digital literacy; (ii) the ability to know more, that is, to learn continuously, should be more important than what is known at the moment; (iii) furthermore,

learning and knowledge are, in this context, understood as processes based on the diversity of opinions. By being exposed to a plurality of perspectives, learners develop critical thinking and, through the connection between nodes (information units within a network, such as other learners, teachers, articles, digital platforms, etc.), build a deeper understanding of a given content.

In this sense, Digital Information and Communication Technologies (DICTs), such as social media, can be pedagogically explored to enrich formative processes. In the #Adote project, a social media platform is integrated into the educational process in Microbiology, expanding the possibilities of interaction between mediators and students (and between students and their peers) through a bidirectional, asynchronous, and extracurricular communication model. For Ferraz and Santos (2024), social media favor interaction between individuals and promote the co-creation and circulation of information and knowledge in different spaces and times. Given its popularity in Brazil among younger people and its educational and formative potential, from 2021 onwards, Instagram began to be explored as VLE by the group as an alternative to Facebook (Armellini et al., 2025).

Ausubel (2000) highlights that learning is meaningful when new knowledge interacts with and transforms pre-existing knowledge, recognizing that students are not devoid of knowledge, but rather possess prior conceptions fundamental to the teaching-learning process. Thus, it is up to the teacher to create conditions that favor the anchoring of this knowledge, assuming the role of mediator in the educational process. This understanding directly dialogues with the contributions of Vygotsky, who emphasizes mediation as a central element for learning. Based on Vygotsky's Theory of Mediation, Fadeev (2019) states that digital learning environments accentuate the role of mediation, both symbolic and human, in the teaching-learning process. On Instagram, symbolic mediation would correspond to that which occurs through signs such as reels, feed posts or stories, and captions. This multimodality confers an important pedagogical dimension to the platform. According to Siegel (1995):

Transmedia, the act of translating meanings from one sign system to another, increases students' opportunities to engage in generative and reflective thinking because students must invent a connection between the two sign systems, since the connection does not exist a priori (p. 455).

In turn, human mediation situates learning within the dimension of communication. According to Vygotsky (1978), learning occurs in the space formed between the zone of actual development, where the learner has the

capacity to construct knowledge autonomously, and the zone of potential development, where the knowledge to be constructed depends on guidance or collaboration with someone wiser. He called this space the Zone of Proximal Development (ZPD), and it is within this space that human mediation materializes in the form of communication. The mediator is able to understand the knowledge that the learner already possesses and guide them in the learning process towards the construction of new knowledge, offering cognitive, psychomotor, and affective support with a view to autonomy.

In the ‘Adopt a Bacterium’, this role is played by undergraduate students who have already participated in the project and postgraduate students, who analyze the posts created by undergraduate students and act through comments, guiding them to an increasingly complex level of learning. In parallel, this experience represents an important opportunity for the professional development of the mediators, contributing to the pedagogical training of a new generation of researchers and teachers familiar with active teaching-learning methodologies (Fahnert, 2026). Therefore, understanding the impact of mediation in Microbiology education reveals new perspectives on the teaching-learning process in virtual environments.

METHODOLOGY

Active teaching-learning methodology of the #Adopt project: ‘Adopt a Bacterium’

The curriculum content of the Bacteriology discipline can be understood in three major thematic categories of knowledge: 1. Morphology, which includes the contents of morphology, diversity and bacterial ecology; 2. Physiology, which includes nutrition, growth and metabolism; and 3. Pathogenicity, which includes genetics, antimicrobial resistance, growth control (chemical and physical agents) and pathogenicity. According to Piantola et al. (2018), in ‘Adopt a Bacterium’ students are organized into five groups of up to ten members. Table 1 shows the distribution of the ‘Adopt a Bacterium’ groups on Instagram over the last five years.

Table 1
Distribution of the ‘Adopt a Bacterium’ groups on Instagram by year.

2021	2022	2023	2024	2025
			<i>Bacillus</i> spp.	<i>Bacillus</i> spp.

<i>Escherichia coli</i>	<i>Escherichia coli</i>	<i>Escherichia coli</i>		
	<i>Mycobacterium tuberculosis</i>	<i>Mycobacterium tuberculosis</i>	<i>Mycobacterium tuberculosis</i>	<i>Mycobacterium tuberculosis</i>
			<i>Neisseria spp.</i>	
	<i>Pseudomonas spp.</i>	<i>Pseudomonas spp.</i>	<i>Pseudomonas spp.</i>	<i>Pseudomonas spp.</i>
	<i>Staphylococcus spp.</i>			<i>Staphylococcus spp.</i>
<i>Streptococcus spp.</i>	<i>Streptococcus spp.</i>	<i>Streptococcus spp.</i>	<i>Streptococcus spp.</i>	<i>Streptococcus spp.</i>
<i>Treponema pallidum</i>		<i>Treponema pallidum</i>		
<i>Vibrio cholerae</i>				
<i>Yersinia pestis</i>				

At the end of each thematic category, each group must create and publish at least one post on Instagram, freely and creatively, relating the content previously studied in class to information about the chosen bacterial genus and/or species. All posts are published on a private profile, created specifically to function as a VLE and ensure the privacy of members and control of the material. Under supervision, each group has the support of at least two mediators (undergraduate students who have already participated in the project and postgraduate students), who act through comments on the posts, identifying conceptual difficulties and providing feedback, verifying the accuracy of the published information, raising discussions, and proposing new research in order to enrich the learning process and enhance students' understanding of the content. Evaluations are carried out continuously with each post. And, at the

end of the project, the groups are also evaluated by presenting a seminar in order to share the knowledge produced with the class, teachers, and mediators.

Ethics

The #Adopt project and this study were evaluated by the Human Research Ethics Committee (HREC) of ICB/USP and considered exempt from the need to request authorization to be carried out (no. 990/2018 and 1348/2024, respectively). However, all participants (mediators and students) signed an Informed Consent Form (ICF), authorizing the sharing of the presented data. Through this declaration, we exempt Acta Scientiae from any resulting consequences, including full assistance and potential compensation for any damage suffered by the research participants, in accordance with Resolution no. 510, of April 7, 2016, of the National Health Council of Brazil.

Data analysis

The diversity of discourse regarding the *Pseudomonas* spp. group in posts about bacterial pathogenicity in 2022, 2023, 2024, and 2025 was analyzed both qualitatively and quantitatively using word clouds and the Shannon Diversity Index adapted for teaching, respectively.

Word clouds

The text (and/or, in the case of videos, the transcript) of the posts, captions, and comments was initially simplified into keywords and then transformed into word clouds using the Word Cloud Generator website (accessible at jasondavies.com/wordcloud/). In the word clouds, the diversity of discourse considers both the variety of keywords and the size of each one (frequency of citation in the text, i.e., relative abundance).

Shannon's Diversity Index adapted for teaching

The Shannon Diversity Index is a widely used mathematical formula for quantifying species diversity in a community (Figure 1). The calculation considers both the number of species (richness), whether rare or not, and their distribution in the analyzed environment (evenness) (Shannon, 1948).

Figure 1

Shannon's Diversity Index (H') formula.

$$H' = \sum_{i=1}^s (p_i \ln p_i)$$

In the formula, S is the total number of species; i is equivalent to the species; n_i is the absolute frequency of each species in the community; N is the total number of species in the community; $p_i = n_i/N$, that is, the relative frequency of each species in the community. In order to assess the diversity of students' discourse, this formula was adapted to the context of Microbiology education (Armellini et al., 2021). The formula was adapted in such a way that the keywords are equivalent to the species (i), n_i is the absolute frequency of a given keyword in the analyzed text; N is the sum of all keywords; p_i : relative frequency of a given keyword in the text.

Therefore, initially, keywords extracted from the text of posts, captions, and comments were selected to represent and describe the complexity of the discourse on pathogenicity. Synonyms were considered equivalent, as well as the number inflection forms of nouns (singular and plural). Next, the relative frequency of each keyword was calculated and mathematically analyzed using the Shannon Diversity Index, which then determined the richness of the discourse in each year. Finally, a trend analysis using simple linear regression was performed between the obtained values. The data were graphically represented using WPS Spreadsheets software. The higher the Shannon Diversity Index value, the more diverse, rich, and complex the students' discourse on the subject.

RESULTS AND ANALISES

The word clouds highlighted the particularities of the content produced by each group in the four years analyzed.

In 2022, in 88 unique keywords out of a total of 242, students most frequently explored the resistance mechanisms ('effluxpumps', 'blactamases', 'permeability', 'biofilm', etc.) to the main classes of antibiotics used in the treatment of *P. aeruginosa* infections (such as 'blactams', 'cephalosporins', 'fluoroquinolones', 'penicillin' and 'polymyxin'), as well as the mechanisms of action of these drugs ('cellwall', 'structure', 'peptidoglycans', etc.) (Figure 2). They also mentioned the main virulence factors (e.g., 'lipopolysaccharides', 'toxins' and 'adhesion') that make it a highly infectious and sometimes deadly opportunistic pathogen.

The diversity of discourse regarding the Pseudomonas spp. group in the 'Adopt a Bacterium' campaign in 2022.



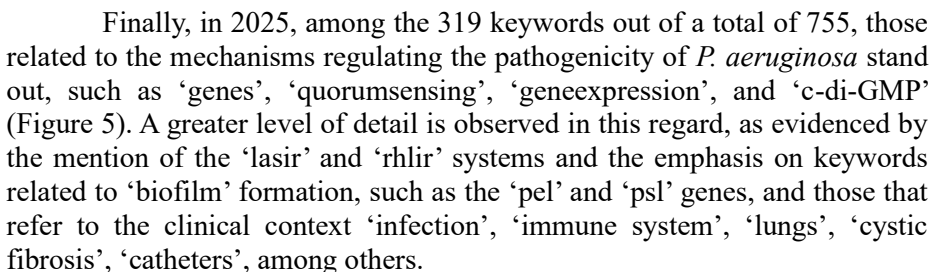
Acta Sci (Canoas), 28(3), 1-23, Jul./Set. 2026 10

Diversity of discourse regarding the Pseudomonas spp. group in the 'Adopt a Bacterium' campaign in 2023.



11

The diversity of discourse regarding the Pseudomonas spp. group in the 'Adopt a Bacterium' campaign in 2024.



The diversity of discourse regarding the Pseudomonas spp. group in the 'Adopt a Bacterium' campaign in 2025.



Table 2

Keywords (i)	n _i per year			
	2022	2023	2024	2025
resistance	14	13	32	16
virulence	2	9	9	14
biofilm	2	3	14	23

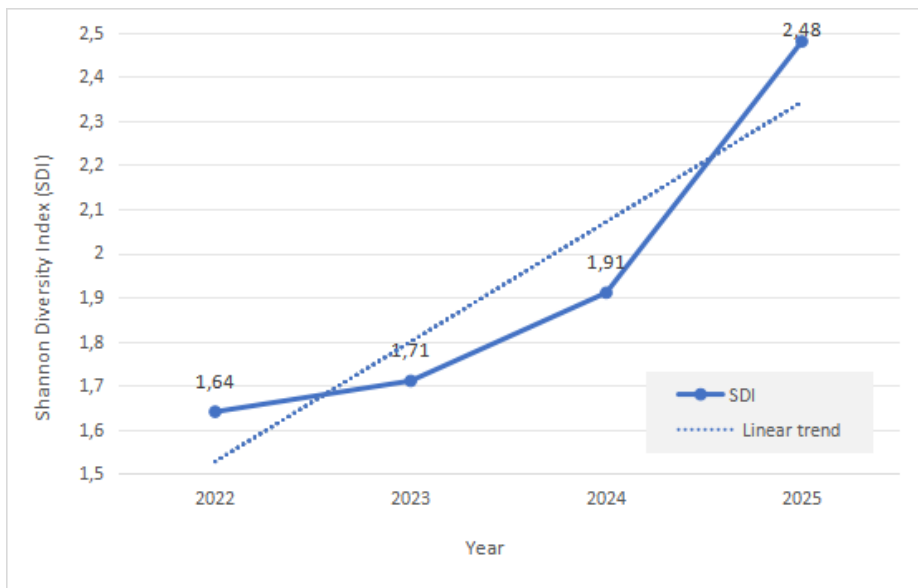
quorumsensing/autoinductor/ahl/rhl/las	0	0	21	70
infection	23	7	11	25
adhesion/fimbriae/pili	11	0	3	18
genetics/genes/genome/genotype/dna/genetic material/generegulation/geneexpression	3	0	30	39
lipopolysaccharides/toxins	9	3	4	10
rhamnolipids	0	2	1	2
t3ss	0	2	1	4
N	44	34	118	189
H'	1.64	1.71	1.91	2.48

Note. Shannon's Diversity Index (H') = $-\sum p_i \ln p_i$, where $p_i = n_i/N$. Keywords (i); n_i is the absolute frequency of a given keyword in the analyzed text; N is the sum of all keywords; p_i : relative frequency of a given keyword in the text.

When analyzed together, the data point to a linear upward trend in the period analyzed (Figure 6).

Figure 6

*A linear increasing trend in the richness of students' discourse on the pathogenicity of *Pseudomonas aeruginosa* between 2022 and 2025.*



DISCUSSION

The use of social media as educational platforms has been widely explored in higher education, particularly Facebook, whose use for this purpose is already well-established in the literature. More recently, following the shift in student mobility, Instagram has gained visibility, especially due to the diversity of multimodal resources it offers (Coelho et al., 2020; Armellini et al., 2025). In this context, metrics such as the number of views and interactions (likes, shares, or comments) have been used as benchmarks to measure the effectiveness of posts — often created by the teachers themselves — in terms of engagement with the content (Moreira et al., 2023). However, approaches to identify and analyze with sufficient robustness the impact of creating posts on student learning, whether in basic or higher education, are still limited (Alonzo et al., 2022; Perez et al., 2023; Oliveira & Costa, 2023; Piantola et al., 2018).

According to Ausubel (2000), a predisposition to learn is a determining condition for meaningful learning. In this sense, the exercise of authorship represents a fundamental component, since the focus shifts from consumption to production, fostering the autonomy and co-responsibility of students for their

own teaching-learning process. Furthermore, in 'Adopt a Bacterium', the very need to transpose content from one sign system to another, such as from classroom notes to posts, creates conditions for students to engage more actively with the content. By valuing the sociocultural experience of students in the production of texts in different languages (visual, verbal, and multimodal), the possibilities of expression and conceptual elaboration are broadened, favoring the construction of meaningful knowledge in Microbiology. In this way, Instagram is configured as a fundamental symbolic mediator for the construction of meanings (Siegel, 1995).

Given the above, recent research has focused on analyzing the discourse present in posts and comments made by students on Instagram as a way to understand the development of learning on this digital platform. In the area of Research in Microbiology Teaching in the context of higher education, Baroni et al. (2024) investigated learning progress through the analysis of the diversity and richness of students' discourse about the bacterium *Escherichia coli* in Instagram posts, using word clouds and the Shannon Diversity Index adapted to teaching. Subsequently, Picinin et al. (2025), using Iramuteq, conducted a systematic evaluation of posts about the bacterial genus *Streptococcus*, strengthening the use of qualitative discourse-based approaches as a strategy to identify evidence of learning. Recently, Tarantini et al. (2026) investigated the impact of the type of social media on the discourse of Generation Z students regarding the bacterial genera *Bacillus* and *Streptococcus* in posts on Facebook and Instagram. The research results demonstrated that although one platform prioritizes a more textual emphasis and the other a more visual approach, which was reflected in the density of the word clouds, these differences did not affect the richness of the students' discourse.

In line with previous studies, the discourse analysis carried out in this work reaffirmed the contribution of word clouds and the Shannon Diversity Index to assess the impact of posts on student learning, but above all, it highlighted the decisive role of human mediation in this process (Aguiar et al., 2023; Moran et al., 2000; Fadeev, 2019). Although all students started with the same content taught in the classroom, the word clouds show not only particularities between the groups, but, above all, a progression in the level of complexity of the discourse over the years. In 2022, there is an emphasis on resistance mechanisms and the action of antimicrobials; in 2023, attention was mainly focused on general aspects of pathogenicity, especially related to the diversity of the genus as a whole; in 2024, mentions of the mechanisms of regulation of bacterial pathogenicity are observed for the first time; And, in

2025, these mechanisms are highlighted in students' discourse on the subject. In that year, changes to the schedule affected the approach to content on genetics, antimicrobial resistance, and growth control within the Pathogenicity thematic category. However, contrary to expectations, this reorganization favored an increase in the diversity of students' discourse on the subject.

The species *P. aeruginosa* stands out for its high capacity to form biofilms — a microbial community strongly adhered to a surface (biotic, such as the lungs, or abiotic, such as hospital devices) and surrounded by an extracellular matrix, which not only hinders the penetration of drugs and, consequently, reduces bacterial sensitivity to antibiotics, but also creates a favorable environment for the exchange of resistance genes (Liu et al., 2024). Among the main mechanisms involved in the regulation of biofilm formation by this bacterium, quorum sensing plays a central role (Tuon et al., 2022). This is a population density-dependent mechanism that involves the synthesis, detection, and response to autoinducer molecules (AIs). In this species, two quorum sensing systems stand out: LasIR and RhlIR, whose main AIs are molecules from the acyl-homoserine lactone (AHL) class, 3-oxo-C12-AHL and C4-AHL, respectively (Lee & Zhang, 2014). In addition to the biofilm, both systems are involved in regulating the expression of important virulence factors of this bacterium, such as proteases, elastases, lectins, exotoxin-A, and siderophores. The study of this mechanism has contributed to the early diagnosis of infections and the development of therapeutic approaches alternative to the use of conventional antimicrobials (Miller & Gilmore, 2020; Kalia, 2013). More than just a gain in content, the incorporation of these concepts into students' discourse over the years indicates an advance in their ability to articulate concepts at different levels of complexity.

The variations observed in discourse among the groups reinforce the unique character of the learning process, since the groups (and, more profoundly, each student within the group) differ in their zone of actual development and, consequently, mobilize content according to their repertoires, individual interests, and ways of thinking (Vygotsky, 1978). But, more than that, they reinforce that learning requires active processes of knowledge construction and is enhanced by communication. In this sense, the linear increasing trend of 0.85 observed in the richness of discourse, evidenced by the progressive increase of 0.08 between 2022 and 2023; of 0.19 between 2023 and 2024; and of 0.57 between 2024 and 2025 in the Shannon Diversity Index on content, indicates that discursive diversity is also a result of the intentional action of the mediators. The mediator, through the analysis of students' discourse in real time, is able to identify needs and direct pedagogical

interventions in a more strategic way, supporting the teaching-learning process through communication.

This collaboration with “more capable peers,” represented in the ‘Adopt a Bacterium’ by undergraduate students who have already participated in the project and therefore master the content, and by postgraduate students, is facilitated by Instagram as a VLE, especially in contexts where classroom interaction is limited or unproductive. In this process, both postgraduate and undergraduate students learn, because “those who teach learn by teaching and those who learn teach by learning” (Freire, 1996). It is important to recognize, however, that a richer discourse in the analyzed material does not necessarily translate into greater conceptual understanding; just as the opposite does not, in itself, imply less understanding.

CONCLUSIONS

The analysis of students' discourse on the pathogenicity of *Pseudomonas aeruginosa*, using word clouds and the Shannon Diversity Index, provided an important indicator of the teaching-learning process over the last four years of the 'Adopt a Bacterium' program and highlighted the importance of investing in the continuing education of undergraduate and postgraduate students as mediators, as a strategy for transforming teaching practice, reinforcing the effectiveness of Instagram as a virtual teaching-learning environment for collective construction and training of multipliers of knowledge in Microbiology.

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AUTHORS' CONTRIBUTIONS STATEMENTS

CCMC was responsible for conceptualization, data curation, formal analysis, investigation, project management, visualization, and writing; BRCA contributed to the methodology, review, and editing of the text; RSF performed the formal analysis, review, and editing; RCCF contributed to the conceptualization, resource provision, validation, visualization, guidance, and

supervision of the entire process. All authors approved the final version of the work.

DATA AVAILABILITY STATEMENT

The data supporting the results of this study may be made available by the authors CCMC and RCCF upon reasonable request.

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