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Drag Queen performance art as an alternative approach to teaching Chemistry

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Abstract
This article aims to highlight and discuss the potential of using *Drag Queen performance* art in an experimental demonstration in chemistry classes. To this end, the research used this approach in a college entrance exam prep course to teach the concept of density. The teaching practice that was the subject of this research was carried out in two stages, the first dedicated to a demonstrative experiment on the concept addressed through *Drag Queen performance* art and the second dedicated to the systematization of knowledge. Data were collected from students through questionnaires and analyzed using categorical content analysis. The results showed that the methodological aspects used helped to stimulate student interest due to the dynamism of the class and the development of teaching and learning processes, mediating teacher-student relationships in a non-hierarchical manner and promoting *Drag Queen* culture.
Keywords
traditional teaching; learning strategies; learning difficulties; concept.

A arte performática Drag Queen como uma abordagem alternativa para o ensino de Química

Resumo
Este artigo tem como objetivo evidenciar e discutir as potencialidades da utilização da arte *performática Drag Queen* em uma prática experimental demonstrativa na disciplina de Química. Com tal propósito, a pesquisa utilizou essa abordagem em um curso preparatório para vestibulares no ensino do conceito de densidade. A prática didática objeto desta pesquisa foi realizada em duas etapas, sendo a primeira dedicada a uma experimentação demonstrativa sobre o conceito abordado por meio da arte *performática Drag Queen* e a segunda dedicada à sistematização do conhecimento. Os dados foram coletados junto aos estudantes por meio de questionários e analisados através da análise categorial de conteúdo. Os resultados evidenciaram que os aspectos metodológicos utilizados auxiliaram no interesse dos estudantes devido ao dinamismo da aula e no desenvolvimento dos processos de ensino e aprendizagem, mediando as relações entre professor e aluno de forma não hierárquica e promovendo a cultura *Drag Queen*.
Palavras-chave
ensino tradicional; estratégias de aprendizagem; dificuldade de aprendizagem; conceito.

El arte escénico *Drag Queen* como enfoque alternativo para la enseñanza de la Química

Resumen
Este artículo busca destacar y discutir el potencial del uso del arte escénico *Drag Queen* en una práctica experimental demostrativa en Química. Para ello, la investigación empleó este enfoque en un curso preparatorio para el examen de admisión universitaria para enseñar el concepto de densidad. La práctica docente objeto de esta investigación se desarrolló en dos etapas: la primera, dedicada a un experimento demostrativo sobre el concepto abordado a través del arte escénico *Drag Queen* y la segunda a la sistematización de conocimientos. Los datos se recopilaron de los estudiantes mediante cuestionarios y se analizaron mediante análisis de contenido categórico. Los resultados mostraron que los aspectos metodológicos utilizados fomentaron la participación estudiantil gracias al dinamismo de la clase y al desarrollo de los procesos de enseñanza y aprendizaje, facilitando las relaciones no jerárquicas entre profesor y estudiante y promoviendo la cultura *Drag Queen*.
Palabras clave
enseñanza tradicional; estrategias de aprendizaje; dificultades de aprendizaje; concepto.

1 Introduction

Formal education processes offer few opportunities for the inclusion of artistic expression, which is a particular feature of the humanities, especially in marginalized cultural contexts. The composition of the educational curriculum is a space for cultural selection, guided by social, philosophical, and epistemological values (Sacristán, 2008).

As a cultural manifestation, *Drag Queen* art challenges social conventions, subverts rigid norms of gender and sexuality, and questions the patriarchal and heteronormative structures that sustain society (Brazil, 2017). When inserted in the educational context, it manifests itself as an artistic expression of great impact, capable of playing a non-authoritarian pedagogical role, breaking with a traditional approach to teaching (Keenan; Mess, 2020).

In this context, *Drag Queen* art has established itself as a visual and *performative* teaching strategy, contributing significantly to the improvement of teaching and learning processes (Rosa; Felipe, 2021). In addition, its presence in the school environment fosters welcoming and inclusive spaces, encouraging the appreciation of diversity and freedom of identity among students. (Mayberry, 2022).

Silva, Vital, and Peil (2023) highlight the potential of this artistic movement as a mediator in learning processes through a reading project carried out by *Drag Queen* storytellers in libraries in San Francisco (California, United States). The authors point to this approach as a strategy to break with heteronormativity in the curriculum and foster new identity narratives.

In historicizing *Drag Queen* art, Amanajás (2014) and Neves, Gomes, and Brambatti (2020) trace its origins back to Ancient Greece, where female masks were used in theatrical performances. According to the authors, before acquiring a defined structure, the term *"drag queen*" was historically related to cross-dressing, a practice in which men played female roles in plays that were often religious in nature. Over time, this practice underwent significant changes, shifting between comic exaggeration, glamorous ostentation, and political protest, until the concept and nomenclature were consolidated (Amanajás, 2014; França, 2022; Neves; Gomes; Brambatti, 2020).

According to the authors, in the 18th century, women were banned from performing in Brazilian theater, leading men to challenge gender and sexuality norms. In the 1980s and 1990s, transformism established itself as an art form, and the term *Drag Queen* gained prominence. Despite the changes, its political and provocative essence remained (Amanajás, 2014; Neves; Gomes; Brambatti, 2020).

Being a Drag Queen does not constitute a gender identity; rather, artists employ various techniques to intentionally transform their gender expression in the body in order to construct an artistic and/or aesthetic experience. For example, to produce the illusion of femininity, makeup becomes a tool for characterization (Souza; Ferreira; Merkle, 2022). However, this artistic expression is often limited to a comical and caricatural interpretation, ignoring its power as a political movement in defense of the LGBTTQQIAAPPN+ community's agenda (Casteleira; Inocêncio; Polizel, 2019).

Although seen as mere entertainment, *Drag Queen* art should be recognized as a biopsychosocial and cultural expression, capable of transforming perceptions and reformulating relationships in the historical and social context of the individual. Thus, the inclusion of this approach in the educational context enriches pedagogical practices by broadening the horizons of teaching and learning.

The collective imagination related to the construction of Natural Sciences, including in school environments, is predominantly associated with the male gender. This perception can be exemplified by the initial study called "Draw-a-Scientist," conducted by Chambers (1983), in which students drew scientists and associated them with a middle-aged white man wearing a lab coat and glasses. This result is similar to more recent studies, such as those by Fagionato-Ruffino and Pierson (2013) and Oliveira and Guebara (2024), conducted with elementary school students in Brazil.

In addition, the research by Hendges and Santos (2023) on the interrelationships between gender and Science-Technology in science education in Brazil stands out, in line with the studies by Chassot (2004), which examine the conception of the construction of science as a predominantly male practice and highlight that, in the social imagination, its learning is geared towards intelligent men. Given the above, the learning of natural sciences appears to be uninviting to other genders.

In this context of Natural Sciences, the learning of Chemistry is widely recognized as one of the most challenging subjects for students, which requires teachers to adopt alternative methodologies to traditional ones to assist in the teaching and learning process and establish connections between the submicroscopic, macroscopic, and representational levels (Pereira; Santos; Cruz, 2023; Tenoro, 2022). Among the aspects that interfere with the teaching and learning processes of chemistry are decontextualized classes, lack of experimental classes, traditional classes, among other aspects (Albano; Delou, 2024).

These three levels of chemical knowledge, established by Johnstone (2000), are described as follows: the macroscopic level refers to observable phenomena; at the submicroscopic level, chemical phenomena are explained and detailed through molecular arrangement and the movement of atoms and molecules; while the representational level uses symbols to represent phenomena, such as structural formulas and chemical equations. Thus, to understand chemical knowledge, it is important to work with these levels, promoting transitions between them (Gibin, 2013; Johnstone, 2000; Santos, D.; Santos, T.; Gibin, 2022).

Among the classic approaches to teaching Chemistry, demonstrative experimentation stands out as a relevant strategy. Gaspar and Monteiro (2005) describe

this practice as experimental activities that allow the presentation of concepts and phenomena, with an emphasis on a qualitative approach and the use of physical instruments. The use of experimental demonstrations can make the learning process more engaging and accessible when linked to the student's reality, arousing their interest and facilitating the teaching and learning of chemistry (Da Silva *et al.*, 2009).

Another relevant strategy for the learning process is the integration of art into the teaching of chemistry, as this association not only promotes a more dynamic and stimulating environment, but also contributes to making the subject more attractive, especially for those preparing for college entrance exams (Da Cruz; Carbo; Joerke, 2022).

When analyzing educational processes in college entrance exam prep courses, these are marked by the mechanization of learning, prioritizing memorization and repetition of knowledge over critical understanding, transforming the educational process into training focused exclusively on passing college entrance exams (Da Rosa *et al.*, 2020). Even so, this approach is defended for its ability to bring theory closer to the reality of college entrance exam takers, despite the limitations it may present in the development of meaningful learning (Da Luz; Longhin, 2019; Da Rosa *et al.*, 2020).

In addition, these teaching spaces adopt a content-based model, in which a large amount of information is transmitted in an accelerated and intensive manner (Silva *et al.*, 2017). The intense pressure imposed by the approaching entrance exams for higher education negatively interferes with the active participation of students in their studies and the development of their critical thinking, thus compromising the quality of the teaching and learning processes (Da Silva *et al.*, 2010). Given this scenario, it is essential that teachers of pre-university entrance exam courses adopt alternative methodologies capable of balancing the different levels of knowledge of students, wh t the same time creating a more welcoming learning environment that is conducive to intellectual development (Bicalho, 2013; Zago, 2008).

The teacher's role in implementing alternative methodologies to the traditional ones that balance the different levels of knowledge of the students is essential not only for the fulfillment of the objectives of the discipline, but also for the creation of a more welcoming educational environment. This aspect becomes even more relevant in light of the intense psychological pressures, anxiety, and internal conflicts experienced by

students preparing for college entrance exams (Borges; Sampaio, 2019; Schönhofen *et al.*, 2020).

Vygotsky's (2010) perspective reinforces this need by demonstrating that cognitive development does not occur in isolation, but rather in interaction with the social and educational environment in which the individual is inserted. The author highlights the central role of language as an essential tool for the development of thinking and learning, emphasizing social mediation as a determining factor for the internalization of knowledge. In relation to teaching, Vygotsky (2010) states that, for student development, educators play an active role in providing support, guidance, and strategies that promote the development of students' skills and knowledge. In this context, teachers can boost students' development in relation to the chemical concepts covered, improving their performance and fostering the creation of an inclusive and welcoming environment.

Given the above, this article aims to highlight and discuss the potential of using *Drag Queen performance* art by analyzing its use in an experimental practice in the Chemistry class on the concept of density in a college prep course.

2 Methodology

In order to respond to the research objective, this study was characterized as qualitative and exploratory, since this type of research allows for the understanding of complex and subjective phenomena through interpretive analysis (Bicudo, 2005). Considering that exploratory research is usually dedicated t y practice (Pereira; Coutinho, 2023), the aim is to understand situations (events or facts) that need to be explored and that the research participants undergo a moment of reflection during the investigative process (Lösch; Rambo; Ferreira, 2023).

Regarding data collection, an open *online* questionnaire was used, involving questions about the pedagogical approach, covering experimental aspects and *Drag Queen performance* art. This data collection tool was selected because it allowed us to reach a large number of participants, guarantee anonymity, and allow participants to respond when they deemed it convenient. In addition to these positive points, it reduced contact with the researcher's opinions (Matias-Pereira, 2016).

In accordance with the ethical principles of research, students were informed in advance about the objectives of the study, the guarantee of anonymity, the voluntary nature of participation, and the right to withdraw their consent at any time, with the consequent exclusion of their data. The Free and Informed Consent Form was made available digitally and signed by the participants. Therefore, this qualitative and exploratory approach, with data collection through a questionnaire in order to explore the subjectivity of the educational practice carried out, allows the participant to express their conceptions with minimal discomfort, in addition to enabling the exploration of data on the participants' educational process.

Content analysis consists of a set of techniques in which a group of data is explored and analyzed (Valle; Ferreira, 2025). Among the techniques that make up this method of analysis, we used Bardin's (2021) categorical analysis, which uses the entire *corpus* and its classification of content through the criteria of absence or presence of a specific category. In this type of analysis, “[...] the category system is provided and the elements are distributed in the best possible way as they are found” (Bardin, 2021, p. 147).

The analysis of these data was performed using Bardin's (2021) categorical content analysis, which has two functions: the first is to explore the material in order to make new discoveries, and the second is to administer tests to verify hypotheses and previous analyses. This research falls into the latter category, as it allows us to understand students' conceptions of the approach used during class and analyze them, as well as their potential.

Bardin (2021) defines the analysis processes in three chronological stages: pre-analysis, exploration of the material, and treatment of the results. The documents are examined to formulate hypotheses and indicators that support the interpretation; in the second, the material is explored and categorized based on the pre-analysis, allowing for an in-depth understanding of the content; and in the third, the raw data is systematized to facilitate its final interpretation (Bardin, 2021).

The research was conducted in a free pre-university entrance exam course linked to a public university in the state of São Paulo, and the 43 participants' main objective was to enter higher education. All research participants were regularly enrolled in semi-

extensive afternoon or evening classes. The age range of the students was diverse, with the following distribution: 35 aged between 15 and 17 years and 11 months; seven aged between 18 and 23 years and 11 months; and one aged between 24 and 30 years.

The teaching practice was carried out separately in the afternoon and evening classes and divided into two stages, beginning with a demonstration experiment on density using a test tube with oil and Pasteur pipettes dripping water with dye, demonstrating the movement between liquids due to the difference in density. The concept of density is of fundamental importance in the field of Natural Sciences, as it becomes the basis for other concepts, such as the characterization of substances, for example (Melo; Amantes, 2022).

This experimental practice was approached through the *performing* art *of Drag Queen*, in which the teacher performed a cover of the song "Applause" by Lady Gaga. Thus, while the dubbing and interpretation of the song took place, the teacher, dressed as *a Drag Queen,* dripped liquids into a test tube containing oil, visually demonstrating the behavior of liquids with different densities in the same container.

In the next stage, a lecture on density was given, in which the teacher developed the correlation between the phenomena observed by the students and the concepts to be systematized, using questions about knowledge related to the practice during the mediation process.

3 Results and discussion

To understand the scenario investigated in this research, as well as the potential of *Drag Queen* art as an approach associated with demonstrative experimentation, it is essential to analyze and correlate the following units of analysis: the relationship of the research participants with the learning of Chemistry throughout the schooling process and in the pre-university entrance exam course; and *Drag Queen* art as a strategy linked to demonstrative experimentation.

Regarding Context Unit I: Relationship of research participants with learning chemistry during their schooling and in the college entrance exam prep course, analysis of the questionnaire revealed that most students (79.7%), before entering the college

entrance exam prep course, faced learning difficulties in the subject of chemistry. According to the participants, these difficulties were attributed to the absence of the subject in the New High School curriculum, as well as methodological problems on the part of teachers. This perception can be observed in the justifications of participants E1, E5, and E13 when asked about the existence of obstacles in understanding concepts related to chemistry.

> *Since most of my high school education (9th to part of 12th grade) was* distance learning*, I ended up not learning the content of many important subjects, and I believe that many young people also went through this, and also because my teacher did not have very good teaching methods (monotonous classes), without experiments or anything like that; this did not hold my attention to learn* (E1).
>
> *I found it a little difficult to understand the subject. The teacher explained things very quickly and was not willing to go over the explanation several times so that the students could understand. In addition, he wasted a lot of time before starting the classes and repeated the content* (E5).
>
> *Difficulty applying formulas and converting values, difficulty with the mathematical part of chemistry, and difficulty solving problems* (E13).

As exemplified above, the limited contact of the research participants with the content, the inherent complexity of chemistry, and the methodologies and approaches that do not directly involve students, leaving them passive, are factors that contribute to learning difficulties in the discipline. These data corroborate the research by Santos (2024), showing that the choice of training itineraries by the students themselves generates inequality, as not everyone has access to the same content. Thus, it is emphasized that initial training, as well as understanding the role and processes of experimentation, are essential to overcoming learning obstacles (Milagres; Simões, 2024).

In addition to the constraint related to the lack of contact with chemistry, the learning difficulties mentioned by students are widely addressed in the academic literature on chemistry content in high school, as detailed by Albano and Delou (2024).

The aforementioned authors conducted a literature review that covered articles, books, theses, dissertations, monographs, among others, published in Brazil between 2001 and 2021, with the aim of discussing the main learning difficulties in chemistry in high school in the Brazilian context. Among the results obtained, we highlight the perpetuation of traditional chemistry teaching, decontextualized from the students' reality,

which disregards prior knowledge and assigns the teacher a position of authority, leaving students in a passive stance and as mere recipients of knowledge. Furthermore, traditional chemistry teaching, based on the memorization of formulas, rules, structures, and nomenclatures, presents content in a way that is disconnected from students' daily lives, treating chemistry as a strictly theoretical science and ignoring its experimental essence (Lima, 2013). Furthermore, this environment is characterized by a disciplining silence (Gama *et al.,* 2021).

The situation initially presented by the students in relation to learning chemistry was modified after they entered the pre-university entrance exam course. Of the 36 participants who reported difficulties in this subject, only three indicated that these difficulties continued after attending chemistry classes, in which demonstrative experimental practice, using *Drag Queen* art*,* is applied. However, the reasons given for these difficulties were related to low or non-existent class attendance and the time needed to assimilate the content.

This change in students' perception of chemistry learning was justified by the students due to the non-traditional presentation of the subject through the class that is the subject of this research, detailed explanations, interactivity, attributing it to the "teacher's teaching methods." Thus, the data presented corroborate Monteiro and Rivas (2012), since the authors highlight that teacher mediation contributes to students' cognitive progress, offering support while they deal with challenging activities that are possible to perform with their guidance (Monteiro; Rivas, 2012).

Considering this change in students, it is pertinent to discuss the results related to Context Unit II: *Drag Queen* art as an approach linked to demonstrative experimentation.

After the teaching and learning processes, the students evaluated the experimental approach and shared their conceptions and experiences of *Drag Queen performance* art, with a view to analyzing their previous contact with and perceptions of the method adopted. The responses of the research participants revealed that most students were unfamiliar with *Drag Queen* art. Among those who had already had some contact with it, the appreciation of art in activities that, in common sense, tend to be predominantly associated with entertainment, such as the *reality show RuPaul's Drag*

Race, Carnival, and the LGBTTQQIAAPPN+ Pride Parades[1] stood out. The process of observing *Drag Queen* art brings about the perception of a contrast to normativity and aesthetic relationships (Ka; Rockenbach, 2024). In the proposal carried out, aspects related to tolerance were implicitly addressed through the insertion of this art in a traditionally heteronormative and cisgender environment.

The process of teaching mediation through a *Drag Queen persona* makes explicit a non-neutrality in the body and an ethic in which there is no exclusion or annihilation of differences, seeking the plurality of human existences (Speckart; Aguilar, 2024). The experimental practice, incorporated through this artistic movement, was perceived positively by 42 of the 43 students. Only one student, E30, rated the experience as having a negative impact, justifying his assessment: *"At the end of the drag queen performance art, it was necessary for the teacher to explain what happened in the experiment, proof that the experience may not have been very well* understood" *(*).

This statement by the student does not reflect dissatisfaction, but indicates that the demonstrative and illustrative approach used during the dubbing of *the* song “Applause” was insufficient to promote their learning. However, the teaching and learning process of demonstrative experimentation requires explanation in order to aid in the understanding of the unobserved phenomenon. In this form of experimentation, it is up to the teacher to take the lead, questioning students and carrying out the practice while highlighting what is observed, with the scientific explanation of what is observed being paramount (Oliveira, 2010).

In addition, the research participants who evaluated the approach positively highlighted it as an effective means of arousing interest, making classes more dynamic, and facilitating learning, as well as promoting contact with *Drag Queen* art, as can be analyzed in the responses presented below:

> *Yes. The fact that art was used to explain a subject that is generally considered boring sparked my interest* (E5).

1 The acronym LGBTTQQIAAPPN+ is an acronym that encompasses people who are lesbian, *gay*, bisexual, trans, queer/questioning, intersex, asexual/aromantic/agender, pan/poli, non-binary, and more. It represents gender relations and sexual orientations in the following order. In addition, the "+" sign is used to include people who do not feel represented by the other letters.

> *The way the class was taught made us more interested, as it was more dynamic, thus enabling us to follow the reasoning and understand it easily* (E12).
>
> *I respond with a question: why would it have a negative impact? It didn't offend anyone, it just made the class more dynamic and fun* (E13).

The students' responses show that the integration of art and chemistry acts as a facilitator of learning. Furthermore, the students' conceptions corroborate those outlined by Quadros *et al*. (2011), who emphasize that student engagement in teaching and learning processes depends, to a large extent, on teacher engagement. According to Vygotsky (2010), the learning process is essentially social, and it is up to the teacher to actively intervene so that pedagogical action results in meaningful learning. In this sense, when analyzing students' perspectives on teaching practices that break with traditional methodology, it is important to highlight the findings of Batista, Carvalho, and Ribeiro (2007): the y construction of knowledge requires methodologies that spark students' interest, bringing chemistry closer to everyday life and mediating learning in a guiding manner.

Given this largely positive perspective on the experimental approach, it is necessary to analyze the characteristics of the students' learning processes, considering the demonstrative experiment mediated by the *Drag Queen* approach and the systematization of knowledge promoted by the teacher.

5 Final considerations

This research aimed to highlight and discuss the potential of using *Drag Queen performance* art in an experimental practice in the subject of Chemistry, in the context of a college entrance exam prep course. The main results showed that the integration of *Drag Queen* art helped to bring students closer to the subject of Chemistry, especially those who had previously struggled with studying this science. The change in this scenario was attributed to the dynamism provided by the class, together with a detailed explanation of the observed phenomenon.

Thus, the demonstrative experimentation, integrated with *Drag Queen performance* art, helped to spark the students' interest due to the dynamism of the class, promoting student engagement both with the content and later with the theoretical class.

This approach also broke with the traditional paradigms of chemistry teaching by proposing an experimental practice that does not prioritize memorization or exclusively quantitative activities.

In summary, the scenario investigated showed that the inclusion of this artistic movement in formal education brought students closer to this cultural expression, which is often marginalized. This initiative promoted greater engagement, demystifying *Drag Queen* art as a mere instrument of entertainment and generating a feeling of acceptance among college entrance exam students, who were placed in an environment receptive to differences.

For future research, we propose the analysis of more frequent interventions with this approach in different contexts, with the aim of understanding these and other potentialities through the diversification of the target audience, the content to be taught, the environments, and the contact time. Although the inclusion of *Drag Queen* art in this research was a one-off occurrence, this approach is carried out regularly with students, with the practice analyzed in this study being the participants' first experience of contact.

Furthermore, it is important to highlight the importance of developing a teacher training curriculum that considers human diversity in order to foster proposals that seek to expand the pedagogical repertoire, promote interdisciplinarity between art, culture, and science considering a socially marginalized population, value diversity in the educational environment, and develop non-hierarchical educational practices, in addition to reflecting on the social role of the teacher. Thus, the research contributes to promoting reflection on the inclusion of this artistic movement and others from *queer* culture in the Natural and Earth Sciences curriculum, aiming to assist in the construction of a pluralistic science accessible to all.

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DATA AVAILABILITY

The entire dataset supporting the results of this study has been published in the article itself.

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