

EUROPEAN  
SCIENCE  
EDUCATION  
RESEARCH  
ASSOCIATION

ESERA



HACETTEPE  
UNIVERSITY



ESERA

2023  
*Cappadocia*  
TÜRKİYE

The 15<sup>th</sup> Conference of the European Science Education Research Association (ESERA)

August 28 - September 1, 2023, Cappadocia, Türkiye

Abstract Book

Compiled by  
**Metin Sardag & Gokhan Kaya**  
Hacettepe University STEM & Maker Lab, Türkiye

## Abstract

There have been a significant expectations on all over the World to participate students in science, technology, engineering and mathematics (STEM). However, both recruitment and interest in STEM related career choices decreased in all over the World. Recent studies have shown that Therefore, the aim of this research was to explore middle school students' attitudes on performance-based science activities. In this descriptive survey study participants was 226 students. Data was collected during 2022-2023 fall term from middle schools (5th to 8th grade). Data collection tool was adapted and implemented. The data collection tool has different type of questions including demographic, Likert types, and open ended. For this reason, as a data analysis both qualitative and quantitative analysis methods was used in order to observe differences in gender and grade level. According to the preliminary results, less middle school students wants to pursue career in STEM related jobs. Most boys thought that engineering is a male job whereas nursing is a female job. On the contrary most of the girls think that jobs has no gender. In addition to that, both girls and females know more male scientists than female scientist. Almost half of the middle school students did not state any woman scientist. Other findings related to the middle school students' opinions related to performance-based science education stated that most of them have positive opinions about science is important but ironically most of them said that science is not for them but clever people. This research's findings has implications to scientist image, gender inequalities and career choice in STEM.

## 517 Laughing and Subverting the Chemistry Curriculum: A Critical Ethnographic Analysis of Brazilian High School Students' Identity Work Through Humor

Matheus dos Santos Barbosa da Silva, Ana Cláudia Kasseboehmer

University of São Paulo, São Carlos, São Paulo, Brazil

## Abstract

This study draws upon Mikhail Bakhtin's theory of the carnivalesque, Pierre Bourdieu's notion of social space, symbolic power and doxa, and the construct of science identity, to understand how marginalized Brazilian high school students' subversive practices (humor and laughing) in chemistry classes act as a tool for doing identity work as chemistry learners. Analyzing ethnographic data collected from two suburban public schools in Brazil which are mostly attended by working-class communities, we document how high school students constructed a bakhtinian carnival-like chemistry class through humor and laughter. We analyze how students invoke laughter and humor to position themselves as playful students and significant members of the peer group, while simultaneously working to be good Chemistry learners in class, toning down the seriousness of chemistry lessons, and constructing a milieu that exudes a sense of belonging and solidarity. This study contributes to the debates surrounding the issues of structure and agency in science identity studies by focusing on the relationship between the formal organization of the chemistry curriculum and students' playful practices that reflect subversion and resistance.

# LAUGHING AND SUBVERTING THE CHEMISTRY CURRICULUM: A CRITICAL ETHNOGRAPHIC ANALYSIS OF BRAZILIAN HIGH SCHOOL STUDENTS' IDENTITY WORK THROUGH HUMOR

*This study draws upon Mikhail Bakhtin's theory of the carnivalesque, Pierre Bourdieu's notion of social space, symbolic power and doxa, and the construct of science identity, to understand how marginalized Brazilian high school students' subversive practices (humor and laughing) in chemistry classes act as a tool for doing identity work as chemistry learners. Analyzing ethnographic data collected from two suburban public schools in Brazil which are mostly attended by working-class communities, we document how high school students constructed a bakhtinian carnival-like chemistry class through humor and laughter. We analyze how students invoke laughter and humor to position themselves as playful students and significant members of the peer group, while simultaneously working to be good Chemistry learners in class, toning down the seriousness of chemistry lessons, and constructing a milieu that exudes a sense of belonging and solidarity. This study contributes to the debates surrounding the issues of structure and agency in science identity studies by focusing on the relationship between the formal organization of the chemistry curriculum and students' playful practices that reflect subversion and resistance.*

**Keywords:** Science Identity; Carnival Theory; Humor

## INTRODUCTION

As a common practice in everyday life and social interactions in the classroom, humor has long been recognized as a significant aspect of students' affective experience in the process of learning science (Roth et al., 2011). From a critical perspective, humor is considered an effectively useful tool for poking fun at institutionalized structures and meanings in a middle-class school culture (Zhang, 2022). According to Roth et al. (2011), laughing in the science classroom is a way of dealing with the 'seriousness' of science, and this can make science "become more life-like and less alien to learners" (p. 454). Yet, few researchers have studied the role of humor in shaping students' identity and positioning in the context of chemistry learning. This is particularly important in the sense that, as pointed out by identity-based researchers, normative assumptions in science require students to be "nerdy" (DeWitt, Archer and Osborne, 2013), quiet and "well behaved" (Varelas, Kane and Wylie, 2011) in order to be celebrated as science people while potentially excluding other identities which are regarded as undesirable or inappropriate. In this study, we seek to investigate the relationship between humor and identity work in chemistry classes among Brazilian high-school students. Next, we will also outline the main theoretical concepts employed in this research.

## THEORETICAL FRAMEWORK

In the present work, we understand identity as an ongoing process; thus, we consider a sociocultural perspective of identity as an intersubjective accomplishment produced in the ongoing interactions between actors engaged in the field (Bucholtz and Hall, 2005). We prefer to use the term 'identity work' to explore how humor is invoked as an affective practice for shaping identities and positions in chemistry classes. In terms of structure, we conceptualize the chemistry classes as a Bourdieusian social space with its own rules of legitimate engagement in science – *doxa* (Bourdieu, 1977). While the dominant *doxa* tends to extol the 'seriousness' of science and chemistry (Roth et al., 2011), humor and laughter are, in this case, considered *subversive* practices and voices that are devoid of symbolic power in the classroom. Finally, we argue that students' subversive practices through humor have the power to create a carnivalesque atmosphere in the chemistry classroom. For Bakhtin (1984), contrary to the authority of institutionalized practices, during carnival, people are liberated from their normal daily routine, and they engage in festive activities and

practices which are characterized by laughter, humor, joy, and playfulness. The carnivalesque discussed by Bakhtin (1984) is “a parody of the extracarnival life, a ‘world inside out’” (p. 11) where mockery and laughter are allowed and targeted against all authorities and monologic discourses. While Bakhtin discussed the carnivalesque laugh in the context of the Middle Ages and Renaissance, in this study, we argue that the carnival metaphor as counter-hegemonic discourse is a useful tool that helps to understand students’ practices of subversion. Thus, throughout this work, we aim to answer the following research questions: **(RQ1):** how do marginalized Brazilian high school students experience humor in chemistry classes? **(RQ2):** what is the role of humor in the identity work of Brazilian high school students as chemistry learners?

## DATA AND METHODS

The present investigation is a one-year critical ethnography-based study (Carspecken, 1996) conducted in two suburban public schools located in low-income communities in a middle-sized city in Brazil. The schools selected are attended mainly by students from working-class and poor communities, though one of them (Dominó’s school) has a more homogeneous student population composed mainly of Afro-Brazilian students, and the other one (Lavoisier’s school) has a more mixed racial composition. Data were collected from six focus groups (n = 21) and individual interviews conducted with seven high school students, the chemistry teachers, and the vice-principal or the head master in each school, and a total of 45 hours of observations. All the data were digitally transcribed and anonymized. The transcripts were carefully read multiple times while each sentence was coded in search of instances where students thought that “they were amusing” and where “they were perceived to be amusing by at least some participants” (Holmes, 2000, p. 163). Within a critical perspective, we are mainly concerned about who benefits from the dominant organization of chemistry learning as a serious and authoritative subject, and the role humor plays in shaping students’ self-understanding as chemistry learners in the classroom.

## FINDINGS

RQ1: The findings showed that humor played a particularly important role in the affective atmosphere of chemistry classes (Table 1), as it made students enjoy learning even though some of them still faced some difficulties in understanding chemistry concepts. Other students found in humor a safe space where they obtained relief and solace from the boring routine of chemistry classes. By being ‘playful chemistry learners’, the students were able to build a sense of belonging with their peers who shared similar conditions of boredom and sense of difficulty in terms of understanding abstract concepts.

Table 1. Ethnographic evidence of students’ experience with humor in chemistry classes.

Theme	Examples of ethnographic evidence
Laughing as relief from the boredom of chemistry classes	One of the boys described how chemistry classes “ <i>were getting boring</i> ” now in his second year of high school, although they sounded “ <i>more fun</i> ” in his first year because of the following (in his own words): “ <i>we laughed more. I think that’s why we were more interested in Gilberto’s (the chemistry teacher) classes</i> ” (field note).
Humor to build camaraderie atmosphere	“ <i>If you entered the classroom and didn’t laugh from the moment you arrived until the end, [then] you are literally not feeling well or you are not in our classroom!</i> ” (Tamira, Afro-Brazilian girl).
Carnavalesque laughter in the chemistry classroom	“ <i>In my classroom, people are very cheerful. They make fun of everything. We’re there tired, and a little joke ends up making everyone smile. It ends up making people more motivated and excited. We joke around, we play. It’s really cool to joke around like this when you’re in an awkward moment.</i> ” (Lara, White girl)

RQ2: Humor was frequently invoked in the construction of an acceptable identity as a chemistry learner (Table 2). However, some students needed to manage their laughter in order to conform to the seriousness expected by the doxa of the chemistry curriculum - “[a good student] *is the one who has high grades, engages, stays quiet, answers everything I ask (...)*” (Chemistry teacher Carlos). In this sense, some students tried to simultaneously assume the position of a ‘good chemistry student’ dedicated to schoolwork, and a



playful student who wanted to fit in the peer group. Other students used humor to talk about their low self-esteem regarding learning chemistry; although they did not recognize themselves as capable chemistry learners, through self-depreciation jokes, they were able to find a way to feel included. Students also used humor and joking as a tool to disrupt the serious and authoritative routine of chemistry learning.

Table 2. Ethnographic evidence of students' identity work as chemistry learners.

Themes	Examples of ethnographic evidence
Self-depreciation jokes in the chemistry classroom	During a chemistry test on electronic distribution, Julio, an Afro-Brazilian boy, said laughing, "I'm honest! I will score zero!" When the teacher was talking about the correct answers to the questions in a test, the same student said: "I won't even correct it because I already know I got zero! (laughing)" (field note).
Balancing students' positions	"When there is a well-balanced atmosphere, like... There are jokes, but like, at least for me, I am joking around but I am also [focused] on the [chemistry] lesson. I can find a nice balance between the the two" (Pedro, Afro-Brazilian boy).
Playful disruptors	"What is this tube [on the blackboard], Carlos?" asks Pedro in an ironic tone. Carlos, the teacher, teaching electrochemistry in the classroom, looks at Pedro with an interrogative stare. Pedro then says, "I'm joking. I know it is a battery!" Carlos then says "I'm not very good at drawing", while Pedro laughs at him saying "It's okay" (field note).

## DISCUSSIONS AND IMPLICATIONS

In a context of marginalization, this study shows that humor can be an important tool that can be used by students to negotiate their identities in chemistry classes, between the position of a "good chemistry student" and a playful student. Although the formation of science identity is commonly regarded as an individual construct, this study shows that the students' act to disrupt the seriousness of chemistry learning and position themselves as "playful chemistry learners" was a collective accomplishment in the classroom. The present work also showed that one of the roles played by humor in the classroom was to relieve students from the boring routine of chemistry learning; in addition, through humour, the students were able to use their own voice to dominate the chemistry classes beyond the teacher's control and the serious and authoritative nature of the official curriculum (Bakhtin, 1984). As discussed by Bakhtin, laughing has the potential to show "the world anew in its gayest and most sober aspects" (p. 94), allowing a radical resignification of all official meanings and discourses. Although it recognizes the importance of students' socialization within the discourses of chemistry and science, this study raises the question of how to go beyond deficit-oriented approaches in order to bring students' affective practices, such as humor, to shape the curriculum and develop a new, playful, and life-affirming environment where chemistry learning can flourish considerably.

## REFERENCES

- Bakhtin, M. (1984). *Rabelais and his world*. Bloomington, IN: Indiana University Press.
- Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge, UK: Cambridge University Press.
- Bucholtz, M., & Hall, K. (2005). Identity and interaction: a sociocultural linguistic approach. *Discourse studies*, 7(4-5), 585-614. doi: 10.1177/1461445605054407
- Carspecken, F. P. (1996). *Critical ethnography in educational research: a theoretical and practical guide*. London: Routledge.
- DeWitt, J., Archer, L., & Osborne, J. (2013). Nerdy, brainy and normal: children's and parents' constructions of those who are highly engaged with science. *Research in Science Education*, 43(4), 1455-1476. doi: 10.1007/s11165-012-9315-0
- Holmes, J. (2000). Politeness, power and provocation: how humour functions in the workplace. *Discourse studies*, 2(2), 159-185. doi: 10.1177/1461445600002002002
- Roth, W. M., Ritchie, S. M., Hudson, P., & Mergard, V. (2011). A study of laughter in science lessons. *Journal of Research in Science Teaching*, 48(5), 437-458. doi: 10.1002/tea.20412
- Varelas, M., Kane, J. M., & Wylie, C. D. (2011). Young African American children's representations of self, science, and school: making sense of difference. *Science Education*, 95(5), 824-851. doi: 10.1002/sce.20447
- Zhang, M. (2022). "No! I Can't!": noise and silence as everyday resistance at a Chinese suburban middle school. *Ethnography*, 23(1), 104-129. doi: 10.1177/1466138120910169