

Emotions and Scientific Initiation Among Underprivileged High School Students in Rio de Janeiro, Brazil

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Introduction

Provoc-Fiocruz is the first non-formal proposal for scientific initiation in basic education in Rio de Janeiro, Brazil. The program was established in 1986 at the *Oswaldo Cruz Foundation* (Fiocruz) and was specifically coordinated by *Joaquim Venâncio Polytechnic School of Health* (EPSJV) through a team of professionals at the Scientific Initiation Laboratory in Basic Education (Lic-Provoc). This team matches researchers with High School students so that they supervise the students in science practices and skills needed for them to advance to higher education. The research advisors who undertake High School students' supervision on science activities work in the areas of Biological, Health, Human or Social Sciences in the realms of this foundation (de Sousa et al. 2008; Sousa and Filipecki 2009). The purpose of the research is to understand the emotions of students in the development of learning scientific research.

Investigating Youth Scientific Experience's

Most Brazilian High Schools have not been socialized in the school realms with the codes, conventions, and skills required by scientific practices. Therefore, there is a great demand to teach the know-how of academic language, development of laboratory and research activities to this population. Previous researches have demonstrated the importance of the researcher-advisor relationship with High School students (Sousa and Filipecki 2009). They show how high school students can learn how to be mature and be responsible by expanding their interpersonal relationships through science initiation (Cabral Félix de Sousa 2013; Félix de Sousa and Filipecki 2017). Science initiation is an important characteristic for academic higher education in terms of professional choices and practices (de Sousa et al 2008; Santos et al. 2018a). Gender differences regarding diverse academic and professional choices and emotions have also been investigated (de Sousa et al. 2008; Santos et al. 2019).

This research is intended to contribute to thinking about academic practices, such as scientific education, as relevant when taught in basic education and not only in higher education. Most alumni of Provoc-Fiocruz continue their studies towards undergraduate programs. When alumni were interviewed, they recognized the relevance of having been socialized with the skills and dispositions required for scientific practices as necessary for their academic

choice and formation process in higher education (Cabral Félix de Sousa 2013; Sousa and Filipecki 2009). This study wants to study if and how social class influences the process of science initiation in association with the expression of emotions that can be or not be intertwined with the construction of knowledge that result in academic and professional choices.

Sociology of Emotions

According to Émile Durkheim emotions are mediated by social norms, having the role of being aggregators of a given society (Fisher and Chon 1989). Emotions in a formative scientific process allow young people to understand the meanings of being a researcher (Meis 2000). This formative process can occur by understanding the contents and by being exposed to the judgment of others and by the questioning of beliefs (Rosiek 2003). Emotions, therefore, participate in the development of students' scientific initiation and can mediate this process (Ovigli 2014).

Social Class and Brazilian Universities

Cultural capital unfolds into implicit and internalized values that define different performances in academic institutions according to social class (Bourdieu 1986, 2003). Despite Brazilian public policies' attempts to diminish the educational gap among social classes in this century (Brazilian Institute of Geography and Statistics 2018), André Salata (2018) indicates that young people from Brazilian classes with the greatest accumulation of economic and cultural capital have had much more possibilities in accessing higher education. Moreover, the history of Brazilian students' access to universities has been remarkably low compared to other nations (Organization for Economic Co-Operation and Development 2019).

Methodology

Discourse analysis will be used to analyze the semi-structured interviews that will be conducted with up to fifteen High School underprivileged students and fifteen researchers-advisors from *Provoc-Fiocruz*. The discourse analysis approach (Drid 2010) will take into account verbal and nonverbal signs to determine semantic complexity.

References

- Brazilian Institute of Geography and Statistics. 2018. *Summary of Social Indicators: An Analysis of the Living Conditions of the Brazilian Population*. Rio de Janeiro: IBGE. <https://biblioteca.ibge.gov.br/visualizacao/livros/liv101629.pdf>.
- Bourdieu, Pierre. 1986. "The Forms of Capital." In *Cultural Theory: An Anthology*, edited by Imre Szeman and Timothy Kaposy, 81–93. Wiley-Blackwell: Oxford.
- Bourdieu, Pierre. 2003. "Conservative School: Inequalities Against School and Culture." In *Education Writings: Pierre Bourdieu*, translated by Aparecida Joly Gouveia, edited by Maria Alice Nogueira and Afrânio Catani, 41–64. Petrópolis: Vozes.
- Cabral Félix de Sousa, I. 2013. "Outcomes of a scientific nonformal educational initiative for youth in Rio de Janeiro." *Cultural Studies of Science Education* 8(1): 193-213. <https://doi.org/10.1007/s11422-012-9431-1>.
- de Sousa, Isabela Cabral Félix, Cristiane Nogueira Braga, Telma de Mello Frutuoso, Cristina Ferreira Araripe, & Diego da Silva Vargas. 2008. "The Female Predominance of a Vocational and Scientific Education Programme for High School Students in Rio de Janeiro and Recife, Brazil." *Convergence* 41(2-3): 83-97.

- Drid, Touria. 2010. "Discourse Analysis: Key Concepts and Perspectives." *Al Athar Journal* 9: 20-25. Retrieved from: https://www.academia.edu/29803928/Discourse_Analysis_Key_Concepts_and_Perspectives.
- Félix de Sousa, Isabela Cabral, & Ana Tereza Pinto Filipecki. 2017. "Scientific Initiation of High School Students: a look at this Formation in a Brazilian Biomedical Research Institution." *Visioni Latinoamericane* 17: 74-95. Retrieved from: <https://www.arca.fiocruz.br/handle/iciict/20534>.
- Fisher, Gene. A., & Chon, Kyum Koo. 1989. "Durkheim and the social construction of emotions." *Social Psychology Quarterly* 52(1): 1-9. <https://dx.doi.org/10.2307/2786899>.
- Meis, Leopoldo. 2000. "Chocolatology." In *Science and Education: The Human-Technological Conflict*, edited by Leopoldo Meis, 14-16. Rio de Janeiro: SENAC.
- Organization for Economic Co-Operation and Development. 2019. "Education at a Glance 2019: OECD Indicators". Paris: OECD Publishing. Retrieved from: https://www.oecd.org/education/education-at-a-glance/EAG2019_CN_BRA.pdf.
- Ovigli, Daniel Fernando Boloventá. 2014. "Scientific Initiation in Basic Education: A More Than Necessary Activity." *Revista Brasileira de Iniciação Científica* 1(1): 78-90. Retrieved from: <https://periodicos.itp.ifsp.edu.br/index.php/IC/article/view/13/425>.
- Rosiek, Jerry. 2014. "Emotional Scaffolding: An Exploration of the Teacher Knowledge at the Intersection of Student Emotion and the Subject Matter." *Journal of Teacher Education* 54(5): 399-412. <http://dx.doi.org/10.1177/0022487103257089>.
- Salata, André. 2018. "Higher Education in Brazil of the Last Decades: Reduction in Inequalities." *Tempo Social* 30(2): 219-253. <https://doi.org/10.11606/0103-2070.ts.2018.125482>.
- Santos, Bruna Navarone, Cristiane N. Braga, & Isabela C. F. de Sousa. 2018a. "Gender Inequalities and Emotions in the Choices of Young People of the Scientific Vocation Program of the Oswaldo Cruz Foundation." Paper presented at Colóquio Internacional de Filosofia e Educação, State University of Rio de Janeiro, Rio de Janeiro, 05 October 2018. Retrieved from: <http://www.filoeduc.org/9cife/adm/trabalhos/diagramados/TR379.pdf>.
- Santos, Bruna Navarone, Ana T. P. Filipecki, Cristiane N. Braga, & Isabela C. F. de Sousa. 2018b. "The Availability for Careers in the Biological Sciences and Health of Alumni of the Oswaldo Cruz Foundation's Scientific Vocation Program." *Cadernos de Gênero e Tecnologia* 11(37): 27-39. <https://doi.org/10.3895/cgt.v11n37.7564>.
- Santos, Bruna Navarone, Cristiane N. Braga, Ana T. P. Filipecki, & Isabela C. F. de Sousa. 2019. "Youths in Scientific Research: Gender and Emotions Experiences." *Revista Brasileira de Iniciação Científica* 6(7): 94-107. Retrieved from: <https://periodicos.itp.ifsp.edu.br/index.php/IC/article/view/1147/1158>.
- Sousa, Isabela Cabral Félix de, & Ana T. P. Filipecki. 2009. "Mentoring: The Relationship That Makes the Difference in Scientific Research Training for Youth." *IEEE Professional Communication Society Newsletter* 53(7): 1-3. Retrieved from: https://www.arca.fiocruz.br/bitstream/iciict/8945/2/pub17_mentoringtherelation.pdf.