



OPEN SCIENCE AND THE SCIENCE EDUCATION FIELD: PERSPECTIVES AND DIALOGUES

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Scientific knowledge is a human and social construction, considering that social practices and actions standardized by certain scientific communities, which are recognized and internalized among its members, guide scientific work, that is, the processes of production, communication, evaluation and legitimization of what counts as a valid knowledge claim (Kelly, 2008).

It is the social nature of scientific work that enables dealing more critically with the question of objectivity versus subjectivity inherent in science. As Longino (1990) argues, as being produced by a community, scientific knowledge transcends the contribution of a single individual (or a subcommunity of that whole), since the hypotheses and conclusions are produced collectively through the convergence and disagreements of points of view. In other words, based on critical discursive interactions, established by scientific communities (Longino, 2002), it becomes possible to guarantee greater objectivity in the sciences “not by canonizing one subjectivity over others, but by assuring that what is ratified as knowledge has survived criticism from multiple points of view” (Longino, 2002, p. 129). Therefore, what is accepted as scientific knowledge has survived various kind of criticism imposed by public scrutiny.

A scientific journal plays a very important role in critical discursive interactions for the establishment of what counts as knowledge. Longino (2002) presents criteria and norms that should guide critical discursive interactions, in order to make them more effective in the production of knowledge. These criteria and relationships with the role of a scientific journal are presented below:

- **Venues:** refers to the recognition of the need for public forums to criticize scientific research evidence, methods, reasoning and conclusions. These forums can take place as discussions at scientific meetings and in specialized journals. The forums discussions may favor evaluation of the hypotheses, methodology and its relation with the research questions therefore leading to a better appreciation of the research results. Critical discursive interactions take place at various points in the development of scientific work in communities, but peer review is undoubtedly one of the contemporary marks of legitimizing knowledge. Peer review is an academic method that aims to assess and guarantee the quality, completeness and originality of an academic work. It aims to improve academic work according to the quality criteria taken by the journal in dialogue with the disciplinary field (Ross-Hellauer & Görögh, 2019).
- **Uptake:** There must be uptake of criticism. It means that the scientific community must be open to criticisms and modifications of principles that guide the research, accepting and reviewing its statements, arguing and considering the principle of moderate equality of intellectual authority.

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- **Tempered equality:** there must be an equal distribution of intellectual authority in the communities, emphasizing that what counts is the positioning regarding the research and not just the status of the researcher or research group.
- **Public standards:** involves criteria that guide the acceptance or rejection of the research and that are shared and open in the community. This becomes important since it prevents the skewed disqualification of the research from the use of arbitrary standards. These criteria can change over time according to new standards, objectives and values agreed in the community. Such patterns of analysis are also susceptible to critical analysis in the same way that occurs with the judgment of knowledge.

Based on these social productions of knowledge criteria and norms, this editorial aims to present new practices that will be implemented by the *Ensaio Research in Science Education* periodical in this quadrennium. They are in line with the Open Science paradigm recommended by Scielo and other publishers and platforms that agree with practices that go against the commercialization of science and the privacy of knowledge. In general, Open Science consists of a movement by the academic community to make scientific research products and processes accessible and usable by all (SciELO, 2018). The pillars of the Open Science movement are: transparency, reuse of research data, reproducibility of results and methodologies, cooperation and responsibility. The main practices to be implemented in journals, according to this movement, are (SciELO, 2018):

- **free access, virtual, without any restrictions (including financial ones)** to all scientific articles published in academic journals;
- **preprints:** consists of the deposit of the complete manuscript, identified and unpublished by the authors on preprint servers (such as arXiv, bioRxiv, scielo preprints, preprints.org, F1000, OSFpreprints) before being sent for analysis in a scientific journal to be validated. The goal is to speed up the dissemination of research and ensure authorship of new ideas, processes and discoveries. Once uploaded to a public preprint server, the manuscript is identified with a DOI and its access is public. When submitting the manuscript for evaluation in a journal, the authors inform the DOI identifier of the work deposited on the server.
- **data and programming codes:** consists of the deposit in repositories of program codes and research data, which are accompanied by metadata to define the authorship of the researchers. The deposit of data must be done considering the ethical principles that outline the development of the research. Considering that data can be analyzed in different ways according to the researcher's theoretical lens, the objective of sharing research data aims to favor reuse in other investigations, it also helps in the evaluation of the manuscript, in the preservation of data and reproducibility. Taking into account that research funding is primarily done by public initiative, it is considered that the reuse of data can contribute to the good use of public investment in research.
- **open peer review:** Normally, in the Science Education field, the peer review process takes place in a double blind manner, so that neither the authors nor the reviewers are revealed to each other. The practice of conducting open reviews has gained prominence in the agenda of the Open Science paradigm, with the main objectives of promoting greater participation in scientific productions, giving more transparency to arbitration processes, avoiding bias, and encouraging the participation and partnership of reviewers in manuscript reviews, since reviews are also published with the accepted articles (Ross-Hellauer & Görögh, 2019). The social practices of scientific communities are learned from participation, that is, from the involvement of individuals with them. Sometimes this implies prolonged interactions between individuals and members already familiar with the ways in which knowledge is produced, communicated, evaluated and legitimized within the community (Kelly & Licona, 2018). In this sense, in addition to the factors already highlighted in the peer review advantages, the publication

of reviews becomes an educational action for those new to the community. In fact, there are some reports that highlight that open reviews add quality and consistency (Ross-Hellauer & Görögh, 2019). On the other hand, some research shows that authors or reviewers prefer not to disclose identities, not signing reviews, for example, for interpersonal reasons and political conflicts (Bornmann, Herich, Joos, & Daniel, 2012). In this way, each community reflecting on the benefits of peer review, aiming at criteria for its implementation from the possible diversities of opening identities (total or partial opening of identities, opening to the community in general, open interaction, for example) and the different ways in which opinions can be published (followed by the article, forums, placed in the article with comments, for example) (Ross-Hellauer, Deppe, & Schmidt, 2017).

Free access and continuous publication are already adopted by *Ensaio Research in Science Education* journal in line with the Open Science perspective. As of this year, the Scielo Open Science form (available in three languages) began to be completed by all authors when submitting the manuscript, informing whether it is already available on any preprint server and the identifier. The intention to make supplementary research materials available in some type of repository will also be questioned.

Taking into account that the practice of peer review is very promising, but limited in the area, a pilot study of the implementation of this practice for a thematic axis in the area of Science Education will be carried out in the years 2021 and 2022. From the experiences, the paths will be evaluated for an organic work process with peer review. Here, the path that led to this choice was briefly presented.

In the year 2020, the members of the editorial team of *Revista Ensaio Research in Science Education*¹ sought to critically evaluate the procedures and reflect on the demands of the journal's authors and reviewers. In addition, there is a great dedication to thinking about the journal's course in the face of the persistent crisis that is plaguing the Brazilian community of researchers and professors and which impacts academic production in the country.

In one of these analyzes, a survey on the themes of articles published in the journal from 2017 to 2019 was carried out, considering the thematic axes of relevant events in the area, such as those proposed in the last National Meeting of Research in Science Education (ENPEC). A low number of articles in certain areas was found, namely: Health Education and Science Education; Theoretical and methodological issues of research and Differences, multiculturalism and interculturality.

In this sense, following the editorial plan aligned with the Open Science perspective (which seeks equity, diversity and inclusion), we seek policies that aim to favor a greater number of publications related to the themes previously exposed.

This proposal aims to contribute to the realization of one of our most desired objectives: to make *Ensaio* a more diverse and, therefore, more representative journal in the area of Science Education.

In order for the community to join us, continuing the proposal of this editorial, in March 2021 we will present an invitation letter to authors interested in publishing works in the thematic line 'Differences, multiculturalism and interculturality', clarifying the guidelines of the evaluation process of type OPR. The choice of this process is justified by the attempt to qualify the debate on the theme, recognize the effort of authors and reviewers and, in practical terms, monitor the pilot project of this editorial practice, reflecting on its implementation guidelines and results. Thus, in the invitation letter, we also outlined the methodological paths that will be adopted by the journal in the open peer review process, inviting referees to work together with us in this endeavor.

We cordially say goodbye, wishing an increasingly open dialogue in our community.

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NOTES

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