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## **Bilingual Geoscience Education: Approaches to Integrating Deaf Students in Educational and Academic Environments**

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## Bilingual Geoscience Education: Approaches to Integrating Deaf Students in Educational and Academic Environments

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### Introduction

The formal process of knowledge transmission in schools, courses, and universities has historically been structured in an exclusionary manner for people with disabilities (Alves & Santos, 2024; Moreira et al., 2025), particularly the Deaf community. Schools, as primary spaces for educational access, represent the initial point of this inequality, especially when inclusive classroom teaching still faces significant challenges (Rodrigues & Silva, 2010; Guarinello et al., 2008). This scenario highlights disparities in knowledge access, worsened by the use of methodologies that are often inaccessible (Monteiro, 2006). In the context of pure sciences such as Mathematics, Linguistics, or Philosophy, the use of technical vocabulary already presents significant complexity (Carmona, 2015; Lobato, 2015). In applied sciences, the terminology becomes even more challenging. In this context, the excessive reliance on textual content, the use of specialized language without proper adaptation, and the lack of specific training for educators contribute not only to learning gaps but also to the systemic exclusion of Deaf individuals from educational, academic, and, eventually, professional environments. This abstract aims to present bilingual (Libras and Portuguese) educational strategies targeted at educators in the Geosciences field and to discuss practices that promote the effective integration of Deaf students into both academic and professional settings. To this end, a literature review was conducted, focusing on inclusive pedagogical practices designed to support accessible lesson planning and to analyze the main challenges faced by Deaf students, including language barriers, lack of specialized interpreters, and non-adapted teaching methodologies.

### Method

The literature reveals gaps across multiple stages of the educational process. Based on this, several promising practices have been identified, including the use of visual resources and assistive technologies, the creation of bilingual glossaries (Libras–Portuguese) containing technical terms in the field, and the production of educational videos in Libras to support instruction. Ongoing training for teachers (Lang, 2002) and interpreters (Guarinello et al., 2008; Martins, 2006), with a focus on technical vocabulary (Hahnl et al., 2025), is also essential for more effective pedagogical mediation. Furthermore, positive outcomes have been observed in institutions that implement Libras-mediated study groups and hands-on activities that stimulate visual and tactile communication. These actions have demonstrated a significant impact on the retention (Bisol, 2010) and academic performance of Deaf students (Ansay, 2007), providing concrete pathways for fostering more accessible and inclusive learning environments.

### Results and Conclusions

The findings emphasize the urgent need for a truly inclusive bilingual educational approach, particularly within the Geosciences, where the technical complexity of the content demands specific adaptations. The systematic implementation of strategies such as specialized teacher training, the development of accessible materials, and the recognition of Libras as a language of instruction should be considered an institutional policy priority. Ensuring full access to scientific knowledge is not only a matter of equity, but also a commitment to epistemic diversity and the development of a more representative and democratic scientific community.