Review of International Geographical Education I RIGEO I 2020

# RIGE

ISSN: 2146 - 0353

## Review of International
## GEOGRAPHICAL EDUCATION

www.rigeo.org

# A comprehensive literature analysis of empirical studies on language in geography instruction at the elementary and secondary school levels

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*Article Info*

*Received: 27-12-2024* *Revised: 14-01-2025* *Accepted: 26-01-2025*

**ABSTRACT**

The growing linguistic diversity in today's schools has sparked interest in the role of academic language in geography instruction. Given that students' daily language is different from subject-specific language, language-aware geography education helps meet subject-specific language expectations. But there doesn't seem to be any comprehensive review or empirical investigation on the subject. In order to provide the groundwork for future studies in this area, this project will comprehensively examine papers that have conducted empirical research on the role of language in geography instruction. This research followed the PRISMA standards and assessed 38 papers from three literature databases: Scopus, Web of Science, and ProQuest. The subject-specific topics, conceptions of space, working techniques, and studied languages were used to classify the empirical investigations. The studies' primary results demonstrated that written language and the text/discourse level were the primary foci of the research. The majority of the research focused on reading abilities. In addition, the publications focused on physical geographical subjects. For studies examining the use of language in geographical education, this review offers theoretical and practical considerations for the future.

KEYWORDS
Geography education; language; primary and secondary education; systematic review

## 1. Introduction

The significance of subject-specific proficiency in written and spoken language is rising, particularly in light of the rising tides of migration and globalization (Peukert & Gogolin, 2017). Considering this setting, the presence of several languages in geography classes leads to students' obstacles to language and learning by reducing their exposure to scholarly materials (Spires, Kerkhoff, Graham, Thompson, & Lee, 2018; Fang, Schleppegrell, & Cox, 2006). This is crucial because, depending on their level of socialization and previous linguistic expertise, students may not be acquainted with the subject-specific aspects of the language employed in geography (Peukert & Gogolin, 2017). Furthermore, subject-specific language has distinct needs than students' ordinary language (Halliday, 1999; Snow & Uccelli, 2009).

## 2. Theoretical framework

Exemplary education in geography seeks to provide students with the tools they need to understand and make sense of the world via the study of its many geographical and temporal aspects, as well as the relationships between them (Brooks, 2017; Lane & Bourke, 2019). In

order to recognize spatial patterns and related difficulties, it is crucial for students to have a well-rounded grasp of geographical processes as they pertain to the human-environment linkages that make up geographical thinking (Alexandre, 2009; Lambert, 2011; Puttick & Cullinane, 2022).
The fundamental way for students to access the language- and content-related aspects of geography is through subject-specific language, which, from an epistemological standpoint, forms the foundation for their geographical thinking: "[...] thinking geographically and commu- nicating geographically are inextricably entwined with one another" (Delaney & Hay, 1997).
To fully grasp the ideas, concepts, and principles covered in geography classes, one must first

become fluent in the subject's unique language, which includes its own syntax, grammar, and vocabulary (Gallagher & Leahy, 2019; Kirk, 1995).

Because of this tight relationship, the topic and language go hand in hand. The research will identify the most distinguishing important elements of each idea independently in order to systematically build categories, therefore developing fundamental categorization schemes, despite the interwoven notion of geography and its language.

### 2.1. Conceptualizing the subject of geography

Fundamental to the field of Geography are questions of space and its features (Gersmehl, 2014). Physical geography, which includes subfields like geology, geophysics, and climatology, and human geography, which includes subfields like economics, urban planning, and ethnology, are two common ways that geography is taught and studied (Gersmehl, 2014; Lambert & Balderstone, 2012). Topics like as migration and climate change, which include the interplay between human and natural systems, are particularly prevalent in this area of study. Also, it's ever-changing since both society and scientific understanding are in a perpetual state of flux (Lambert & Balderstone, 2012; Puttick & Cullinane, 2022). Given its use in addressing the dynamic complexity of Earth, the idea of space is inherently geographical (Bednarz & Lee, 2019; Symaco & Brock, 2017). Taking into consideration that geographers have different ways of thinking about space—for example, as space, place, and scale (Cresswell, 2008; Lambert, 2011; Taylor, 2009) or as a container, locational relation, object of perception, and social construct (Wardenga, 2002)—this study identifies two competing ways of thinking about space. We begin by defining physical-material space according to the neutral quantifiable features, structures, and functions of geographical phenomena (Bednarz & Lee, 2019; National Research Council, 2006). Secondly, according to Weiss (2020), space is defined from a constructivist point of view when it encompasses both individual and communal conceptions of space, as well as space as a social product of communication and practices.
Students build capabilities in working procedures via their handling of spatial or geographical information. Data collection and the manipulation of discontinuous texts like maps, diagrams, and satellite pictures constitute the basis of these activities, which may lead to the creation, presentation, and assessment of geographical information (Lambert & Balderstone, 2012). In addition, geographical information may be presented visually, graphically, or textually via the use of idea maps, which show spatial relations, and other similar tools; examples include mental maps and the use of diagrams to increase graphicness (Lambert & Balderstone, 2012). The subject's categories are summarized in Table 1.

### 2.2. Conceptualizing language in geography education

Subject-specific language in geography education can be conceptualized based on three language dimensions (word, sentence, and text/discourse level) as well as language actions (reception, production, interaction, and mediation). A summary

of the key features of language actions is illustrated in Table 2.

**Table 1.** Summary of the categories of geography.

| Subject of geography | Key features |
|---|---|
| Themes | Subject-specific content from physical and human geographical systems and their interrelations. |
| Concept of space | Two notions of space based on neutral quantifiable features and their interrelations as opposed to perceptual, socially constructed notions of space. |
| Working methods | Working with the representation of spatial information. |

**Table 2.** Summary of the categories of language actions.

| Subject-specific language actions | Key features |
|---|---|
| Reception | Oral and written understanding of input |
| Production | Oral and written text production |
| Interaction | Symmetrical and asymmetrical exchange of geography-specific information |
| Mediation | Oral and written transfer of geographical information between different modes of representation |

Abedi et al. (1997) and Schleppegrell (2004) both state that subject-specific language may be examined at the word, phrase, and text/discourse levels. Speares et al. (2018) note that the word level is where subject-specific terminology and geographical ideas that need cognitive access are communicated. Also, phrases used in geography classes may not always have the same meaning as they do in common parlance (Gallagher & Leahy, 2019; Morawski & Budke, 2017).
Embedded in phrases at the sentence level are subject-specific terms. When discussing subject-specific work techniques (e.g. chunks), these expressions often appear in structures that are comparable to one another. Furthermore, fundamental communicative linguistic behaviors are included at the phrase level (Schleppegrell, 2004). As a result of including features from both the word and sentence levels, as well as complexity linked to cohesiveness, the text/discourse level has the greatest linguistic demands (Berendes et al., 2018; Budke & Kuckuck, 2017). At this stage, students of geography are taught that language is associated with both continuous and discontinuous texts. Reading and writing texts with dense material presented in a clear and succinct manner using geographically particular terminology to describe complicated processes is what this phrase alludes to (Schleppegrell, 2004; Snow & Uccelli, 2009).

A more comprehensive system for classifying language used in geography education is provided by the respected Common European Framework of Reference for Languages, which takes into account communicative language acts (reception, production, interactions, mediation) in addition to the language component. According to the Council of Europe (2020), the following linguistic acts are shown in relation to spoken and written language modes:
In most contexts, reception is comprehending material either orally or in writing. Students need to use their cognitive abilities to analyze and comprehend oral and written inputs that are geography-specific, such as audio or teacher-led discussions and continuous and discontinuous texts (Morawski & Budke, 2017). Because it encompasses the overt linguistic ability of reading comprehension, written reception is of special relevance to this research (Council of Europe, 2020). The reading of texts and maps have been specifically included in this research (Chang et al., 2021; Hinde et al., 2011; OECD, 2019) due to reading being one of the sources of information production.
What we call "production" in language is the use of deciphered and comprehended geographical information in both spoken and written forms. In order to highlight the more formal forms of writing in geography classes, this research included the category of producing a formal text in written production (Council of Europe, 2020; Morawski & Budke, 2017).

The third aspect of oral and written contact is the possibility of students' (symmetrical) and instructors' (asymmetrical) co-construction of geographically particular knowledge and perspectives. Furthermore, it is expected that students respond to oral contributions using language that is suitable for their geographical area (Morawski & Budke, 2017). After all that, mediation is the process of creating and communicating meaning via many mediums (Council of Europe, 2020). This may work for elucidating geographical concerns that rely on, say, maps. Not only that, but mediation also entails transforming spatial data and information into alternative representations (Morawski & Budke, 2017). Because it "makes student scientific thinking and reasoning visible" (Osborne et al., 2004, p. 995), argumentation competency is intrinsic. The Toulmin scheme (data, warrant, backup, qualifier, claim) is considered a quality criterion in geography education, hence we included reasoning with argumentation in our classification system (Toulmin, 2003). Nevertheless, it should be remembered that linguistic dimensions and actions are very closely connected, even if this specific separation is required to establish a precise classification system (Council of Europe, 2020).

## 3. Method

Following the PRISMA criteria, a comprehensive literature analysis was carried out in English on the topic of language in geography education research in order to answer the research objectives posed by this study (Page et al., 2021). Also, a methodology was developed by thinking about what research to include and what to leave out while making our selections. We then used a theoretically grounded and predetermined literature-based classification system to evaluate these studies (see to Section 2). Figure 1 displays the PRISMA scheme that was produced.

### *3.1. Literature search*

Three databases, namely Web of Science, Scopus, and ProQuest, were searched systematically. Web of Science and Scopus were both included because of their respective numbers of peer-reviewed papers (Creswell, 2002). To expand our access to dissertations, we also included ProQuest. We also created a search protocol that was used to search the relevant literature databases from January 1, 2000, to November 17, 2021, using a syntax that was suitable for language usage in geography education:
We were able to conduct a thorough search by include the phrases geography and earth science1 in our query (National Research Council, 1996).
The search procedure was enhanced by include quotation marks to guarantee that full words were entered. Curved brackets were used in addition to quote marks in the instance of ProQuest. Aside from this, in terms of educational attainment,

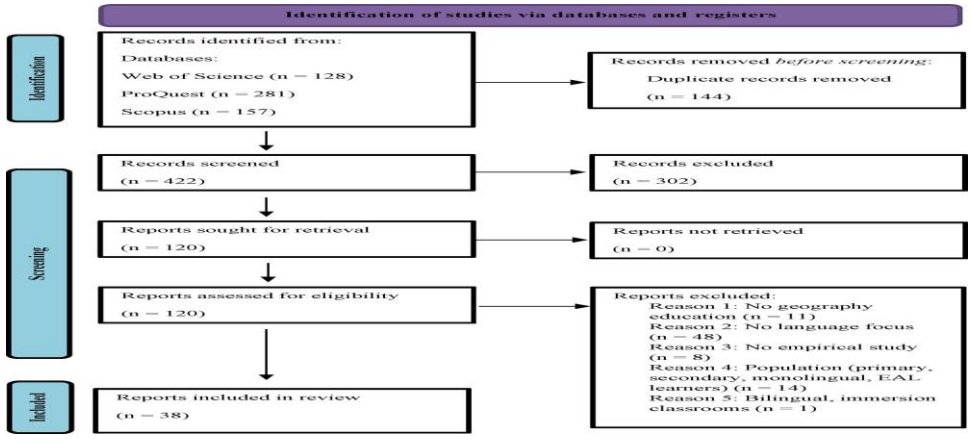


**Figure 1.** Systematic search and selection process based on the PRISMA statement. Source: Adapted for this study based on Page et al. (2021).

we added synonyms that evolved after finishing the preliminary searches. Moreover, truncations (*) were applied to the search syntax for Web of Science and Scopus to ensure that the various word endings of the terms were included. The terms of the syntax referring to language in geography education were inferred from pre- liminary searches and included rather explicit language-related key skills, e.g. "read- ing" or "writing" (Brown & Ryoo, 2008; Snow & Uccelli, 2009).

### 3.2. Literature analysis

Following the elimination of duplicates, the last search was carried out on 17 November 2021, yielding 422 publications. Following this, 302 articles were removed from consideration after their titles, keywords, and abstracts were evaluated using the following criteria:

1. The publication must be peer-reviewed.
2. The publication must be in English to ensure a transparent and replicable approach.
3. Empirical publications must include the aims of the research, descriptions of participants, study designs, and data.
4. The study's focus should be on language in geography education, including language actions indicated by the Council of Europe (2020).
5. The article's context should refer to primary and secondary geography education and its students. Publications examining teacher variables or parents' views were excluded.
6. Publications on research conducted in monolingual classrooms, which may involve students with English as additional language (EAL) backgrounds, were included. We excluded publications on bilingual or immersion education, as they involve undertaking a different approach toward foreign language acquisition (Dalton-Puffer & Smit, 2013; Nikula, 2016).
7. Publications on research involving students with special needs were excluded.

The results were screened by an independent second rater. We found that the interrater reliability resulted in $\varkappa = 0.92$, indicating an almost perfect agreement (Brennan & Prediger, 1981). All discrepancies were resolved through discussion and a consensus was found.

Following the full-text screening of 120 publications based on the respective inclusion and exclusion criteria, 38 papers were found to be eligible for inclusion in this systematic review and were exported into an Endnote Library. Data extraction was carried out by one researcher and then systematized based on the categorization schemes.

## 4. Discussion

The researchers in this study set out to fill a gap in our knowledge on how language factors into studies of geography taught in elementary and secondary schools. In addition to the previously mentioned, the present research sheds light on geography by analyzing relevant articles across many categories. The following questions served as the basis for this review's methodology:

Research Question 1: How much is known about the use of language in elementary and secondary geography lesson plans?

The second research question concerns the precise topics, methodologies, and spatial ideas addressed by studies in elementary and secondary geography classes.

We found 38 papers that were peer-reviewed and looked at the aforementioned results experimentally. Three major conclusions emerged from the current study after reviewing the systematic review. First, while there were a few studies that looked at language at the word or sentence level, the majority of the articles focused on text or discourse level language (33 studies). Second, it became clear that publications were on written language (33 research) rather than spoken language (14 studies). Ten of the studies that were chosen really looked at both forms of language. Thirdly, human geographical themes were underrepresented in the publications, with just three addressing physical-geographical topics. This is in contrast to the twenty-two research that dealt with human-geography.

Following our theoretical approach (Berendes et al., 2018; Snow & Uccelli, 2009), our first and second results emphasize that language at the text/discourse level is associated with both continuous and discontinuous texts in geography education studies. Furthermore, reading a text was the primary language competency studied in the chosen collection of studies; notable examples of such works are Alford and Windeyer (2014), Chang et al. (2021), Lee (2010), and Ward-Washington (2008). Interesting to notice in this context is that the focus was on teaching reading as a crucial language ability using a language-aware approach.

this research. One study that looked at EAL students' reading abilities employed a "language-driven content and language integration model where content is used as a vehicle to learn the target language (Banegas, 2012; Met, 1999)" (p. 79) to explain the findings. The study's intriguing finding is that language teachers can improve language-aware geography education by drawing on their knowledge of "the language demands of geography (...) to identify the literacy practices within geography that create opportunities for learn-ing" (p. 91). "It is recommended that high school content area teachers are trained in the most current reading research practices, especially strategic reading instruction" (p. 67) according to Ward-Washington's (2001) study, which lends credence to this viewpoint. According to one theory, the results show that reading proficiency gives students a better grasp of the geographical information and spatial patterns shown, which in turn helps them to foresee potential spatial problems in the future across different time and space dimensions (Alexandre, 2009; Lambert, 2011).

Gallagher and Leahy (2019), the OECD (2019), and Seah and Chan (2021) have all confirmed what many had suspected: reading proficiency is critical to academic success. Keeping this in

mind, it's worth mentioning that Chang et al. (2021) also found evidence supporting the idea that students' reading abilities are positively correlated with their subject-specific accomplishments. The findings of Lee (2010) corroborate this, since they show that teaching subject-specific language explicitly improves the meaning construction from geographical

information (p. 84). According to Alexandre (2009) and Puttick and Cullinane (2022), this helps us grasp the idea of geography more thoroughly by revealing its interconnection and complexity.

In addition to studies on reading texts alone, other publications have investigated reading abilities in conjunction with geographically specific discontinuous documents, including maps (Adeyemi & Cishe, 2016; Falode et al., 2016; Richter et al., 2012; Słomska-Przech et al., 2021; Utami et al., 2018). Utami et al. (2018) found that "students who have low literacy geography have difficulty in using map" (p. 1), highlighting the interconnectedness of language abilities and map decoding abilities. A number of studies have examined argumentation and reasoning specifically; for example, Chang (2010), Engelen and Budke (2021), Kerlin et al. (2010), Pallant et al. (2020), Yoo et al. (2020), Ruhimat et al. (2018), and Pallant et al. (2010). The findings of these studies further highlight the inseparable connections between language and content education. Research by Engelen and Budke (2021), Kerlin et al. (2010), and Yoo et al. (2020) suggests that using the Toulmin scheme structure explicitly improves the quality of both written and oral arguments on geographical topics. The idea of incorporating counterarguments and evidence relevant to geography, such USGS data, led to the development of more qualitative argumentation constructs. Alexandria (2009) and Bourke (2019) found that this helped pupils even more with geographical thinking, communication, development, and expressing their own opinions on spatial problems.

Twelve studies addressing research on earth science classes (Adams, 2009; Chang, 2010; Chang et al., 2021; Kerlin et al., 2010; Lee, 2010; Nuryanti et al., 2019; Pallant) demonstrate the dominance of physical-geographical themes in geography education research, aside from the role of language.

Pedretti (2009), Thomas (2017), Polman & Pea (2001), Yoo et al. (2020), and Voss (2011) are cited. The studies mostly addressed natural catastrophes, the water cycle, and astronomy as physical geographical subjects. Interestingly, human-centered geographical issues were almost ignored.

Considering the inseparable nature of language and content, this study's major findings suggest that current research in geography education views students' subject-specific language proficiency as crucial to their level of access to and comprehension of geographical information. Therefore, it is the duty of geography educators to provide students with language skills relevant to geographical subject matter.

The findings of this research may have three possible limitations, however. One potential drawback is that only empirical articles written in English were included. This might have led to bias. It is possible that research published in other languages was missed since all non-English papers were excluded. The second possible drawback is that this research only used three databases—Scopus, ProQuest, and Web of Science—to search for peer-reviewed papers. It follows that further searches on other platforms, such Google Scholar, would have uncovered reports and other non-peer-reviewed literature. The challenges of conducting a systematic search for these led us to restrict our search to articles that have been peer-reviewed. Thirdly, the selection of a subset of the studies that were ultimately returned was likely influenced by the search phrases that were included or excluded. Instead of the language activities proposed by the Council of Europe (2020), we included explicit language abilities that had previously been deduced from the literature. So, it's possible that we missed studies that looked at language in geography instruction but used terminology different from those we included.

## 5. Conclusion

This study does a good job of summarizing the empirical studies on the language used in geography teaching at the elementary and secondary levels, although it does have some limitations. Teaching students to think geographically begins with helping them develop their language skills, which in turn lead to a more complete view of the world as a result of human-

environment linkages (Brooks, 2017). Thus, by laying the groundwork for recognizing advancements, research desires, and future requirements in the subject of geography education, this systematic review significantly contributes to the research community in this area. More research is needed to prevent prejudice in geography education, as Lambert (2010) suggests. For example, there needs to be more study on the function of language in geography education. Since no previous work has offered a systematic review based on a language-and content-based categorization approach, the current investigation is an important step in the right direction.

There are several theoretical and practical consequences stemming from this study's findings. At the level of spoken language in particular, the language-related categorization system places a heavy emphasis on a research desire. Additionally, it promotes additional studies that look at how subject-specific language is learned at the word level.

In addition, the subject-related categorization method used in this study suggests a need for geographical interventions centering on human geographical themes in research. Furthermore, publications seldom focus on subject-specific working approaches.

Last but not least, this study sheds light on the current literature on the topic of language in elementary and high school geography classes. That students' subject-specific language skills are critical to their geography education and accomplishments is particularly highlighted, and it adds to the expanding body of data indicating the rising significance of the function of language in geography education research. It is our sincere desire that this study will pave the way for more research in this vital field.

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