

# Curiosity in geography education: A systematic review

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**ABSTRACT** Curiosity is a human quality manifested as the desire to discover new information, things, or experiences. The nature of the discipline of geography, as well as the diversity of geography education, offers a wide range of opportunities for the exercise of students' curiosity. Geographical education highlights geographical thinking, which cannot be tackled without engaging with students' curiosity. What do we know about student curiosity in geography education? Using a systematic review and hermeneutic content analysis, we investigate how scholars have defined curiosity and its importance in geography education, identifying four important areas of geography education closely related to the development of student curiosity: inquiry/questioning, teaching with avatars, fieldwork, and learning with technology. We interpret these four areas in relation to applied geography, geographical thinking, and the roles of geography teachers. Research has shown that incorporating curiosity into geography education can change traditional perspectives on the use of technology, observation, and questioning.

**KEY WORDS** geographical education – curiosity – student's curiosity – geographical thinking – applied geography – questioning – systematic review – hermeneutic content analysis

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## 1. Introduction

The 1996 Delors Report of the United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasised the significance of lifelong learning and the development of curiosity to achieve quality education. The report indicated that education systems have been failing to recognise students' potential for curiosity and creativity. Moreover, research on students' curiosity in school shows that current educational systems are inhibiting students' curiosity (Jirout, Vitiello, Zumbrunn 2018). Noting the decline in early childhood curiosity as students age due to the lack of opportunities to explore, play, or collaborate in groups, Carney (2022, for UNESCO) highlighted the need to ensure quality teaching for all students, underscoring the importance of providing teaching that supports the development of children's curiosity and creativity. Traditional teaching methods are the most important factor in students' loss of curiosity (UNESCO 2020, OECD 2024). Methods such as traditional frontal teaching, transcribing material from textbooks into notebooks, and traditional notes from teachers' explanations limit students' curiosity, creativity, and critical thinking (Schleicher 2023). Constraining students' curiosity will also constrain their desire for knowledge and discovery of new phenomena (Institute of the Czech Language 2011).

Curiosity can be understood as an 'eager wish to know or learn about something', which can also mean: 'something that is interesting because it is rare or unusual' (Cambridge 1999). This duality reflects curiosity as a desire for knowledge and an attraction to anything uncommon or strange. The Institute of the Czech Language (2011) defines curiosity as 'the quality of one who (or what) is curious; to burn with curiosity; to satisfy one's curiosity; a curious question', and as someone 'who desires to gain new knowledge, new enlightenment (inquisitive)'. Psychologically, curiosity is linked to motivational processes and personality traits, such as wisdom, interest, and the drive to acquire knowledge (Shin et al. 2019). Encouraging students' curiosity not only stimulates their engagement but also their creative productivity and innovation, as curiosity and creativity are interdependent. Globally, curiosity appears in educational frameworks either explicitly, as in PISA 2022 (OECD 2024), or implicitly, linked to attitudes, motivation, critical thinking, and potential realisation (UNESCO 2020, Carney 2022, CSI 2024). This underscores curiosity's pivotal role in fostering intellectual growth, discovery, and lifelong learning while highlighting the pressing need to integrate curiosity effectively into national education systems, such as in Czechia.

Despite long-term reform efforts, Czech education continues to struggle with students' lack of interest in learning and poor desire to find solutions (CSI 2024). Czech geography education is still characterised by traditional methods (Marada et al. 2017), leading to the fact-based nature of teaching (Bendl, Rubáš 2023). This may be one of the reasons for the long-standing calls for the transformation of

geography education (Knecht, Doboš 2024; Bendl, Rubáš 2023). Geography curriculum makers have sought to address this situation in the current revision of the Czech geography curriculum within the larger revision of the Framework Curriculum for Primary Education (FEP PE 2024).

Identifying what to include within the national geography curriculum is challenging owing to its multiparadigmatic nature (Knecht, Doboš 2024), as this diversity often results in a predominantly fact-based approach that can limit the potential to foster curiosity. Nonetheless, the multiparadigmatic nature of geography offers diverse paradigms, from traditional to (post)modern approaches, providing varied teaching concepts and enabling students to develop various knowledge and skills (Puttick 2013), which can encourage curiosity. Geographical thinking, as a response to this diversity (cf. Maude 2024), involves working with key concepts and formulating geographical questions (Geographical Association 2022). As Bendl and Marada (2021) pointed out, geographical questions (questioning) on geographical concepts should stimulate students' cognitive processes to the maximum extent and increase the intellectual challenges of geography teaching.

Globally, particularly in Czechia, geographical thinking is increasingly integrated into school geography (Geographical Association 2022, Maude 2024; FEP PE 2024, in progress), compelling teachers to reconsider the geography class curriculum (Geographical Association 2022, Maude 2024). In the Czech national curriculum, geographical thinking is emerging together with an understanding of the spatial distribution of natural and social phenomena, critical evaluation of information, and active and responsible behaviour in real and digital spaces regarding the sustainability of life on Earth (FEP PE 2024, in progress). Such generally defined curriculum content should be developed through modern teaching strategies (practical tasks in the classroom and outdoor environment, projects, presentations, creation, and analysis of mind maps or discussions) and assessment techniques (portfolios, written tests, or essays); however, the concept of curiosity is not explicitly indicated in the curriculum.

Although the concept of curiosity is not explicitly mentioned in the Czech geography curriculum (FEP in general), the above may imply that teachers can develop students' curiosity by geographical questioning, thereby stimulating their intellectual development and critical thinking, as well as their interest in geography. However, although quality literature on geographic thinking (e.g. Geographical Association 2022; Maude 2024; Bendl et al. 2024) and geographical questioning exists (Řezníčková, Matějček 2014), little is known about curiosity in geography education. Thus, given the significance of students' curiosity in facilitating geographical enquiry and thinking, the gap left by the lack of literature review curiosity in geography education must be filled.

This review aims to provide insights into the issue of curiosity in geography education by addressing the following fundamental question: What does curiosity

in geography education represent? In this systematic review, we employed couple of research questions to explore whether curiosity in geography education is addressed in the international literature and how. We present the design of a systematic review with an applied hermeneutic content analysis and interpret the findings.

## 2. Method and aims

A systematic review (Finfgeld-Connett 2014) and hermeneutic content analysis (Vieira, De Queiroz 2017) seem to be relevant research approaches to analyse publications' content. Thus, this study aimed to analyse the current understanding of students' curiosity in geography education. The analysis is based on the following questions:

1. How do authors of publications on geography education define curiosity?
2. How do the authors of these publications emphasize the important aspects of increasing curiosity in geography education?

## 3. Procedure and criteria

We selected the online Scopus and Web of Science (WoS) databases for this systematic review. Given our research questions, we analysed not only research studies, but also 'theoretical' papers (Sjølie 2014) following the recommendations of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Page et al. 2021).

We selected the following keywords and their combinations: school, education, teaching, elementary school, primary school, students, pupils, geography, geography, education, and curiosity. The final keyword combinations in the SCOPUS and WoS databases (based on the tested combinations) were as follows: TITLE-ABSTRACT-KEY ((school OR education) AND (students OR pupils) AND (geography) AND (curiosity)). No time limit was set, nor was there a limit set for the educational stages.

We obtained 28 results from the WoS database. The Scopus database contains 48 publications, with 13 duplications between the databases. Content analysis was performed on 63.

Publications had to meet these criteria:

- Written in English.
- The abstract of the publication (or amongst the keywords) contains the term curiosity.
- The term geography appears in the abstract of the publication (or keywords).

After reviewing the titles and abstracts, 42 titles were excluded, and of the remaining 21 titles, the final number of publications was 8 after applying a PRISMA scheme providing a systematic overview of the subject area (Page et al. 2021; see Fig. 1).

Exclusion criteria for the publications were:

- The author/s did not focus on curiosity but only mentioned it.
- Geography was only considered within the framework of the natural sciences.

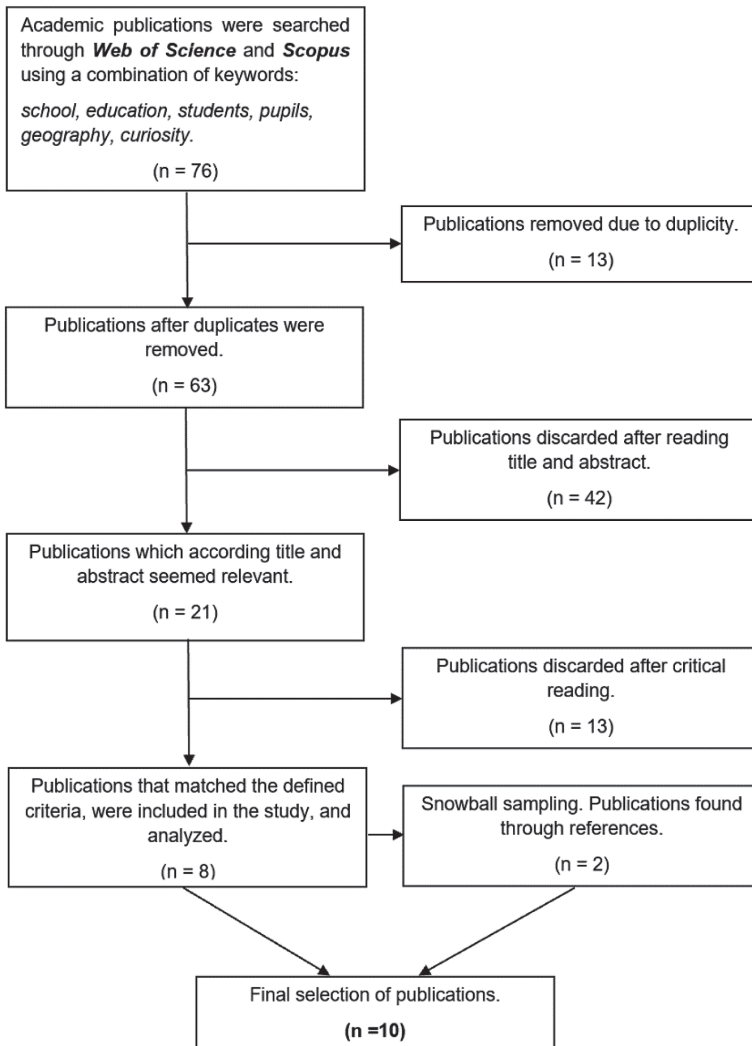


Fig. 1 – PRISMA flow diagram depicting the selection of studies for the review. Own illustration.

**Tab. 1** – Analysed publications, their characteristics, and areas of aspects

Author (year)	Type of publication	Areas of aspects	Basic characteristics of publications
Harichandan, Shaik, Sumni (2004)	theoretical chapter (added by snowball method)	enquiry/questioning	<ul style="list-style-type: none"> <li>- aim: develop an understanding of the teacher's role in applying teaching methods, and develop an understanding of the advantages of individual methods</li> <li>- involved teachers: in general</li> <li>- teaching methods: observation, inspirational teacher, excursion</li> </ul>
Davidson (2006)	theoretical article	enquiry/questioning	<ul style="list-style-type: none"> <li>- aim: brief article; urges teachers to evaluate how they begin their lessons and to reconsider the value of this standardised approach. Promotes the view that enquiry methodology represents good curriculum practice in geography, which requires a different approach to lesson introductions</li> <li>- involved teachers: of the Key Stage 3</li> <li>- teaching methods: key questions, variety of stimulating interests, recognise and generate questions ('need to know'), diverse informative activities to make sense, reflect, identify, and summarise learning</li> </ul>
Murdoch (2014)	theoretical article (added by snowball method)	enquiry/questioning	<ul style="list-style-type: none"> <li>- aim: this article explains the enquiry process from the geographical perspective</li> <li>- involved teachers: in NC14 (of the Key Stage 3)</li> <li>- teaching methods: bringing the natural world into the classroom, the urge to discover, providing open-ended experiences, minding your language, keeping it authentic, taking the unexpected path-going with the flow, slowing down and making time to wander and wonder, from curiosity to care</li> </ul>
Howard (2020)	theoretical chapter	teaching with avatars	<ul style="list-style-type: none"> <li>- aim: the chapter discusses an innovative teaching method using an avatar to engage young learners in United States geographic studies</li> <li>- involved teachers: in the author's case, 'Moffat the Traveling Rabbit' accompanies first-grade Colorado pupils in their study of all 50 states</li> <li>- teaching methods: a stuffed rabbit is used in the classroom to make these connections, inspiring the students to write their own geography- and history-based stories</li> </ul>
Phillips (2012)	theoretical article	fieldwork	<ul style="list-style-type: none"> <li>- aim: this article introduces some innovative fieldwork approaches drawn from outside formal education and designed to rediscover and provoke curiosity in ordinary landscapes</li> <li>- involved teachers: in general, and from primary schools</li> <li>- teaching methods: asking questions, technologies, guerilla geography, ideas from various adventurers</li> </ul>

Phillips (2015)	empirical article	fieldwork	<ul style="list-style-type: none"> <li>- research: qualitative approach</li> <li>- aim: determining the usefulness of fieldwork with a focus on the senses</li> <li>- number of involved teachers: author (4 senior-year college students)</li> </ul>
Vierling, Frykholm, Glasson (2002)	empirical article	learning with technology	<ul style="list-style-type: none"> <li>- research: qualitative approach</li> <li>- aim: pedagogical accuracy, accessibility, and acceptability for as many teachers as possible</li> <li>- number of involved teachers: teachers of 7 pilot schools (2-3 grade, 3-4 grade, 4-5 grade)</li> </ul>
Kojima (2016)	empirical article	learning with technology	<ul style="list-style-type: none"> <li>- research: quantitative approach</li> <li>- aim: developing a child's spirit towards nature, life, and space through the efficient use of space materials</li> <li>- number of involved teachers: 700 (teachers participating in JAXA seminars)</li> </ul>
Vasileva (2019)	theoretical article	learning with technology	<ul style="list-style-type: none"> <li>- aim: the paper seeks to spark a discussion and offers some didactic and practical ideas that can 'unlock' creativity in geography teaching</li> <li>- involved teachers: in general, at Bulgarian schools</li> <li>- teaching methods: using animated schemes and maps, flash animations, information and communication technologies</li> </ul>
Roelofsen, Carter-White (2022)	empirical article	learning with technology	<ul style="list-style-type: none"> <li>- research: qualitative approach</li> <li>- aim: impact of virtual reality on how geographic concepts are taught and how it can be used as a pedagogical tool</li> <li>- number of involved teachers: 15 (participants of postgraduate course at universities)</li> </ul>

Owing to the low number of acceptable publications for review, we subsampled the publications using the snowball method and identified 2 additional publications suitable for inclusion in the final selection of 10 publications (Fig. 1). This suggests that student curiosity about geography is not a frequent topic of interest for authors in geography education. Thus, this study is unique in that it successfully identified a significant research gap in the field. Moreover, all the selected publications were from the 21st century, indicating that the topic is currently only gaining relevance.

The selected publications were divided into three periods, with each roughly corresponding to individual decades. The first period, 2002–2006, contained three publications; the second period, 2014–2016, contained three publications; and the last period, 2019–2022, contained four publications. By type, they included two monographs (one chapter of a scholarly book), four empirical articles, and four theoretical articles. Harichandan, Shaik, Sunni (2004) and Murdoch (2014) were included using snowball sampling.

For a detailed analysis, we chose hermeneutic content analysis, which combines hermeneutic and qualitative content analyses (Vieira, De Queiroz 2017). The analysis reflects the basic principles of both analyses, namely, the description of the findings and interpretation in terms of the field. The analysis was conducted in two steps, both of which enabled us to answer our research questions. In the first step, we searched for and described the findings regarding curiosity in the analysed publications (pre-understanding of the issue) and identified key areas relevant to students' curiosity. In the second step, we considered the relationship of curiosity in the identified areas with geography education (understanding the issue in context). We interpreted the findings of the first step of the analysis (pre-understanding) to understand the meaning of students' curiosity in geography education and the deepest relevance of the publications (hermeneutic meaning, Vieira, De Queiroz 2017).

The first step of the analysis of all publications unveiled that four areas of teaching methods and strategies applied in geography education. The authors used these areas to describe students' development and curiosity (Table 1): inquiry/questioning, teaching with avatars, fieldwork, and learning with technology. Although thematic overlaps were observed in some studies, the publications were matched to the most dominant areas in the respective publications.

Table 1 provides the most relevant information based on the publication type. For the empirical publications, we provided the selected research approach, aim, and research population (teachers). For theoretical publications, we report information on the aim of the work, subject of interest, and teaching methods.

In the second analysis, we focused on three strong geographical themes underlying these strategies and methods that occurred frequently in all analysed publications. These themes formed three interconnected threads that provided



deeper insights into students' curiosity in geography education. The first is geography – from and for life, the second is geographical thinking, and the third is the role of geography teachers in encouraging students' curiosity.

## 4. Results

We introduce our findings using a two-step hermeneutic content analysis (Vieira, De Queiroz 2017). First, we presented the findings of the first step (description of the phenomenon under study in the publications). We labelled specific aspects of aspects described as teaching methodological aspects that play a specific role in addressing curiosity: inquiry/questioning, teaching with avatars, fieldwork, learning with technology, and, in some cases of publication, an implicit definition of curiosity. In the following areas, we concentrated on and described (not interpreted) aspects that showed a relationship between curiosity and geography education. The findings of this step were combined and interpreted in the next step of the analysis.

Second, we integrated and interpreted students' curiosity and identified areas of teaching methods and strategies and topics of geographical education.

### 4.1. *The pre-understanding step: Description of curiosity in publications*

#### 4.1.1. *Enquiry/questioning*

Harichandan, Shaik and Sunni (2004) focused on the importance and basic principles of geography. In addition to defining the subject of geography and geographic thinking, another important aspect is portrayed: Geography can satisfy students' inherent curiosity, defined as the desire to know as much about other countries and their populations as possible, leading to fascination and meaningful teaching. If a student actively observes and seeks information about a subject (object), this is a much more valuable tool for acquiring knowledge than using only textbooks and teachers. The authors also mentioned that when students remain in the classroom, various materials, such as terrestrial globes, can be used to encourage curiosity.

Harichandan, Shaik and Sunni (2004) also referred to the inspirational approach of teachers, emphasising their role as instruments to improve geography lessons. The cornerstone of quality geography teaching is the beginning of the lesson when the teacher raises questions with reference to previous learning. Moreover, questions should be directed towards creating curiosity and willingness amongst students to tackle new knowledge. Murdoch (2014) applied

this focus to curiosity, highlighting student questioning (enquiry-based). She explained that students' questioning may be perceived as a sign of ignorance, which may make them afraid to ask questions to avoid embarrassment (Murdoch 2014). The author has witnessed how some teachers were frustrated by the inclusion of geographical questioning in their lessons because the students did not show any interest. Nonetheless, if the enquiry method is used appropriately, students will become curious and want to learn more. The author suggests that teachers ask geographical questions about real-life problems, which arouses more interest in students than simply reading textbooks or memorising theories. Questions such as 'What if...?', 'I wonder...?', and 'Why...?' trigger students' curiosity and desire to solve problems. However, according to Davidson (2006), questioning must be situated at the beginning of a lesson to allow students space for questioning by providing a motivational entry, thus provoking curiosity. Both Murdoch (2014) and Davidson (2006) alluded to the fact that teachers' attitudes are the most important factor in geographic enquiries. For students to express their curiosity, the teacher needs to show honest interest in the geography curriculum. In other words, it is necessary for the teacher to show students that they enjoy geography and illustrate to them what curiosity looks like. The authors also mentioned that if teachers dismiss students' questions to avoid class disruptions, students' curiosity may be discouraged, thereby hindering enquiry development. Murdoch (2014) drew from her own experiences, whereas Davidson (2006) provided exemplary activities (in game form) validated by several teachers. These activities can be used as inspiration or directly in geography lessons. Sample activity: The teacher explained that she had just been on holiday and met someone who needed help. On the board, she then displayed a picture of 'Lonesome George', a giant tortoise from the Galapagos Islands. She explained to the students that George was looking for a mate and that there would be a \$10,000 reward if anyone found him. She then displayed George's vital statistics on the board. Thereafter, the students were placed in groups and asked what information they required to receive the reward. Questions were then devised and used to investigate significant conflicts in the Galapagos Islands involving people and the environment (Davidson 2006, p. 106).

#### 4.1.2. *Teaching with avatars*

Howard (2020) offered a unique perspective on student learning using avatars and other mascots. She described the use of a plush assistant, Moffat, which allowed students to learn through interaction with curiosity, helping to establish relationships. Students were the most engaged when they were drawn into a geographical story using an avatar guide to create images, sounds, and even smells. In addition to the interaction with Moffat, students were able to visit different

places worldwide (cultures, traditions, indigenous tribes, etc.). Owing to Moffat, previously uninteresting photographs became engaging to students as they viewed them with increased curiosity. However, this method seems to be applicable only to younger students. Nonetheless, the author suggested that teachers of older students should follow their instincts and develop lesson plans with an avatar or other mascots that will benefit them. Realising how strong curiosity is and what the avatar will evoke in their students, as well as the learning that comes from it, is crucial (Howard 2020). Despite the fact that the students' parents were first sceptical about the use of Moffat, they complimented the author highly by the end of the year as the children became more curious about exploring new places on Earth.

#### 4.1.3. *Fieldwork*

The third group of publications focused on the applicability of fieldwork to geography education and included two publications by the same author. As the following paragraphs indicate, these are essentially forms of applying the above-mentioned themes in an outside school environment (research, enquiry, and participatory learning).

According to Phillips (2012), teachers' interest in fieldwork is decreasing, even though fieldwork can excite students. Fieldwork aims to rediscover and provoke students' curiosity about the landscape and world around us. Thus, the author encourages teachers to increase their creativity by paying attention to hidden places (which can evoke students' excitement) or by mapping litter (where students can create maps based on their observations). In fieldwork, the author believes that teachers should ask students questions about the use of technology, given its increasing prevalence across schools. The main aim is to inspire teachers to seek inspiration from geographers who undertake practical fieldwork despite their lack of teaching experience. This method is a great source of inspiration for field education teachers.

In a recent article, Phillips (2015) examined whether fieldwork in geography education could benefit students' curiosity, referencing projects by undergraduate geography students with whom he worked. Particularly, the students were asked to use their senses to explore New York City. The students were able to observe the city from a completely different perspective, providing them with new, inspiring, and enlightening experiences suitable for use in geography. The author urged students to make their projects as entertaining and creative as possible to reflect their innate curiosity towards their work. He bases this curiosity on his own inspirational phrase: 'When a young person sees and touches something as ordinary as a rock, they can become curious, formulate questions about the world, and then refine them and try to answer them' (Phillips 2015, p. 2).

#### 4.1.4. *Learning with technology*

In this best-represented group, with four publications, the authors highlighted the awakening of students' curiosity in geography through various technological tools, mainly referring to the essence of integrating digital technologies into geography education because of constant modernisation and technological developments. In contrast to previous thematic groups, technology, according to the authors, brings about a great number of problems with its implementation in schools, as portrayed in the following paragraphs.

At the beginning of the 21<sup>st</sup> century, the idea of integrating digital technology into schools, particularly geography classes, began to develop. Vierling et al. (2002) presented the intentions of curriculum development for primary schools in the USA, where one of the goals was to foster students' curiosity. The University of Colorado curriculum, Earth Systems Connections Elementary Curriculum (ESCEC), mentions the importance of students' understanding of the meaning and interdependence of environmental systems at a young age. The ESCEC's work was divided into three main strands in 50 lessons to introduce a curriculum involving technological tools. One strand, global vision, attempts to enhance geography teaching using remote sensing methods. According to the authors, teaching materials should be adapted to foster a sense of curiosity and self-confidence in emerging thinkers and scientists who will be responsible for shaping research and policy priorities in the coming decades.

Kojima (2016) introduced a similar theme: the use of satellite images from the JAXA Space Education Center to consider the geographical characteristics of mountain ranges and the use of 3D glasses after Earth observations. The JAXA Center defines curiosity as one of the three parts of a child's soul that must be encouraged. The author mentioned that seeing the world from a different perspective could capture students' attention. Teaching materials are used in several Japanese schools, and the use of satellite images has increased students' curiosity. Teachers have realised the importance of broadening their perspectives to engage students. Roelofsen, Carter-White (2022) use similar three-dimensional technology to work with virtual reality. The authors point out that virtual reality should not be seen as a simple form of entertaining insight into a virtual but rather as a stimulus designed to arouse new geographical questions that can be used in many educational activities related to geography. Most commonly, however, virtual reality is used in connection with virtual field trips, such as Google Expeditions. The authors emphasised the involvement of curiosity when, in the (almost) real experience, the students felt the urge to explore each observed detail. Afterwards, the students felt the need to learn more about the place because they became curious.

Vasileva (2019) noted another way to supplement geographic learning, pointing out that learning should have personal meaning. Her efforts lie primarily in

triggering discussions about the nature of geography whilst encouraging teachers to incorporate information technology into geography teaching, for example, by supporting their explanations with animated diagrams and maps or as information resources for group activities. The author also mentions that the core of curiosity is based on a positive teacher-student relationship that can effectively arouse students' curiosity and help them rediscover their sense of geography. From the author's perspective, technology, in general, is a powerful support for learning, but what is most important is the extent to which teachers can adapt to the requirements of introducing technology into their lessons.

All the authors of this group of analysed texts collectively agreed that the use of technology is particularly attractive to students who encounter technology during their leisure time. However, funding is a major problem with the use of technology in school education. For example, virtual reality is expensive for schools. In addition to funding, some teachers may have problems with technology. However, this is not a simple matter based on intuitive handling and use.

The first step of the analysis showed that, despite the authors' attention to curiosity, they did not emphasise its definition and did not place it at the centre of their descriptions. The identified aspects were oriented towards teaching methods and techniques, which are important indicators of pre-understanding curiosity in geography education. In the second step, we concentrated on the similarities that emerged across these aspects and interpreted them with an emphasis on geography education. These similarities act as strong red threads that run through all publications, illuminating the key question of what curiosity signifies in geography education: geography from and for life, geographical thinking, and the roles of geography teachers.

#### *4.2. Understanding and interpretation step: Curiosity in geography education*

##### *4.2.1. Geography from and for life*

Most of the publications analysed in the first step of the analysis referred to useful (applied) geography in terms of students' curiosity. The authors discussed the naturalness, fascination, and meaningfulness of geographical topics (Harichandan, Shaik, Sunni 2004), as well as personal relationships with geography (Vasileva 2019) and practicality (Davidson 2006). Practical demonstrations in the classroom and field observations are related to the nature of human recognition and geographical phenomena (Cooke, Epagoge in Organon 1938). Specifically, an inductive method of recognition has been applied to geography education (Clegg 1969, Marada et al. 2017) and can be identified as a learning pathway in early childhood when curiosity and fascination inspire learning and

maturation. Therefore, early childhood curiosity should inspire students of all ages (Martens, Crawford 2019).

Geography has long struggled to define its core subject matter, which is often useful (Massey 2005, Parkinson 2020, etc.) across all paradigms (Maude 2024). Students attend school with preconceptions and pre-existing knowledge from their everyday experiences (Murdoch 2024). This knowledge is valuable and can be used as a starting point for teaching new geographical concepts (Roberts 2023). Thus, geography's usefulness can be built on constructivist principles based on preconceptions, misconceptions, and scaffolding (Bruner 1986; Taylor 2017; Vygotsky 1978). Roberts (2023) pointed out that teachers should create learning activities that connect the school curriculum with students' real-world experiences. In essence, it is about being creative and applying activities that students enjoy and can accomplish in daily life (Kaplan 2024), such as discussing local geographical phenomena or events that students are familiar with in their neighbourhood (Hammond 2022). Alternatively, they work with powerful stories or the shifting feelings of students towards a place (Rubáš, Matějček, Řezníčková 2024).

Analyses of the publications revealed that to stimulate students' curiosity in geography, teachers should be motivated to actively engage students in practical geography activities (Roberts 2023) and to experience and perceive the affective dimension of space and place (Burlingame 2023). Practical activities and students' perceptions of the affective dimension of space and place should be used in fieldwork, with opportunities for direct observation and the use of technology (Mašterová 2023). During fieldwork, students could understand and apply their theoretical knowledge. As one of the first pedagogues in Czechoslovakia pointed out, it is curiosity that 'arises from the need for adequate intellectual activity and is allied to the feeling of wonder' (Pech 1937, p. 42). The multisensory approach by which fieldwork is conducted enables students to engage all their senses in observing and exploring geographical phenomena, thus providing an in-depth understanding of the subject matter (Phillips 2015). Meanwhile, fieldwork is where students experience geography (Harichandan, Shaik, Sunni 2004). Although fieldwork requires teachers to overcome various barriers (Philips 2012), fieldwork and excursions are currently some of the most popular activities in geography education (Kidman 2018) for students, teachers, and parents (Svobodová et al. 2020).

Roelofsen and Carter-White (2022) noted another aspect of the concept of place. Students' curiosity can be stimulated through technology and by observing details in specific places. However, in technologies such as GIS, generalisation techniques have been highlighted to help minimise unnecessary details and retain crucial information for users (Spiess 2020). This raises questions about whether we can convey detail to students in information technology and whether we are leading students to 'quality observation'. Working with detail in place enables only

those mapping materials that focus on direct observation in place and mapping 'details without descriptions' (Balák et al. 2020).

The use of technology in classrooms may be even more complicated for teachers. Some teachers still adapting to older technologies may be concerned about new tools, such as virtual reality, satellite imagery, or GIS (Bernhäuserová et al. 2022). Technology can be a powerful tool for awakening curiosity about space and more distant places on Earth; however, our review suggests that students' curiosity may be missed owing to its more challenging accessibility.

#### 4.2.2. *Geographical thinking*

Useful geography is linked logically (linearly) to geographical thinking and questioning. Experiencing geography through senses, feelings, and personal experiences should initiate a desire to know and ask questions. However, we argue that geographical questioning does not have straightforward applications in education linked to students' curiosity as useful geography (geography for life) does. We conclude that geographical questions and the search for answers are closely related to students' curiosity (Murdoch 2014; Davidson 2006; Phillips 2012; Harichandan, Shaik, Sunni 2004). However, we are unsure whether geographical questions trigger curiosity, or vice versa. Does the urge for knowledge (curiosity) generate geographical questions, or do these questions generate an urge for knowledge? Davidson (2006), Murdoch (2014), and Vasileva (2019) state that asking geographical questions initiates curiosity, whereas Phillips (2012, 2015), Howard (2020), and Roelofsen and Carter-White (2022) identify curiosity before asking questions and geographical thinking.

Another aspect of geographical thinking related to curiosity may complicate classroom enquiries. If students are concerned about asking questions, however curious they might be, for fear of highlighting their own lack of knowledge (Murdoch 2014), they may avoid both asking and answering questions. Concerns about asking questions, especially students' inability to think geographically at a high level, are caused by their lack of geographical knowledge (Solem 2023). However, this places us in a vicious circle with traditional teaching, which is based on a factual approach, and the existing requirements for changing to a different type of curriculum. There is a need to clearly declare that the focus of geography education is competence or powerful knowledge (Young et al. 2014). The enquiry-based approach can help compensate for these complications, not only in terms of questioning but also, more importantly, in terms of engaging students' curiosity (Harichandan, Shaik, Sunni 2004). In enquiry-based learning, the use of an inductive teaching strategy does not require a focus on facts (knowledge). This knowledge can be one of the final products of the enquiry-based learning process (Clegg 1969; Wolpert-Gawron 2016; Bacon in Tang 2019).

#### 4.2.3. *Role of geography teachers*

Although certain geographical topics are more attractive to students than others (Korvasová 2023), our findings show that considering work with students' curiosity, the choice of topic itself is not sufficient. Thus, how teachers understand these topics must be explored (Howard 2020).

Given that we face issues related to students' lack of interest and low desire for knowledge (CSI 2024), it is not appropriate to wait for spontaneous expressions of the desire for knowledge (curiosity) and, thus, natural questioning in geography education. Curiosity must be encouraged and stimulated through education. Teachers can use the emotional-motivational power of any learning activity to arouse students' curiosity. Psychological studies have shown that curiosity is closely linked to student motivation (Shin, Lee, Kim 2019) and attitudes (OECD 2024). Geographical questioning designed in an emotionally motivational manner can trigger students' curiosity and lead them to formulate geographical questions. For instance, the avatar is used in the learning process (Howard 2020). Emotional attachment and interaction with avatars can greatly influence students' motivation and engagement in the learning process and provide a safe and controlled learning environment (Wang 2011).

From the perspective of the teacher's approach, curiosity is underlined as important for the psychological growth and well-being of students (Kashdan 2004). As an inspirational aspect, teachers should show a genuine interest in geography (Murdoch 2014, Davidson 2006). Teachers are unable to make their students adequately interested in educational content when they do not express curiosity about their disciplines (Carney 2022). They should not ignore students' questions but show how they ask geographical questions or gain a feeling of geography (Murdoch 2014, Davidson 2006). This means that they should be honest with their students about the geography curriculum, be good role models, and risk everything (Fischer 2022).

Additional ways of grasping geographical topics include situations that we might classify as trivial but which teachers may not necessarily consider in detail. What emerged in geographical questioning was the timing of the questions and the way of handling them: does the teacher or the students themselves ask the questions? (Davidson 2006). Similarly, the purpose of questioning also needs to be considered. Questioning by teachers or students should not be used only to test knowledge, but first lead to the acquisition of 'powerful' knowledge of the field and to natural working with mistakes (Mitchell et al. 2022). For teachers to be more capable of motivating and guiding their students to ask questions, they need to believe in the value of questioning and its contribution to geography teaching in the first place (Lee, Kriewaldt 2024). In this context, asking the right questions in the right order in the delivery of course material is crucial for student motivation (Fouberg 2023).



Curiosity can be invisible and illegible to some teachers; however, for others, it is a major component of teaching quality that must be purposefully developed by students (Hackmann, Engel 2002). According to Markey and Loewenstein (2014), there are several methods to foster curiosity in students, with curiosity being identifiable by pupil dilation, which correlates with the pupils' level of attention. Monitoring pupil dilation is unnecessary when developing geographical thinking. Instead, we can focus on whether students ask questions out of a genuine desire for answers rather than to merely please their teachers.

## 5. Implications for practice

Currently, we are facing a new challenge in implementing the revised curricula in schools. The progressive trend in geography education not only places higher demands on teachers in school practice but also requires coherence and synergy with the upcoming subject. It is delightful that the newly designed geography curriculum could promote opportunities for developing students' curiosity given that geography curriculum makers have included geographical thinking and emphasised applied geography, which can address the challenges associated with curiosity. Despite the incorporation of geographical thinking and an understanding of geographical interactions and critical thinking within the national curriculum, we believe that without a desire for knowledge and discovery, expecting students to formulate and answer geographical questions or develop their intellect and thinking would be difficult. Thus, we highlight the retroactive effect of curiosity on student achievement. Students' curiosity influences their learning outcomes (Mullis, Martin, Hooper 2019) and the development of their literacy (Schleicher 2023 on PISA 2022) and creative thinking (OECD 2024). In the case of the national curriculum, we can now clearly argue for the necessary role of geography education in the process of student development and its direct linkage to students' curiosity, which has disappeared from learning (CSI 2024).

As recommendations for the practice and implementation of the revised curriculum, we highlight key aspects that seem essential for arousing curiosity in geography education. First, we emphasise the affective involvement of (not only) students in the learning process. This includes working with the emotions, feelings, senses, and experiences of students and teachers. The second highlighted aspect is the constructivist approach and inductive teaching strategies, which focus mainly on students' cognitive development. This aspect may allow teachers to consider and legitimise the role of fact-based knowledge in the learning process. Finally, we draw attention to procedural aspects. Planning and thinking about engaging in curiosity through technology, avatars, observation, and questioning in geography education is appropriate with an awareness of the details in place or

question timing, as well as with the understanding that curiosity might or might not be triggered by questions.

The question remains: how can geography education be successfully implemented in the absence of curiosity? In such situations, geography teachers should play a key role in encouraging students' curiosity. Teachers are the bearers of teaching strategies, especially open-ended questions, project-based learning, the promotion of independent discovery, and an explorative approach, and may only increase students' curiosity about learning (OFSTED 2013; Jirout, Vitiello, Zumbum 2018; UNESCO 2020; OECD 2024). Competency Framework for Graduate Teachers (MOEYS 2024, in progress).

In addition, the names of the geography sub-disciplines themselves, such as geography of food, geography of smells, and geography of sexuality, could evoke students' desire for knowledge and discovery. However, teachers rely on their own experiences in the classroom, and given that the curriculum in the FEP PE (2021, 2024) is not clearly defined, teachers must decide which topics and in what manner they will address geography lessons and whether they will stimulate students' curiosity.

After both steps of our analysis, whether curiosity naturally arises at the beginning of a teacher's engagement with geographical topics, functions as an inherent driver of learning, or must be actively stimulated through teaching strategies remains unclear. This ambiguity highlights the importance of purposefully fostering curiosity using emotionally engaging methods, enquiry-based approaches, or teachers' enthusiasm for geography as potential triggers. Clarifying this ambiguity is essential to effectively integrate curiosity into geography education and ensure its role as a catalyst for intellectual growth.

## 6. Conclusion

The systematic review selected 10 publications focusing on curiosity in geography education. This might indicate the marginality of the issue, but these 10 publications convinced us of the contrary. However, we are aware of the limitations of this study, which may be related to the small number of publications or working with implicit definitions of curiosity and an indirect focus on the concept of curiosity in the analysed publications. Additionally, none of the analysed publications explicitly defined curiosity, often relying on an implicit understanding of the concept. Focusing on the keyword 'curiosity' when searching for publications could be a limitation. If we had chosen another key element in the criteria for selecting articles for content analysis, such as 'motivation' or 'interest', the number of results captured would likely have been higher. Incorporating different but related concepts into an analysis can mislead us and prevent us from meeting our intended aims.

While writing this paper, we continually asked ourselves what curiosity is and how important it is in geography education. The second step in the analysis and interpretation of the research findings on curiosity in geography education revealed the following themes, which could also frame practical recommendations. These are the connections between geography and everyday life (geography from and for life: it is necessary to search for topics that belong to the fields of useful or applied geography that are simultaneously relevant to education), the need to develop geographical thinking in teaching and the indispensable roles of geography teachers.

An analysis of publications focusing on students' curiosity uncovered four significant areas of teaching methods and strategies applied in geography education that stimulated students' desire for knowledge and discovery in geography education. Curiosity in geography education can be viewed through the following teaching methods and learning strategies: enquiry/inquiry, teaching with avatars (or other mascots), fieldwork, and learning with technology (e.g. GIS). Using specific examples, we provide evidence that teaching strategies are closely related to students' curiosity. These progressive and inspiring techniques are based on interactive and exploratory approaches (UNESCO 2020, OECD 2024). When these strategies succeed, they often lead to those powerful 'lightbulb moments' where a student's curiosity is not only sparked but sustained. In such instances, students become actively engaged, taking ownership of their learning and driving their own educational journey forward with enthusiasm and purpose (Fouberg 2023).

We found that curiosity is central to geography education. However, we believe that engaging students' curiosity in the learning process can change their traditional views on the use of technology, observation, and enquiry in geography education. Thus, this study must be used to inspire especially emerging researchers, not only the co-author of this study (Horutová 2024). This study introduces new topics and questions that remain unanswered. For instance, what are the detailed manifestations of students' curiosity about geography education? What causes a spontaneous focus on the details of place in geography teaching, and how can technology help this? How can generalisation be combined with GIS to focus on details? What is the causal relationship between questioning and curiosity? How open are teachers to expressing their own relationships with geography to their students? The questions open a promising avenue for future research to investigate the conditions under which curiosity emerges and thrives in geography education.

Finally, we present a courageous challenge on the basis of Einstein's statement that 'it is a miracle that curiosity survives formal education' (Einstein 1956). We believe that through revised geography education, curiosity will not only survive in formal education but will also be systematically encouraged and developed to cultivate students' growth.

## References

- BALÁK, I., HOFMANN, E., SVOBODOVÁ, H., DURNA, R., KOLEJKA, J., TICHÝ, Š., ZUBALÍK, J. (2020): *Moravský kras a okolí: Atlas pro terénní výuku a outdoorové aktivity*. Nakladatelství Masarykovy univerzity, Brno.
- BENDL, T., MARADA, M. (2021): Kritické myšlení v geografickém vzdělávání: je geografické myšlení kritické? *Geografie*, 126, 4, 371–391. <https://doi.org/10.37040/geografie2021126040371>
- BENDL, T., RUBÁŠ, D. (2023): Za pět dvanáct: potřeba rekontextualizace geografie ve vzdělávání. *Informace ČGS*, 42, 2, 1–12.
- BENDL, T., KRAJŇÁKOVÁ, L., MARADA, M., ŘEZNÍČKOVÁ, D. (2024): Geographical Thinking in Geography Education: A Systematic Review. *International Research in Geographical and Environmental Education*, 1–19. <https://doi.org/10.1080/10382046.2024.2354097>
- BERNHÄUSEROVÁ, V., HAVELKOVÁ, L., HÁTLOVÁ, K., HANUS, M. (2022): The Limits of GIS Implementation in Education: A Systematic Review. *ISPRS International Journal of Geo-Information*, 11, 592. <https://doi.org/10.3390/ijgi11120592>
- BRUNER, J. (1986): *Actual minds, possible worlds*. Harvard University Press, Cambridge. <https://doi.org/10.4159/9780674029019>
- BURLINGAME, K. (2023): Learning by Feeling: Excursions Into the Affective Landscape. *Journal of Geography in Higher Education*, 47, 706–718. <https://doi.org/10.1080/03098265.2021.1977917>
- CAMBRIDGE (1999): *Cambridge Dictionary*, <https://dictionary.cambridge.org/> (21. 6. 2024).
- CARNEY, S. (2022): Reimagining our Futures Together: A New Social Contract for Education. *Comparative Education*, 58, 4, 568–569. <https://doi.org/10.1080/03050068.2022.2102326>
- CLEGG JR, A.A. (1969): Geography-Ing Or Doing Geography: An Inductive Approach to Teaching Geography. *Journal of Geography*, 68, 5, 274–280. <https://doi.org/10.1080/00221346908981113>
- COOKE, H.P. (1938): *Aristotle The Organon*. Harvard University Press, London.
- CSI (2024): *Národní zpráva PISA 2022 Tvůrčí myšlení*. Česká školní inspekce, Praha.
- DAVIDSON, G. (2006): Start at the Beginning. *Teaching Geography*, 31, 3, 105–108. <https://doi.org/10.1080/00221340608978677>
- DELORS, J. (1996): *Learning: The Treasure Within*, UNESCO Publishing, <https://unesdoc.unesco.org/ark:/48223/pf0000109590> (28. 6. 2024).
- EINSTEIN, A. (1956): *Out of my later years*. Citadel Press, New York.
- FEP PE (2021): *Rámcový vzdělávací program pro základní vzdělávání*, <https://prohlednout.rvp.cz> (21. 6. 2024).
- FEP PE (2024): *Revize rámcových vzdělávacích programů – Vzdělávací oblast Geografie, Rámcový vzdělávací program pro základní vzdělávání*, <https://prohlednout.rvp.cz/zakladni-vzdelavani/vzdelavaci-oblasti/geo#top> (21. 6. 2024).
- FINFGELD-CONNETT, D. (2014): Use of Content Analysis to Conduct Knowledge-Building and Theory-Generating Qualitative Systematic Reviews. *Qualitative Research*, 14, 3, 341–352. <https://doi.org/10.1177/1468794113481790>
- FISCHER, F. (2022): “She Just Can’t Break it Down to the Classroom...”: Expert Perspectives on German Geography Trainee Teachers’ Competencies and Initial Teaching. *International Research in Geographical and Environmental Education*, 31, 3, 205–221. <https://doi.org/10.1080/10382046.2021.1973254>
- FOUBERG, E.H. (2023): Learning geographic concepts. In Fouberg, E.H, Smith, J.S. (eds.): *Teaching human geography: Theories and practices in thinking geographically*. Edward Elgar Publishing, Cheltenham, Northampton, 39–57. <https://doi.org/10.4337/9781800885202.00010>

- GEOGRAPHICAL ASSOCIATION (2022): A Framework for the School Geography Curriculum, <https://geography.org.uk/wp-content/uploads/2023/07/GA-Curriculum-Framework-2022-WEB-final.pdf> (21. 6. 2024).
- HACKMANN, H., ENGEL, S. (2002): Curiosity in context: The classroom environment examined. Williams College, Williamstown.
- HAMMOND, L. (2022): Recognising and Exploring Children's Geographies in School Geography. *Children's Geographies*, 20, 1, 64–78. <https://doi.org/10.1080/14733285.2021.1913482>
- HARICHANDAN, S., SHAIK, A., SUNNI S. (2004): Methods of teaching geography. Utkal University, Bhubanėšvar.
- HORUTOVÁ, M. (2024): Žákovská zvědavost v geografii na základní škole: Přehledová studie, Masarykova univerzita, <https://is.muni.cz/th/ts5a2/> (21. 6. 2024).
- HOWARD, C.L. (2020): Traveling with a Rabbit: Finding the Hook to Engage Young Readers. In: Heuvel, L. L. (Ed.). *Living history in the classroom*. Emerald Publishing Limited, Leeds, 63–82. <https://doi.org/10.1108/978-1-78973-595-620201007>
- INSTITUTE OF THE CZECH LANGUAGE (2011): *Slovník spisovného jazyka českého*, <https://ssjc.ujc.cas.cz/> (21. 6. 2024).
- JIROUT, J.J., VITIELLO, V.E., ZUMBRUNN, S.K. (2018): Curiosity in schools. In: Gordon, G. (ed.): *Psychology of emotions, motivations and actions. The new science of curiosity*. Nova Science Publishers, New York, 243–265.
- KASHDAN, T.B. (2004): Curiosity. In: Peterson, C., Seligman, M.E.P. (ed.): *Character strengths and virtues: A handbook and classification*. Oxford University Press, New York, 125–141.
- KAPLAN, D. (2024): Geografie dětí: Metodické přístupy a inspirace nejen pro geografii. *Geografie*, 129, 2, 211–231. <https://doi.org/10.37040/geografie.2024.006>
- KIDMAN, G. (2018): School Geography: What Interests Students, What Interests Teacher? *International Research in Geographical and Environmental Education*, 27, 4, 311–325. <https://doi.org/10.1080/10382046.2017.1349374>
- KNECHT, P., DOBOŠ, P. (2024): Jakou geografii pro vzdělávání? *Informace ČGS*, 43, 1, 37–57.
- KOJIMA, A. (2016): To Ignite the Passion in Children's Hearts – Role and Effect of Space Education, Issues and Consideration. *Acta Astronautica*, 127, 614–618. <https://doi.org/10.1016/j.actaastro.2016.06.040>
- KORVASOVÁ, V. (2023): Researching Students' Image of Geography: Developing a Questionnaire Survey. *J-READING Journal of Research and Didactics in Geography*, 2, 151–168.
- LEE, S.J., KRIEWALD, J. (2024): Where Powerful Knowledge and Pedagogical Content Knowledge Intersect: The Case of Knowledge and Beliefs for Teaching School Geography Through Inquiry. *International Research in Geographical and Environmental Education*, 1–16. <https://doi.org/10.1080/10382046.2024.2348274>
- MARADA, M., ŘEZNIČKOVÁ, D., HANUS, M., MATĚJČEK, T., HOFMANN, E., SVATOŇOVÁ, H., KNECHT, P. (2017): Certifikovaná metodika geografického vzdělávání, <https://www.egeografie.cz/> (28. 6. 2024).
- MARKEY, A., LOEWENSTEIN, G. (2014): Curiosity. In: Pekrun, R., Linnenbrink-Garcia, L. (ed.): *International handbook of emotions in education*. Routledge, New York, 228–245.
- MARTENS, S., CRAWFORD, K. (2019): Embracing Wonder and Curiosity: Transforming Teacher Practice Through Escape Room Design. *Childhood Education*, 95, 2, 68–75. <https://doi.org/10.1080/00094056.2019.1593764>
- MASSEY, D. (2005): Geography matters in a globalized world. In: Smith, M. (ed.): *Teaching geography in secondary schools*. Routledge, London, 286–292. <https://doi.org/10.4324/9780203994238-31>

- MAŠTEROVÁ, V. (2023): Learning and Teaching Through Inquiry With Geospatial Technologies: A Systematic Review. *European Journal of Geography*, 14, 3, 42–54. <https://doi.org/10.48088/ejg.v.mas.14.3.042.054>
- MAUDE, A. (2024): Thinking geographically: A guide to the core concepts for teachers. Routledge, Abingdon-on-Thames, New York. <https://doi.org/10.4324/9781003376668>
- MITCHELL, D., HANUS, M., BÉNEKER, T., BIDDULPH, M., LEININGER-FRÉZAL, C., ZWARTJES, L., DONERT, K. (2022): Enhancing Teachers' Expertise Through Curriculum Leadership – Lessons From the GeoCapabilities 3 Project. *Journal of Geography*, 121, 5–6, 162–172. <https://doi.org/10.1080/00221341.2022.2149838>
- MOEYS (2024): Kompetenční rámec absolventa a absolventky učitelství: Společné profesní kompetence, Ministersvo školství, mládeže a výchovy, <https://msmt.gov.cz/vzdelavani/kompetencni-ramec-absolventa-ucitelstvi> (28. 6. 2024).
- MULLIS, I.V.S., MARTIN, M. O., HOOPER, M. (2019): TIMSS 2019 International Results in Mathematics and Science, TIMSS and PIRLS International Study Center, <https://timssand-pirls.bc.edu/timss2019/international-results/> (28. 6. 2024).
- MURDOCH, K. (2014): The Urge to Enquire: Curiosity in the Classroom. *Primary Geography*, 85, 10–11.
- OECD (2024): PISA 2022 Results (Volume III): Creative Minds, Creative Schools, PISA, OECD Publishing, Paris (28. 6. 2024). <https://doi.org/10.1787/765ee8c2-en>
- OFSTED (2013): Maintaining Curiosity: A Survey Into Science Education in Schools, GOV.UK, [https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fmedia%2F5a759a19ed915d6faf2b4420%2FMaintaining\\_20curiosity\\_20a\\_20survey\\_20into\\_20science\\_20education\\_20in\\_20schools.doc&wdOrigin=BROWSELINK](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fmedia%2F5a759a19ed915d6faf2b4420%2FMaintaining_20curiosity_20a_20survey_20into_20science_20education_20in_20schools.doc&wdOrigin=BROWSELINK) (3. 7. 2024).
- PAGE, M.J., MOHER, D., BOSSUYT, P.M., BOUTRON, I., HOFFMANN, T.C., MULROW, C. D., SHAMSEER, L., TETZLAFF, J.M., AKL, E.A., BRENNAN, S.E., CHOU, R., GLANVILLE, J., GRIMSHAW, J.M., HRÓBJARTSSON, A., LALU, M.M., LI, T., LODER, E.W., MAYO-WILSON, E., MCDONALD, S., MCGUINNESS, L.A., STEWART, L.A., THOMAS, J., TRICCO, A.C., WELCH, V.A., WHITING, P., MCKENZIE, J.E. (2021): PRISMA 2020 Explanation and Elaboration: Updated Guidance and Exemplars for Reporting Systematic Reviews. *British Medical Journal*, 372. <https://doi.org/10.1136/bmj.n160>
- PARKINSON, A. (2020): Why study geography? London Publishing Partnership, London.
- PECH, O. (1937): Příruční slovník pedagogický. Československá grafická Unie, Praha.
- PHILLIPS, R. (2012): Curiosity and Fieldwork. *Geography*, 97, 2, 78–85. <https://doi.org/10.1080/00167487.2012.12094342>
- PHILLIPS, R. (2015): Playful and Multi-Sensory Fieldwork: Seeing, Hearing and Touching New York. *Journal of Geography in Higher Education*, 39, 4, 617–629. <https://doi.org/10.1080/03098265.2015.1084496>
- PUTTICK, S. (2013): Looking At and Looking Along: A Conceptual Framework for Teaching Different Perspectives in Geography. *International Research in Geographical and Environmental Education*, 22, 4, 353–366. <https://doi.org/10.1080/10382046.2013.826546>
- ROBERTS, M. (2023): Powerful Pedagogies for the School Geography Curriculum. *International Research in Geographical and Environmental Education*, 32, 1, 69–84. <https://doi.org/10.1080/10382046.2022.2146840>
- ROELOFSEN, M., CARTHER-WHITE, R. (2022): Virtual Reality as a Spatial Prompt in Geography Learning and Teaching. *Geographical Research*, 60, 4, 625–636. <https://doi.org/10.1111/1745-5871.12551>

- RUBÁŠ, D., MATĚJČEK, T., ŘEZNÍČKOVÁ, D. (2024): Sense of Place in Geography and Environmental Education: A Literature Review of Empirical Research. *GeoScape*, 18, 1, 37–52. <https://doi.org/10.2478/geosc-2024-0003>
- ŘEZNÍČKOVÁ, D., MATĚJČEK, T. (2014): Učební úlohy ve výuce geografie. P3K, Praha.
- SJØLIE, E. (2014): The Role of Theory in Teacher Education: Reconsidered from a Student Teacher Perspective. *Journal of Curriculum Studies*, 46, 6, 729–750. <https://doi.org/10.1080/00220272.2013.871754>
- SHIN, D.J.D., LEE, H., LEE, G., KIM, S.I. (2019): The role of curiosity and interest in learning and motivation. *The Cambridge handbook of motivation and learning*, 443–464. <https://doi.org/10.1017/9781316823279.020>
- SCHLEICHER, A. (2023): Insights and Interpretations. PISA, <https://search.oecd.org/pisa/PISA%202022%20Insights%20and%20Interpretations.pdf> (28. 6. 2024).
- SOLEM, M. (2023): Geography Achievement and Future Geographers. *The Professional Geographer*, 75, 2, 207–219. <https://doi.org/10.1080/00330124.2022.2081227>
- SPIESS, E. (2020): The need for generalization in a GIS environment. In: Spiess, E. (ed.): *GIS and generalisation*. CRC Press, London, 31–46. <https://doi.org/10.1201/9781003062646-5>
- SVOBODOVÁ, H., MÍSAŘOVÁ, D., DURNA, R., HOFMANN, E. (2020): Geography Outdoor Education from the Perspective of Czech Teachers, Pupils and Parents. *Journal of Geography*, 119, 1, 32–41. <https://doi.org/10.1080/00221341.2019.1694055>
- TANG, C. (2019): Making Facts, Using Facts: Two Poetics of the Factual and One Theory of the Political. *PMLA*, 134, 5, 1165–1172. <https://doi.org/10.1632/pmla.2019.134.5.1165>
- TAYLOR, L. (2017): Progression. In: Jones, M. (ed.): *The handbook of secondary geography*. Geographical Association, Sheffield, 40–47.
- UNESCO (2020): *Inclusion and Education: All Means All*. Global Education Monitoring Report, <https://unesdoc.unesco.org/ark:/48223/pf0000373718> (28. 6. 2024).
- VASILEVA, M. (2019): How to Improve the E-learning in Geography Training in Bulgarian Schools. *SGEM*, 19, 169–175. <https://doi.org/10.5593/sgem2019/5.4/S22.023>
- VIEIRA, K.A.L., DE QUEIROZ, G.M. (2017): Hermeneutic Content Analysis: A Method of Textual Analysis. *International Journal of Business Marketing and Management*, 2, 8, 8–15.
- VIERLING, L.A., FRYKHOLM, J., GLASSON, G. (2002): *The Earth Systems Connections Elementary Curriculum: A World of Contexts for Teaching and Learning Remote Sensing*. Institute of Electrical and Electronics Engineers, 542–544. <https://doi.org/10.1109/IGARSS.2002.1025100>
- VYGOTSKY, L.S. (1978): *Mind in society: The development of higher psychological processes*. Harvard University Press, Cambridge.
- WANG, T.J. (2011): Educating avatars: On virtual worlds and pedagogical intent. *Teaching in Higher Education*, 16, 6, 617–628. <https://doi.org/10.1080/13562517.2011.570433>
- WOLPERT-GAWRON, H. (2016): What the Heck is Inquiry-Based Learning, *Edutopia*, <https://www.edutopia.org/blog/what-heck-inquiry-based-learning-heather-wolpert-gawron> (28. 6. 2024).
- YOUNG, M., LAMBERT, D., ROBERTS, C., ABRAHAMS, S. (2014): *Knowledge and the future school: Curriculum and social justice*. Bloomsbury Academic, London.

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