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# Shifting maps: changing cartographic representations in Romanian, Hungarian, and Ukrainian geography textbooks for lower secondary education during post-socialist transformation

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**ABSTRACT**

This article explores the evolution of cartographic representations in Romanian, Hungarian, and Ukrainian lower secondary geography textbooks during post-socialist and post-Soviet transformations. Through a comparative content analysis of 21 textbooks published between the 1990s and 2020s, the study highlights significant shifts in visual content, with a notable increase in photographs and a concerning decline in cartographic rigour. Findings reveal persistent challenges in integrating meaningful and diverse cartographic representations that foster spatial thinking. The article calls for renewed attention to map skills in geography education, particularly within the evolving digital landscape of geoinformation.

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## 1. Introduction

Once part of the standard equipment of geography classrooms and, later, companions on drives to unknown destinations, maps became widespread in the digital age, making their way into every smartphone user's pocket. Despite their radically different presentation and usage, applications relying on geoinformation assist us in navigating space and rich place-based details on issues of interest, such as public transit, traffic jams, restaurants, or specialised stores and galleries. However, daily interactions with maps are hardly limited to navigation. Maps support news anchors to visualise the latest conflicts as much as the weather forecast projects moving air masses on maps. Those interested in buying a home should consult detailed maps rich in information concerning pricing, access to education, retail, green spaces, and infrastructure when weighing their options and narrowing down the potential real estate. Indeed, maps underwent a spectacular change over time, impacting both their production and usage. While early maps started summarising information partly available in text, paintings, and drawings in a condensed and aesthetic manner, adding geometry turned maps into unique artefacts encoding distance and

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direction (e.g. orientation). Contemporary technology sets the traditionally static maps into motion by allowing for easy alterations of their scale and content. Various devices have progressively taken over outdoor and even indoor navigation, concurrently storing rich data in a customisable manner. The liberalisation of map production allows most individuals to revise, add, and delete information, leading to highly individual and individualised maps. For young people, these shifts translate into early contact and socialisation with various types of geoinformation and cartographic representations. Consequently, students may bring a novel set of skills to geography classrooms, challenging geography, the primary school subject dedicated to cartography and map skills. Geography educators across the globe emphasise the leading role of the subject in fostering students' spatial thinking and navigation skills (e.g. the National Geography Standards of the United States and Germany[1]). Still, geography education has been reluctant to reinvent map skills within the independent school subject of geography and as part of geographical knowledge incorporated into compound subjects, such as social studies, social science, or science.[2]

Former socialist and Soviet Europe constitutes a fascinating case study. On the one hand, post-socialist and post-Soviet transformation faced considerable challenges in formal education, including geography. On the other hand, in the aftermath of 1989–91, these countries also had a historic opportunity to implement fundamental reforms, including education. Therefore, this paper aims to explore the change of cartographic representations in lower secondary geography textbooks in two former socialist countries (Romania and Hungary) and the post-Soviet space (Ukraine). Following the introduction of the main theoretical framework along with a brief literature review (Section 2), this paper explains the operationalisation process (Section 3). The presentation of the main findings according to the three case studies (Section 4) precedes a contrastive discussion (Section 5). Finally, conclusions, limitations, and next steps (Section 6) conclude the paper.

## 2. Theoretical framework and literature review

Following the early years of research on transition[3] from command economies to market economies, interest in former socialist countries and the former Soviet Union surpassed the economic aspects, tackling broader societal challenges as part of the transformation studies.[4] Compared to many other social aspects, educational reform and its effects often take longer to become visible. Therefore, initial work in educational research remained descriptive. However, over recent years, research on both general aspects of education and individual school subjects has gained relevance.[5] A most welcome development is the

[1]National Council for Geographic Education, "National Geography Standards," https://ncge.org/teacher-resources/national-geography-standards/ (accessed March 12, 2025); DGfG (Deutsche Gesellschaft für Geographie), ed., *Educational Standards in Geography for the Intermediate School Certificate* (Bonn: DGfG, 2012).
[2]Krystle Otong and Koketso Khule, "The Need for a Stronger Integration of Technology with School-Based Map Work," *Geography* 105, no. 2 (2020): 94–100.
[3]John Pickles and Tim Unwin, "Transition in Context: Theory in Postsocialist Transformations," in *Europe: Lives in Transition*, ed. Bettina van Hoven (Harlow: Pearson Educational/Prentice Hall, 2004), 9–28.
[4]Michael Burawoy and Katherine Verdery, eds., *Uncertain Transition: Ethnographies of Change in the Postsocialist World* (Lanham: Rowman & Littlefield, 1999).
[5]Wilfried Göttlicher and Tomáš Janík, *Drei Dekaden nach dem Fall des Eisernen Vorhangs: Bilanzen und Perspektive.n Pädagogik in Forschung – Theorie – Geschichte*, vol. 3 (Wien: LIT Verlag, 2023).

growing interest in subject education disciplines, such as geography education (as showcased by this special issue), in rediscovering the importance of historical research in comprehending trends and tendencies over longer periods of time.[6] However, such research needs to be mindful of the larger theoretical framework on the post-socialist and post-Soviet conditions, which is why the next subsection reviews relevant theoretical strands of research in (subject) education.

### 2.1 From transition to transformation – and beyond

Following the dominance of scholarship in economics, various disciplinary and some interdisciplinary approaches have contributed to the challenging task of theorising post-socialist and post-Soviet transformation.

Early theoretical contributions focused on the de-ideologisation inherent in the political and economic transition from a planned economy and dictatorship to market economies and democratic societies. The bipolar world order of the Cold War heavily shaped the initial years of post-socialism. Authors of this period either called for an immediate replacement of the communist legacy, described as an "evil order",[7] or viewed communism and its legacy merely as obstacles to the transition from a planned to a market economy.[8] Contrasted to previous experiments with shock therapy in Latin America and given that the transition unfolded very differently across the different post-socialist states, the need for a more precise conceptualisation of the post-socialist transition and its theorisation became evident.[9]

Conceptualising transition originated from the effects of neoliberal "shock therapy," with its strong focus on economic reforms.[10] The imposed harsh and rigid development path paid little attention to the social costs of transition. Some of these costs included political and social instability, which became particularly evident in the ethnically and religiously fuelled conflicts of the Western Balkans. Thus, while the concept of post-socialist transition may have been convenient in economic terms, it remained one-dimensional[3] and thus only partially suitable for capturing the social complexity in former socialist countries.

As an alternative to transition, the concept of post-socialist transformation emerged to explain broader societal change, with a strong emphasis on individuals and social groups. Burawoy and Verdery[11] spotlighted everyday life and the manifold experiences of post-socialist moments – what they referred to as "small transformations" or "microtransformations". Post-socialist transformation is best understood as an open-ended process with a clearly identifiable starting point – namely, the liberation of millions of people from the constraints of socialism – but an uncertain outcome. Nevertheless, this process follows certain path-

[6]Péter Bagoly-Simó, "Doing Research in Geography Education: An Overview of Trends, Paradigms, Methods, and Dissemination," in *Handbook of Geography Education*, ed. Sarah W. Bednarz and Jerry T. Mitchell (Cham: Springer, 2024). https://doi.org/10.1007/978-3-031-72366-7_9.
[7]Martin E. Malia, *Russia under Western Eyes* (Cambridge: Belknap Press, 1999).
[8]Maxim Boycko, Andrei Shleifer and Robert W. Vishny, "A Theory of Privatization," *Economic Journal* 106, no. 435 (1996): 309–19.
[9]Boycko, Shleifer and Vishny, "A Theory of Privatization," 309–19.
[10]Jeffrey D. Sachs, "Eastern Europe's Economies – What Is to Be Done?," *The Economist*, January 13, 1990; and Jeffrey D. Sachs, "A Strategy for Efficient Debt Reduction," *Journal of Economic Perspectives* 4, no. 1 (1990): 19–29.
[11]Burawoy and Verdery, *Uncertain Transition*.

dependencies,[12] constantly creating hybrid structures that blend socialist elements of the past with those of a democratic society and a market economy.[13] These hybrid structures are particularly evident in educational processes and within school subjects.

Three decades after this political, economic, and cultural rupture, various disciplines have critically evaluated the concept of post-socialist transformation. Early reflections, dating back to the enlargement of the European Union in 2004, rang in the "post-post-socialism".[14] More recent economic and financial assessments[15] reinforced the argument of "post-post-socialism," advocating a rethinking of the open-endedness of post-socialist transformation. Other disciplines[16] have revived debates on the parallels between post-socialism and post-colonialism by exploring the entanglements of Eastern Europe (as a concept encompassing former socialist countries and territories of the Soviet Union) and the postcolonial world within the broader context of globalisation and its histories. In this regard, not only economic factors but also individual and collective processes of social development and cultural experience play a crucial role.

Research in education linked post-socialist, post-Soviet, and postcolonial debates much earlier[17] and has continued to do so ever since.[18] Silova[19] reflected on the phenomenology of transformation across Central, South-Eastern, Eastern Europe, and Asian territories of the former Soviet Union. Within the former Soviet context, forces of globalisation and their impact on (higher) education,[20] in general, and regarding specific aspects, such as social cohesion,[21] played an important role. Early literacy textbooks constitute an excellent example of establishing social cohesion,[22] as showcased by recent studies on the ethnographic dimensions of growing up during the Cold War.[23] In this context, iconographies

[12]F. E. Ian Hamilton, "Transformation and Space in Central and Eastern Europe," *The Geographical Journal* 165, no. 2 (1999): 135–44.

[13]Peter Finke, *Nomaden im Transformationsprozess: Kasachen in der post-sozialistischen Mongolei*. Kölner Ethnologische Studien 29 (Münster: LIT Verlag, 2004).

[14]Christian von Hirschhausen and Thomas Waelde, "The End of 'Transition' – An Institutional Interpretation of Energy Sector Reform in Eastern Europe and the CIS," *MOCT-MOST: Economic Policy in Transitional Economies* 11 (2000): 93–110.

[15]Robert Holzmann, Doris Ritzberger-Grünwald and Helene Schuberth, eds., *30 Years of Transition in Europe: Looking Back and Looking Beyond in CESEE Countries* (Cheltenham: Edward Elgar Publishing, 2020).

[16]James Mark, Artemy M. Kalinovsky and Steffi Marung, eds., *Alternative Globalisations: Eastern Europe and the Postcolonial World* (Bloomington: Indiana University Press, 2020).

[17]Iveta Silova, "Varieties of Educational Transformation: The Postsocialist States of Central/Southeastern Europe and the Former Soviet Union," in *International Handbook of Comparative Education*, ed. Richard Cowen and Andreas M. Kazamias. *Springer International Handbooks of Education*, vol. 22 (Dordrecht: Springer, 2009), 331–48. https://doi.org/10.1007/978-1-4020-6403-6_19.

[18]Iveta Silova, Zsuzsa Millei and Nelli Piattoeva, *Childhood and Schooling in (Post)Socialist Societies: Memories of Everyday Life* (Cham: Springer, 2017); Iveta Silova, "Interrupting the Coloniality of Knowledge Production in Comparative Education: Postsocialist and Postcolonial Dialogues after the Cold War,"*Comparative Education Review* 61, no. S1 (2017): S74–S102.

[19]Silova, "Varieties of Educational Transformation,"331–48.

[20]Iveta Silova, *Globalisation on the Margins: Education and Postsocialist Transformations in Central Asia* (Charlotte, NC: Information Age Publishing, 2010); and Iveta Silova and Sultangali Niyozov, eds., *Globalisation on the Margins: Education and Postsocialist Transformations in Central Asia* (Charlotte, NC: Information Age Publishing, 2020).

[21]Iveta Silova, Mark S. Johnson and Stephen P. Heyneman. "Literacy Textbooks for Early Childhood," *Comparative Education Review* 51, no. 2 (2007): 159–80.

[22]Ketevan Chachkhiani, Garine Palandjian, Iveta Silova and Keti Tsotniashvili, "Pedagogies of Time: 'Editing' Textbooks, Timelines, and Childhood Memories," *Journal of Childhood Studies* 48, no. 1 (2023): 111–25, https://doi.org/10.18357/jcs202320568.

[23]Zsuzsa Millei, Iveta Silova and Susanne Gannon, *Thinking through Memories of Childhood in (Post) Socialist Spaces: Ordinary Lives in Extraordinary Times*, 1st ed. (London: Routledge, 2023). eBook ISBN 9781003429715; Zsuzsa Millei, Iveta Silova and Nelli Piattoeva, eds., *Childhood Memories Connected to the Cold War (An) Archive Book* (Cambridge: Open

and ethnographies enriched scholarship primarily dedicated to systemic aspects of education, including inequality, reform, curricula, and teacher education.

In geography education, similar to geography as an academic subject, there is a certain reluctance to engage with both the post-socialist space and post-socialism. In geography, post-socialism is often dismissed in a mere footnote, as in Massey's (2005, p. 161) case, as "1989 and all that".[24] In geography education, there is amusing musing, such as Moran and Round's[25] statement on the margin of a field trip to Moscow that "[p]erhaps other things could be learned by reflecting on other places". Concerning secondary education, Bagoly-Simó[26] analysed the representation of post-socialist spaces in an international sample of textbooks. His scholarship also explored various facets of post-socialist transformation, such as curricula, textbooks, and the overall disciplinary development in the aftermath of 1989.[27] Still, geography education could dedicate more attention to former socialist countries, and the transformation process, as lessons learned are of great relevance to the trends, challenges, and chances of the school subject in other parts of the world.

### 2.2 Transformation and maps

Since the fall of the Iron Curtain, research in geography education in former socialist countries has progressively become, in general terms, more and more diverse, though much of the scholarship was published in national languages and failed to reach an impact beyond the national space. While these developments only partially apply to maps and map skills, it is still important to comprehend the main research frameworks – the reason why this section starts with a brief overview of main research trends in the region. Karvánková et al.[28] offer an insight into research in geography education in Czech and Central European geography education, addressing matters of curriculum, teaching methods, digitisation, and topical challenges connected to the teaching of human and regional geography. The various studies of Petr Knecht, Michaela Spurná and colleagues,[29] in a set of papers, tackle issues concerning geography teachers' professional identity and professionalisation. Focusing on Poland,

Book Publishers, 2024); Silova, Millei and Piattoeva, *Childhood and Schooling in (Post) Socialist Societies: Memories of Everyday Life*; and Silova, "Interrupting the Coloniality of Knowledge Production in Comparative Education," S74–S102.

[24]Doreen Massey, *For Space* (London: SAGE, 2005), 161.

[25]David Moran and Jon Round, "'A Riddle, Wrapped in a Mystery, inside an Enigma': Teaching Postsocialist Transformation to UK Students in Moscow," *Journal of Geography in Higher Education* 34, no. 2 (2010): 265–82.

[26]Péter Bagoly-Simó, "Still Red and in War or Just Poor? European Transformation Societies in Geography Textbooks," *Journal of Geography* 112, no. 3 (2013): 108–19.

[27]Péter Bagoly-Simó, "1989 and All That – Und was aas für den Fachunterricht bedeutet. Schulgeographie in Rumänien drei Jahrzehnte nach dem Fall des Eisernen Vorhangs," in *Politische Zäsur und Wandel des Bildungssystems: Drei Dekadenn nach dem Fall des Eisernen Vorhangs – Bilanzen und Perspektiven*, ed. Wilfried Göttlicher and Tomáš Janík, *Pädagogik in Forschung – Theorie – Geschichte*, vol. 3. (Münster: LIT Verlag, 2023), 177–94; Péter Bagoly-Simó, "Like It Never Happened: Teaching Post-Socialism in K-12 Geography 25 Years After 1989," in *Proceedings of the International Scientific Conference Geobalcanica 2015* (Skopje, Republic of Macedonia: Geobalcanica Society, 2015), 479–86; and Péter Bagoly-Simó, "1989 and All That: Geography Textbooks During Postsocialist Transformation," in *"1989" und Bildungsmedien: Beiträge zur historischen und systematischen Schulbuch- und Bildungsmedienforschung*, ed. Eva Matthes and Sylvia Schütze (Bad Heilbronn: Klinkhardt, 2016), 99–108.

[28]Petra Karvánková, Dagmar Popjaková, Michal Vančura and Jozef Mládek, *Current Topics in Czech and Central European Geography Education* (Cham: Springer, 2017).

[29]Petr Knecht, Michaela Spurná and Hana Svobodová, "Czech Secondary Pre-Service Teachers' Conceptions of Geography," *Journal of Geography in Higher Education* 44, no. 3 (2020): 458–73, https://doi.org/10.1080/03098265.

Piróg and colleagues[30] address the challenges of geography teachers' demographic ageing and explore the links between geographic skills and labour market demands. In Slovenia,[31] initial geography teacher education constitutes an important field of study, along with textbooks and Education for Sustainable Development. Kádár and Farsang[32] contributed to uncovering student preconceptions and conceptual changes connected to the topic of plate tectonics. Ilovan and colleagues[33] focus on socialism and explore the role textbooks (together with picture postcards) play in socialist indoctrination through school geography. These studies, together with Bagoly-Simó's[34] curricular and textbook exploration, offer the required empirical evidence for endeavours highlighting a more general development of the school subject in Romania.[35] Reaching beyond the national framework, some studies opted for the comparative perspective. For example, Homoki[36] compared the content and educational frameworks of teaching geography in Hungary, Slovakia, and Ukraine. Bagoly-Simó[37] compared Romania to the GDR, Bavaria, and Mexico.

Given their central relevance to geography, maps and map skills have enjoyed increasing interest in countries undergoing post-socialist transformation. Therefore, most studies aimed for a more global outreach through local samples. Analysing the post-socialist condition remained outside their main scope. The researchers around Havelková and Hanus[38] made an important contribution to the analysis of map skills.

2020.1712687; Michaela Spurná and Petr Knecht, "Discovering and Exploring Conceptions of Geography Teaching: A Teacher Education Starter Pack," *International Research in Geographical and Environmental Education* (2024): 1–16, https://doi.org/10.1080/10382046.2024.2377029; Michaela Spurná, Petr Knecht and Eda Hofmann, "Studying Geography Teaching: First-Year Undergraduate Students' Concerns and Expectations," *Annals of the American Association of Geographers* 114, no. 6 (2024): 1251–67, https://doi.org/10.1080/24694452.2024.2350994; and Knecht, Spurná and Svobodová, "Czech Secondary Pre-Service Teachers' Conceptions of Geography," 458–73.

[30]Danuta Piróg and Andrzej Hibszer, "The Situation of Geography Teachers on the Labor Market in Poland: Overt and Covert Issues," *European Journal of Geography* 11, no. 2 (2020): 65–87.

[31]Boštjan Rogelj, Tatjana Resnik Planinc, Blaž Repe and Mojca Ilc Klun, "Education for Sustainable Mobility in Slovenia: Using Gamification to Influence the Travel Habits of Children," *European Journal of Geography* 15, no. 2 (2024): 81–93, https://doi.org/10.48088/ejg.b.rog.15.2.081.093; Mimi Urbanc, Jerneja Fridl and Tatjana Resnik Planinc, "Landscapes as Represented in Textbooks and in Students' Imagination: Stability, Generational Gap, Image Retention and Recognisability," *Children's Geographies* 19, no. 4 (2020): 446–61, https://doi.org/10.1080/14733285.2020.1817333; and Eva Konečnik Kotnik, Mojca Ilc Klun, Tatjana Resnik Planinc and Karmen Kolnik, "Kakšen Učni Načrt si Želijo Slovenski Osnovnošolski Učitelji Geografije?" *Dela* 50 (2018): 45–80, https://doi.org/10.4312/dela.50.45-80.

[32]Anett Kádár and Andrea Farsang, "Comparing the Plate-Tectonics-Related Misconceptions of High School Students and University Undergraduates," *RIGEO* 7, no. 1 (2017): 24–47, http://www.rigeo.org/vol7no1/Number1Spring/RIGEO-V7-N1-2.pd.

[33]Oana-Ramona Ilovan, "Education, Propaganda, and Visual Discourse in Socialist Romania (1948–1989)," *Paedagogica Historica* (2024): 1–29, https://doi.org/10.1080/00309230.2024.2411301; and Oana-Ramona Ilovan, Péter Bagoly-Simó and Georg Herbstritt, "Visual Discourse in Romanian Geography Textbooks During Socialism (1948–1989)," *Romanian Review of Geographical Education* VII, no. 2 (2018): 59–70.

[34]Péter Bagoly-Simó, "Tracing Sustainability: Concepts of Sustainable Development and Education for Sustainable Development in Lower Secondary Geography Curricula of International Selection," *International Research in Geographical and Environmental Education* 23, no. 2 (2014): 126–41; and Péter Bagoly-Simó, "Geografia Fizica în Socialism. Studiu comparativ a două manuale pentru clasa a IX-a, din RSR si RDG," in *Tendințe Actuale în Predarea și Învățarea Geografiei – Contemporary Trends in Teaching and Learning Geography*, vol. 5, ed. Marina Anca, Maria Eliza Dulamă, Florin Bucilă and Oana-Ramona Ilovan (Cluj-Napoca: Clusium, 2008), 326–35.

[35]Maria Eliza Dulamă, Oana-Ramona Ilovan, Péter Bagoly-Simó and Ioana Magdaș, "The Development of the Geographical Education System in Romania, under the Impact of World War II and during the Transition to Communism," *Transylvanian Review* 28, no. Supplement 2 (2019): 219–37.

[36]Eika Homoki, "Content and Educational Conditions of Geography as a Subject Reflecting the Comparison of Some Central European Countries," *Analele Universității din Oradea. Relații Internationale şi Studii Europene (RISE)* 8 (2016): 99–112.

[37]Bagoly-Simó, "Tracing Sustainability," 126–41; and Bagoly-Simó, "Geografia Fizica în Socialism," 326–35.

[38]Lenka Havelková and Martin Hanus, "The Impact of Map Type on the Level of Student Map Skills," *Cartographica* 53, no. 3 (2018): 149–70; Martin Hanus and Lenka Havelková, "Teachers' Concepts of Map-Skill Development," *Journal of*

Employing various methods, ranging from content analysis to eye-tracking experiments, their studies addressed, among other things, teachers' concepts of map skill development and student strategies to solve map-related tasks. As textbooks still dominate the geography classroom in many former socialist countries, the studies by Hemmer and colleagues[39] analysed how tasks included in the geography textbook contributed to map skill acquisition and development. In an overview, Bagoly-Simó and colleagues[40] summarise trends and tendencies around map skills, ranging from document analysis through eye-tracking to more complex studies, also considering additional physiological data to understand student behaviour during task processing better. Ukrainian studies[41] remain limited to textbooks, also considering maps and the spatial dimension of geography as a school subject. Despite these attempts, there is a need for a more systematic study of how geography as a school subject navigates spatial representations and develops students' abilities to navigate spaces and think spatially. Understanding better the trends of the past leading to current configurations of the teaching-learning process seems equally important. This paper takes a first step in this direction.

## 3. Method and sample

This comparative study follows an exploratory objective, which is why the operationalisation is limited to document analysis. Future studies (see Section 6) will require additional approaches, such as interviews and classroom studies.

### 3.1 Method

Mixed methods served to explore the change of cartographic representations in lower secondary geography textbooks during post-socialist transformation. The qualitative phase rested on content analysis. The coding process started with developing codes regarding the typology of cartographic representations. Subsequently, the authors developed a table containing the relevant information: textbook, page, chapter/unit, map type, map content, and additional information. Each cartographic representation received its row. The initial categories underwent continuous revision as new types of cartographic representation were added. The Romanian subsample served as an initial example to secure intercoder reliability based on the codes provided by two independent coders (Cohen's kappa 0.79). Two coders

*Geography* 118, no. 3 (2018): 101–16, https://doi.org/10.1080/00221341.2018.1528294; and Lenka Havelková and Martin Hanus, "Upper-Secondary Students' Strategies for Spatial Tasks," *Journal of Geography* 120, no. 5 (2021): 176–90, https://doi.org/10.1080/00221341.2021.1981979.

[39]Ingrid Hemmer, Michael Hemmer and Péter Bagoly-Simó, "Orientation Without Spiral Curriculum? Evaluating Map Skills in Geography Textbooks," in *Representation of Otherness in Textbooks*, ed. Natalia Mazeikiene, Michael Horsley and Susanne V. Knudsen (Santiage de Compostela: IARTEM, 2013), 38–48.

[40]Péter Bagoly-Simó, Zsolt Palatinus, Nikolaus von Schmettau, Daniel Scholl and Anett Kádár, "Towards an Improved Map Skill Acquisition through Educational Media: Methodological Approaches and Future Steps," in *Educational Media: International Perspectives*, vol. 1, ed. Péter Bagoly- Simó, Mehdi Khaneboubi and Bruce Allen Knight (Oxford, UK: Peter Lang, 2025), 291–306.

[41]N. A. Kovchyn, "A Modern Textbook on Geography as a Means of Personal Development of Elementary and High School Students," *UDC 371*.67, no. 477 (n.d.): 137–44; O. M. Luchnikova, "Analiz chynnykh pidruchnykiv z heohrafii dlia 9 klasu na predmet zastosuvannia informatsiino-komunikatsiinykh tekhnolohii u navchanni," *Problemy suchasnoho pidruchnyka* 16 (2016): 193–202; and Andrii Khutorskyi, "Kompetentnisnyi pidkhid u shkilnii heohrafichnii osviti: suchasnyi stan ta perspektyvy," *Problemy suchasnoho pidruchnyka* 27 (2022): 140–53, https://ipvid.org.ua/index.php/psp/article/view/411/419.

processed each of the three subsamples, reaching similar values (Cohen's kappa 0.78–0.82). Subsequent meetings served to discuss each cartographic representation potentially requiring a new category or with a potential impact on the definition of each existing (sub-)category. Once the coding process was concluded, the quantitative phase started. Based on (aggregated) data for each textbook, the following indicators were computed: (a) average number of visuals/pages; (b) share of each visual type (of all visuals/textbook); (c) share of each cartographic representation type (of all cartographic representations/textbook); (d) share of cartographic representations according to geographical subdisciplines (for each textbook). Following the sampling, two values were calculated for each country to contrast the early years of transformation with the current situation.

### 3.2 Sample

The best sample for this study would encompass all geography textbooks for lower secondary education in all post-socialist countries and from the former Soviet Union. However, language, availability, and comparability challenges led to a reduced sample encompassing selected Romanian, Hungarian, and Ukrainian textbooks. The main reason for this sampling was the availability of textbooks in Hungarian and, based on this, the comparability of all textbooks. Despite considerable backlash and neo-nationalistic tendencies in both countries, ethnic Hungarians can study, whenever possible, in their mother tongue. Traditionally, Romanian and Ukrainian educational authorities authorised translations of the textbooks published for the majority population.

Sampling also needed to be mindful of the educational level. In the three countries, geography enjoys a different status as a mandatory school subject and has different time allocation in primary and lower secondary education. While two grades, namely seventh and eighth, belong to lower secondary education in all three countries, for better consistency and comparability the sample also included all grades of lower secondary education in the three countries: grades 5–8 in Romania, grades 6–8 in Hungary, and grades 6–9 in Ukraine. School enrolment starts between the ages of 5 and 7, meaning that lower secondary students are 10–12 to 14–16.

Two subsamples constituted the Romanian case study. On the one hand, the first reeditions of the socialist textbooks for grades 5 (TB1[42]), 6 (TB2[43]), 7 (TB3[44]), and 8 (TB4[45]) reflect the early stage of post-socialist transformation. As there are no available data on textbook sales, based on feedback from teachers, the most complete current set of geography textbooks was chosen to represent the 2020s: 5 (TB5[46]), 6 (TB6[47]), 7 (TB7[48]), and 8 (TB8[49]).

[42]Jana Ionașcu and Nicolae Ionescu, *Általános természeti földrajz. Tankönyv az V. osztály számára* (Bucharest: Editura Didactică și Pedagogică, 1995).
[43]Petru Bărgăuanu, Ion Sucitu and Valentina Stoica, *Földrajz. Tankönyv a VI. osztály számára* (Bucharest: Editura Didactică și Pedagogică, 1995).
[44]Pavel Voicu, Onoriu Dăneț, Marin Ion and Ion Lețea, *Földrajz. Tankönyv a VII. osztály számára* (Bucharest: Editura Didactică și Pedagogică, 1996).
[45]Claudiu Giurcăneanu, Iuliana Mușat and Gheorghe Ghica, *Geografia României. Manual pentru clasa a VIII-a* (Bucharest: Editura Didactică și Pedagogică, 1993).
[46]Silviu Neguț, Carmen-Camelia Rădulescu and Ionuț Popa, *Geografie. Clasa a V-a* (Bucharest: Art Klett, 2022).
[47]Silviu Neguț, Carmen-Camelia Rădulescu and Ionuț Popa, *Geografie. Clasa a VI-a*. (Bucharest: Art Klett, 2023).
[48]Silviu Neguț, Carmen-Camelia Rădulescu and Ionuț Popa, *Geografie. Clasa a VII-a*. (Bucharest: Art Klett, 2022).
[49]Silviu Neguț, Carmen-Camelia Rădulescu and Ionuț Popa. *Geografie. Clasa a VIII-a*. (Bucharest: Art Klett, 2022).

Consequently, the Hungarian subsample consists of three textbooks from the 1990s, namely for grades 6 (TB9[50]), 7 (TB10[51]), and 8 (TB11[52]), and another set of textbooks for grades 7/8 (type A–TB12[53] and type B–TB13[54]) from the 2020s.

The sample consisted of two subsets of textbooks. For the early years of transformation, textbooks for grades 6 (TB14[55]), 7 (TB15[56]), 8 (TB16[57]), and 9 (TB17[58]) were considered. Considering the impact of the war, the sample of the currently available geography textbooks consisted of grades 6 (TB18[59]), 7 (TB19[60]), 8 (TB20[61]), and 9 (TB21[62]).

### 3.3 Sample frameworks

Starting in 1990, *Romanian* lower secondary schools continued to use socialist geography textbooks. According to Bagoly-Simó,[63] during the second half of the 1990s, the national publishing house [Editura Didactică și Pedagogică] revised the textbook content. A slow but steady liberalisation of the textbook market led to the development of new textbooks. However, as Bagoly-Simó[64] describes, these textbooks continued to be post-socialist hybrid structures, as nearly the same group of authors and editors curated the new textbooks. Romanian formal education experienced constant curricular reform, mainly implementing the requirements of the European Union as part of pre-accession negotiations. At their core, geography curricula remained relatively stable. The Hungarian and German ethnic minorities retained the constitutional right to study geography in their first language, which is why translations of the Romanian textbooks became available, generally with a few years of delay. Given geography's role in Romanian nation-building, eighth-grade Geography of Romania was taught in Romanian by Romanian teachers, causing a significant rupture in students' geographical education. Therefore, the eighth-grade textbook from the 1990s (TB4[65]) was only available in Romanian and had to be included in the sample in its original presentation.

[50]Vendelné Nagy and Károly Udvarhelyi, *Földrajz 6* (Budapest: Tankönyvkiadó, 1991).
[51]Lajos Füsy, Rezsőné Mészáros, Károlyné Nagy, Ágnes Tóth and Albertné Vízvári, *Földrajz 7* (Budapest: Tankönyvkiadó, 1995).
[52]Vendelné Nagy and Károly Udvarhelyi, *Földrajz 8* (Budapest: Tankönyvkiadó, 1996).
[53]István Arday and László Szöllősy, *Földrajz 7/8* (Budapest: Oktatási Hivatal, 2022).
[54]Brigitta Balázs and Adél F. Kusztor, *Földrajz 7/8* (Budapest: Oktatási Hivatal, 2022).
[55]O. J. Szkuratovics, R. R. Kovalneko and L. I. Kruhlik, *Általános földrajz. Tankönyv a középiskolások 6. osztálya számára* (Lviv: Szvit Kiadó, 1997).
[56]V. J. Pesztusko, V. O. Szaszihov and H. J. Uvarova, *Kontinensek és óceánok földrajza: Tankönyv Ukrajna magyar tanítási nyelvű középiskoláinak 7. osztálya számára* (Lviv: Szvit kiadó, 2003).
[57]V. J. Pesztusko and H. S. Uvarova, *Ukrajna természeti földrajza. Tankönyv az általános oktatási rendszerű tanintézetek 8. osztálya számára* (Lviv: Szvit Kiadó, 2008).
[58]P. O. Maszljak and P. H. Siscsenko, *Ukrajna földrajza. Kísérleti tankönyv a középiskolák 8–9. osztálya számára* (Lviv, Szvit Kiadó, 2000).
[59]V. M. Bojko and Sz. V. Miheli, *Földrajz. Tankönyv az általános oktatási rendszerű tanintézetek 6. osztálya számára* (Lviv: Szvit Kiadó, 2014).
[60]V. M. Bojko and Sz. V. Miheli, *Kontinensek és óceánok 7. osztály* (Harkiv: Szicija Kiadó, 2016).
[61]V. M. Bojko, I. L. Gyitcsuk and L. B. Zasztavecka. *Ukrajna a világban: természetvilág, népesség 8. osztály* (Csernyivci: Bukrek Kiadó, 2016).
[62]V. M. Bojko, I. L. Gyitcsuk, T. A. Hrinyuk, I. V. Szmaly and I. M. Harcsenko, *Ukrajna és a világgazdaság 9. osztály* (Csernyivci: Bukrek Kiadó, 2017).
[63]Bagoly-Simó, "1989 and All That," 99–108.
[64]Ibid.
[65]Giurcăneanu, Mușat and Ghica, *Geografia României. Manual pentru clasa a VIII-a*.

In 1989, the 1978 curriculum was in effect in *Hungary's* centralised education system. During the first years of post-socialism, the most widespread textbooks at schools were the ones used during socialism. While an ideological revision was carried out, the textbooks preserved their original structure dating from the socialist era, and they continued to be published by Tankönyvkiadó [Textbook Publisher], the official and, up until then, the only publishing house having the right to publish school textbooks.[66] Though curricular reforms in 1985 and 1986 paved the way for a three-tier curricular system in Hungarian education, the legal framework allowing its introduction was only created in the new law on public education coming into effect in 1993 and, ultimately, the new National Core Curriculum [Nemzeti Alaptanterv, i.e. NAT] of 1995. This curriculum was introduced in 1998 and was followed by three reforms in 2003, 2012, and 2020.

Changes in education led to changes in the textbook market itself. New textbook publishers challenged the dominance of the state textbook publishing house. The first new textbooks were published shortly after the introduction of the 1995 NAT, and the textbook market flourished until the introduction of the 2012 NAT. Between 1989 and 2013, about 193 publishers constituted the Hungarian market, 90% of which was dominated by ten bigger publishing houses. Market competition and strong curricular control were present at the same time, and four publishers dominated two-thirds of the Hungarian market.[67] The 2012 NAT brought about the establishment of a new state-owned textbook publishing house, de facto establishing a monopoly and wiping out the textbook market.[68] Concurrently, a regulation was put in place that forces public schools to use only textbooks produced by the state-owned publisher. The situation has remained the same after the latest curricular reform in 2020.

Changes in design and text started to become increasingly widespread after the introduction of the first new National Core Curriculum in 1993. Currently, there are two types of geography textbooks available: type A textbooks follow a more problem-based approach, while their type B counterparts maintain a more instructive approach.

Following the fall of the Iron Curtain, geography first remained a mandatory school subject in grades 6–8 until the 1995 NAT, only to lose curricular space in grades 7–8. In addition, current textbooks followed the double-spread design of German textbooks and joined the curricular prescription of two subsequent grades.

Following the collapse of the Soviet Union, *Ukraine* went through a complex state-building process. This also included educational policy and, inherently, the introduction of a textbook market. However, despite Ukrainian having replaced Russian as the main language, formal education continued to use the textbooks from the Soviet Union due to lacking resources for educational resource development.

Ukrainian primary education spans nine years, followed by two years of mandatory secondary education. Geography is a mandatory subject in grades 6–9 of primary education – a practice that has remained unchanged after the collapse of the Soviet Union. The subject follows a combined thematic and regional approach, starting with general physical geography (grade 6, 2 weekly hours) followed by the geography of the

[66]Iván Falus and Ida Szűcs, *Didaktika: Elméleti alapok a tanítás tanulásához* (Budapest: Akadémiai Kiadó, 2021).
[67]András Müller, "A tankönyvpiac alakulásának főbb tendenciái," *Új Pedagógiai Szemle*, January 2001, https://epa.oszk.hu/00000/00035/00045/2001-01-tm-muller-tankonyvpiac.html (accessed March 13, 2025).
[68]Emese Szilágyi, "Centralizációs lépések: a tankönyvpiac államosítása," *Közjavak* 2, no. 1 (2016): 47–49, https://doi.org/10.21867/KjK/2016.1.2.

continents and oceans (grade 7, 2 weekly hours). The second half of geography education is dedicated to the national space, discussing Ukraine's nature and population (grade 8, 2 weekly hours) and economy (grade 9, 1.5 weekly hours), in contrast to global structures and processes.

As post-socialist transformation progressed, new educational resources entered formal education; however, the new textbooks showed very little change in content and visualisation, except for the extensive use of colour. Concerning the cartographic representations, the textbooks initially maintained their focus on the Soviet Union and only gradually shifted their emphasis onto Ukraine. Furthermore, the same authors continued to write textbooks after the collapse of the Soviet Union, working within a rather small market with 2 or 3 major publishing houses.

Despite its role in nation-building, Ukrainian curricular requirements, unlike in the early years of post-socialism in Romania, refrained from prescribing Ukrainian as the mandatory language for geography as a school subject. Minorities have enjoyed the freedom to study the subject in their own language, except for certain restrictions and regulations concerning the final examination. Consequently, all approved Ukrainian geography textbooks were also translated into the minority languages, including Hungarian; however, *termini technici* often were erroneous, and the translation was often limited to the continuous text. Consequently, they included the original maps and visuals in Ukrainian. Furthermore, the translation process may take several years, leading to a belated publication of the textbooks in minority languages.

Ukrainian formal education is in a constant state of reform. The New Ukrainian School [Нова українська школа, НУШ/NUS] constitutes the latest reform, dating from 2018.[69] As the reform rolled out, new geography textbooks and their translations entered the market. However, due to the war against Ukraine, Hungarian versions are not yet available. Thus, Hungarian students use translated textbooks published in 2014.

## 4. Results

Following a few general findings, this section introduces the results according to the three case studies.

Content analysis showed that lower secondary geography textbooks from Romania, Hungary, and Ukraine used up to seven types of visuals. In contrast to continuous textbook text, visuals refer to all forms of discontinuous text, namely maps, map-like representations, figures, photos, satellite images, tables and charts (the latter two constituting numerical data/representations).

Cartographic representations serve as an umbrella concept for the 15 sorts of visuals connected to spatial representation. These are, in the order of their introduction across the sample, terrestrial globes, satellite images, thematic maps, physical maps, historical maps, cartograms, geological sketches, 3D models, city maps, croquis, grids, projections, map sketches, contour maps, and topographic maps. The main difference between the categories *of maps* and *map-like representations* lies in the cartographic rigour. Visuals

[69]Ministry of Education and Science of Ukraine, *Nova ukrainska shkola: kontseptualni zasady reformuvannia serednoi osvity* (Kyiv: Ministry of Education and Science of Ukraine, 2016). https://mon.gov.ua/static-objects/mon/sites/1/zagalna%20seredn ya/nova-ukrainska-shkola-compressed.pdf.

counted as maps had to fulfil the minimum standards of the map, namely to feature a scale and a legend. Indicating map orientation was also considered crucial whenever the position of the North was not unmistakably clear.

The initial three geographical subdisciplines, namely physical, human, and regional geography, originated from the curricular content. The two additional categories added during the coding process were *Map Skills and Cartography* and *Other*.

## 4.1 Romania

The eight textbooks reflect a complex development over three decades with some similarities and striking differences. The following subsections offer detailed insight into the distribution of the 2,530 segments identified in the four textbooks published in the 1990s ($n$ = 529) and the 2020s ($n$ = 2,001).

### 4.1.1 Following transition: geography textbooks in the 1990s

In the decade following the fall of the Iron Curtain, students explored the world using text-heavy geography textbooks with modest visuals. On average, the textbooks contain less than one visual per page (Table 1).

The four textbooks of similar length (113–164 pages) were printed in Black and White, with the occasional red or blue – mainly limited to visuals – to spotlight important content. The eighth-grade textbook dedicated to the Geography of Romania (TB4) constitutes the only exception, as it included coloured photos and the occasional coloured map.

Six types of visuals (Table 1) complement the continuous text. Except for charts (missing from TB1 and TB2) and tables (missing from TB4), students encountered a combination of photos, figures, and cartographic representations. In addition to this strong and consistent specialisation, maps and map-like representation dominate the textbooks across the four years, accounting for roughly two-thirds of all visuals, closely followed by photos. Their variability across the grades was minimal. Figures only make an important contribution in fifth-grade physical geography (TB1); the few numeric visuals show an erratic pattern.

The tendency of extreme specialisation (hyperspecialisation) also applies to cartographic representations (Table 2). Thematic maps and globes account for over 99% of all segments. Furthermore, the fifth-grade textbook (TB1) contains most globes. Concerning map typology, during lower secondary education in the 1990s, Romanian

Table 1. Types of visuals (absolute numbers) and average visuals/textbook page featured in the Romanian textbooks (source: authors).

| | TB1 | TB2 | TB3 | TB4 | TB5 | TB6 | TB7 | TB8 |
|---|---|---|---|---|---|---|---|---|
| Maps | 30 | 55 | 51 | 50 | 105 | 90 | 97 | 66 |
| Map-likes | 17 | 30 | 55 | 19 | 5 | 10 | 17 | 14 |
| Figures | 42 | 2 | 4 | 2 | 120 | 67 | 28 | 24 |
| Photos | 26 | 48 | 40 | 41 | 263 | 306 | 283 | 274 |
| Tables | 1 | 1 | 2 | 0 | 26 | 45 | 21 | 21 |
| Charts | 0 | 0 | 12 | 1 | 10 | 39 | 46 | 24 |
| Total | **116** | **136** | **164** | **113** | **529** | **557** | **492** | **423** |
| Visuals/page (average) | **0.77** | **0.66** | **0.67** | **0.65** | **4.13** | **4.35** | **3.84** | **3.30** |

Table 2. Types of cartographic representations (%) in the Romanian textbooks (source: authors).

| | TB1 | TB2 | TB3 | TB4 | TB5 | TB6 | TB7 | TB8 |
|---|---|---|---|---|---|---|---|---|
| Globes | 76.67 | 0.00 | 1.96 | 4.00 | 54.29 | 5.56 | 8.25 | 1.52 |
| Satellite images | 0.00 | 0.00 | 0.00 | 0.00 | 7.62 | 4.44 | 10.31 | 6.06 |
| Thematic maps | 20.00 | 96.36 | 98.04 | 96.00 | 17.14 | 47.78 | 54.64 | 56.06 |
| Physical maps | 3.33 | 0.00 | 0.00 | 0.00 | 13.33 | 31.11 | 26.80 | 16.67 |
| Historical maps | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.11 | 0.00 | 0.00 |
| Cartograms | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.52 |
| Geological sketches | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.18 |
| 3D models | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 | 0.00 |
| City maps | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 | 0.00 |
| Croquis | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 | 0.00 |
| Grids | 0.00 | 0.00 | 0.00 | 0.00 | 1.90 | 0.00 | 0.00 | 0.00 |
| Projections | 0.00 | 0.00 | 0.00 | 0.00 | 2.86 | 0.00 | 0.00 | 0.00 |
| Map sketches | 0.00 | 3.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

students only worked with thematic maps. The only exception is a coloured physical map of Romania featured on the opening pages of the eighth-grade textbook (TB4).

The four textbooks use maps and map-like representations in unique patterns. Nevertheless, once the fifth-grade textbook introduced the basics of cartography and map skills, subsequent years relied extensively on this genuinely geographic visual.

The distribution of visuals across the grades mirrors the geographical content presented in each volume. The relatively high share of globes and map-like representations in the fifth-grade textbook (TB1) helps to introduce cartographic content and map skills. Similarly, given its thematic emphasis on physical geography, the textbook also features a considerable number of figures, including relief profiles, longitudinal and cross-sections, and models – also serving topic-related visualisation purposes. The two textbooks (TB2 and TB3) dedicated to the regional geography of the continents (grades six and seven) display a similar distribution of their visuals. The only exception is the relatively high share of numeric visuals used for compact visualisation of many spaces covering all continents but Europe. Finally, eighth-grade Geography of Romania (TB4) heavily relies on maps, map-like representations, and photos to introduce relevant content for national exams.

A closer look at the content reveals significant differences between the three main geographical subdisciplines of physical, human, and regional geography (Table 3). Textbook authors used over half of all visuals for content dedicated to regional geography, heavily relying on maps and map-like representations. In contrast, in the reading of the textbook authors, content in physical geography required mainly map-like representations complemented by an almost equal share of maps and other visuals. Finally, except for a few map-like representations, human geography almost solely relied on thematic maps.

Table 3. Types of cartographic representations (%) in the Romanian textbooks according to geographical subdisciplines (source: authors).

| | TB-4 (mean) | TB5-8 (mean) |
|---|---|---|
| Physical geography | 26.07 | 40.10 |
| Human geography | 14.42 | 7.43 |
| Regional geography | 58.59 | 42.48 |
| Other | 0.92 | 9.65 |

#### 4.1.2 Three decades later: contemporary geography textbooks

Contemporary school geography in Romania uses busy, colour textbooks that remain, despite an increased share of photos (on average, 3.78 visuals per page), still heavy on text. While the number of visuals decreases with each grade (Table 1), the textbook spreads remain busy and overloaded partly because of colour choices concerning the layout. The four textbooks considered for this study are each 132 pages long.

Six types of visuals complement the continuous text and reflect a strong and consistent specialisation (Table 1). Photos dominate the textbooks, accounting for half to two-thirds of all visuals, with their share increasing with the grade. In contrast, maps and map-like representations only account for up to one-fifth of all visuals, closely followed by numeric visuals, such as charts and tables. Depending on the grade, figures and/or globes play a more important role than any cartographic representation.

The four currently used geography textbooks contained a variety of cartographic representations; however, in quantitative terms, three main types of maps served to visualise content (Table 2). While thematic maps dominate all textbooks, the share of physical maps remains considerable, and that of historical maps is marginal. All textbooks use both maps and map-like representations. However, each volume clearly emphasises maps, with alternative representations only accounting for a modest share. Globes cluster in the fifth-grade textbook (TB5).

There is a clear correspondence between textbook content and the visuals featured in each book. As the fifth-graders (TB5) first learn about cartography and map skills, there is a higher share of globes supporting this process. Furthermore, the textbook primarily introduces physical-geographical content requiring a variety of figures. Apart from a few minor differences, the two textbooks (TB6 and TB7) dedicated to the regional geography of the continents (grades six and seven) showcase a very similar distribution of their visuals. Finally, the eighth-grade textbook (TB8) shows the highest degree of specialisation in photos, maps, and numeric visuals.

Exploring the links between cartographic representations and geographical subdisciplines indicates that regional geography takes the lead (Table 3), followed closely by physical geography. However, there are striking differences, as the authors favour maps representing regional-geographic content. At the same time, they equally strongly rely on maps and other representations, such as globes and satellite images, to visualise chapters dedicated to physical geography. Finally, almost two-thirds of all visuals counted in chapters introducing human-geographical content are maps, with the remaining one-third being map-like and other representations.

### 4.2 Hungary

The five textbooks constituting the Hungarian subsample offer insights into textbook market liberalisation and return to state monopoly under the circumstances of reconfigured content and improved design and production frameworks. The following subsections offer detailed insight into the distribution of the 2,647 segments identified in the three textbooks published in the 1990s ($n$ = 1,001) and the latest set of elective textbooks available in the 2020s ($n$ = 1,646).

### 4.2.1 Post-socialist transition: the 1990s

During the early years of post-socialism, geography was a mandatory school subject in grades 6–8 of compulsory education. Nemzeti Tankönyvkiadó [National Textbook Publisher], the legal heir of the previous Tankönyvkiadó [Textbook Publisher], continued as the sole educational resource publisher. Following the collapse of the socialist political system, educational reform first targeted textbooks. For Hungarian geography, the adjustments first impacted continuous text while the overall textbook design, size, habitual length (170–205 pages), and the distribution of textbook visual types remained unchanged.

Geography textbooks used in Hungarian classrooms throughout the 1990s contained an average of 1.38 visuals per page (Table 4); however, there is some variability concerning the individual grades and textbooks. Except for the cover, textbooks were printed in Black and White, with orange as the colour to highlight specific aspects of diagrams and figures. Furthermore, specially trained draughtsmen produced all visuals, giving the geography textbooks a homogeneous and consistent look. Appendices constituted a special form of composite element entailing, among other things, a mini dictionary of geographical concepts and several tables featuring diverse numeric data (reflecting information originating from physical, social, and economic geography).

The seven types of visuals featured in the geography textbooks of the 1990s (Table 4) display a certain specialisation, though they also undergo a progressive shift from photos to numbers. Photos account for almost 60% of all visuals in sixth-grade (TB9) and only a third of all in eighth-grade textbooks (TB11). Concurrently, the share of tables and charts increases from a fifth of all visuals (TB9) to 40% (TB11). In contrast, maps, map-like representations, and satellite images constitute the most stable types of visuals, with their cumulative share never reaching one-fifth of all discontinuous text types.

Maps only constitute 0.2% of all visuals featured in the three textbooks and are missing from the sixth-grade textbook (TB9). Adding map-like representations leads to a broader spectrum of map variety (Table 5), showing a hyperspecialisation on thematic maps tied, to a varying extent, to croquis (TB9) and contour maps (TB11). While physical maps only play a marginal role, carto-diagrams contribute a modest amount to spatial visualisation.

Regional geography constitutes the main content of the three Hungarian geography textbooks. Sixth-grade geography (TB9) introduces students to the world beyond Europe, while the seventh-grade textbook (TB10) emphasises Europe and the Commonwealth of Independent States. Finally, the eighth grade (TB11) is dedicated to the Geography of

Table 4. Types of visuals (absolute numbers) and average visuals/textbook page featured in the Hungarian textbooks (source: authors).

| | TB9 | TB10 | TB11 | TB12 | TB13 |
|---|---|---|---|---|---|
| Maps | 0 | 1 | 1 | 1 | 4 |
| Map-likes | 33 | 71 | 37 | 87 | 126 |
| Figures | 29 | 65 | 35 | 63 | 68 |
| Photos | 180 | 136 | 97 | 593 | 457 |
| Satellite images | 2 | 2 | 8 | 8 | 16 |
| Tables | 43 | 60 | 84 | 31 | 47 |
| Charts | 18 | 64 | 35 | 58 | 87 |
| Total | **305** | **399** | **297** | **841** | **805** |
| Visuals/page (average) | **1.60** | **1.93** | **0.60** | **3.75** | **3.14** |

Table 5. Types of cartographic representations (%) in the Hungarian textbooks (source: authors).

| | TB9 | TB10 | TB11 | TB12 | TB13 |
|---|---|---|---|---|---|
| Globes | 6.00 | 0.00 | 23.68 | 5.68 | 3.07 |
| Physical maps | 3.00 | 0.00 | 0.00 | 14.77 | 10.00 |
| Thematic maps | 51.51 | 51.38 | 60.52 | 53.41 | 57.69 |
| Contour maps | 15.15 | 22.22 | 0.00 | 2.27 | 0.76 |
| Cartograms | 3.00 | 2.77 | 2.63 | 3.41 | 2.30 |
| Croquis | 18.18 | 20.83 | 10.52 | 9.09 | 14.61 |
| Other | 3.00 | 2.77 | 2.63 | 11.34 | 11.52 |

Table 6. Types of cartographic representations (%) in the Hungarian textbooks according to geographical subdisciplines (source: authors).

| | TB9-11 (mean) | TB12-13 (mean) |
|---|---|---|
| Maps and map skills | 3.50 | 12.62 |
| Physical geography | 13.29 | 12.15 |
| Human geography | 0.00 | 4.67 |
| Regional geography | 75.52 | 70.56 |
| Other | 7.69 | 0.00 |

Hungary. Across the sample, cartographic representations take third place, preceded by a combination of photos and numeric visuals.

The three textbooks follow the regional approach, and chapters dedicated to regional geography account for three-quarters of all cartographic representations (Table 6). While none of the textbooks contains chapters primarily dedicated to human geography, it is surprising that content primarily dedicated to physical geography only uses a combination of thematic maps, satellite images, and croquis.

#### *4.2.2 Post-socialist Utopia: the early 2020s*

The implementation of the 1993 NAT marked the beginning of multiple changes. The emerging private sector in the publishing industry led to intense market competition; however, the curricular control remained strong. The 2010s marked the return to a centralised textbook market under state control. The Office of Education continues to monopolise textbooks for all grades and subjects, publishing two types of textbooks (A and B). Regarding the sample of this study, the type A geography textbook (TB12) is 224 pages long and uses a combination of continuous text and visuals to implement an activity- and problem-based approach that requires students to think, analyse, and evaluate. In contrast, the type B geography textbook (TB13, 256 pages) takes a more instructive stance, combining continuous text and visuals to build students' declarative knowledge.

On average, the two textbooks contain 3.45 visuals per page (Table 4) and are editions in colour. The type A TB12 uses a moderately higher number of visuals to implement its activity- and problem-based approach. Both textbooks use a variety of visuals of heterogeneous origins and lack an overall consistency in content design.

The two textbooks use the same seven types of visuals (Table 4), which exhibit a similar distribution pattern. Photos dominate the visuals in both textbooks, followed by

maps and map-like representations. However, TB13 uses fewer photos and more cartographic and numeric visuals to represent a more instructive approach. Cartographic visuals, encompassing maps, and map-like representations account for 11–16% of all non-continuous text featured in the textbooks.

In a closer reading, the typology of cartographic representations shows a distribution similar to that of the different types of visuals. Both textbooks use the same types of cartographic representations (Table 5), emphasising thematic maps (53–58%) and showing somewhat diverging preferences in the representation typology.

Hungarian lower secondary geography remains tied to regional geography, introducing a combination of content on physical, human, and regional geography along different scales, ranging from the immediate environment through the national (Hungary), supranational regional (Carpathian Basin), and continental to the global. While the main emphasis is regional and integrative, selected chapters explore solely human or physical-geographical topics. Concerning visuals, both textbooks mostly use photos, followed by cartographic and numeric representations.

Given their regional approach, both textbooks concentrate on both the majority and the highest diversity of their cartographic representations within regional geography (Table 6). Surprisingly, physical maps are located outside the chapters dedicated to physical geography.

## 4.3 Ukraine

Compared to the two post-socialist countries, the eight Ukrainian textbooks reflect a much stronger upheaval in formal education. The following subsections offer detailed insight into the distribution of the 2,847 segments identified in the four textbooks published in the second half of the 1990s and the 2000s ($n$ = 916) and the latest set of elective textbooks available in the 2010s ($n$ = 1,931).

### 4.3.1 Post-Soviet transition: the 1990s and 2000s

Post-Soviet transformation following the disintegration of the Soviet Union preserved much of the previous education system. The four textbooks representing the early post-Soviet sample show a gradual visual shift. On average, a textbook page contained less than one (0.82) visual (Table 7); however, the textbooks for the different grades display a significant variation. Starting with 2000, as newer textbooks became available, there was a

Table 7. Types of visuals (absolute numbers) and average visuals/textbook page featured in the Ukrainian textbooks (source: authors).

| | TB14 | TB15 | TB16 | TB17 | TB18 | TB19 | TB20 | TB21 |
|---|---|---|---|---|---|---|---|---|
| Maps | 1 | 8 | 4 | 0 | 6 | 10 | 2 | 0 |
| Map-likes | 9 | 32 | 39 | 17 | 62 | 64 | 63 | 23 |
| Figures | 68 | 41 | 14 | 2 | 231 | 57 | 69 | 35 |
| Photos | 46 | 163 | 360 | 40 | 286 | 388 | 352 | 86 |
| Satellite images | 0 | 0 | 5 | 0 | 8 | 3 | 0 | 0 |
| Tables | 13 | 1 | 11 | 19 | 13 | 5 | 21 | 20 |
| Charts | 2 | 2 | 13 | 6 | 11 | 20 | 15 | 81 |
| Total | **139** | **247** | **446** | **84** | **617** | **547** | **522** | **245** |
| Visuals/page (average) | **0.73** | **0.71** | **1.55** | **0.29** | **2.42** | **2.01** | **1.77** | **0.90** |

gradual and considerable increase in average visual values (from 0.29 to 1.55 visual/page). Each textbook also included a small dictionary of geographical concepts.

Published in Black and White, the four textbooks, published over 13 years, entail the same six types of visuals, with satellite images entering the latest published textbook as a seventh type of visual (Table 8); however, their share displays substantial changes. Except for TB14, photos increasingly dominate the non-continuous text, reaching a share of 80.7% in TB16 (published in 2008). Concurrently, there is a progressive decline in figures. Maps and map-like representations experienced a gradual growth, while the remaining types of visuals show a somewhat erratic pattern.

Despite an overall increasing trend along the publication date, cartographic representations display an inconsistent pattern when viewed along the individual grades (Table 9). Maps only account for 1.42% of all visuals and show a strong specialisation according to the grades (physical, historical, and thematic). Surprisingly, maps are missing from the ninth-grade textbook (TB17). However, viewed together with map-like representations, cartographic visuals show a preference for thematic (53%), followed by historical maps and carto-diagrams. Concerning their distribution across the grades, seventh- (TB15) and eighth-grade textbooks (TB16) entail, to a similar individual share, over three-quarters of all cartographic representations. The initial sixth-grade (TB14) and the final ninth-grade textbooks (TB17) contain very few cartographic representations.

Concerning the topical distribution, the sixth-grade textbook (TB14) introduces the basics of physical geography – including information on the universe, historical aspects of geography, basics of cartography and map skills. Figures, photos and numeric visuals dominate the textbook, with cartographic representations remaining in the background.

**Table 8.** Types of cartographic representations (%) in the Ukrainian textbooks (source: authors).

| | TB14 | TB15 | TB16 | TB17 | TB18 | TB19 | TB20 | TB21 |
|---|---|---|---|---|---|---|---|---|
| Globes | 40.00 | 2.50 | 6.25 | 0.00 | 13.16 | 20.78 | 1.54 | 0.00 |
| Satellite images | 0.00 | 0.00 | 10.42 | 0.00 | 10.53 | 3.90 | 0.00 | 0.00 |
| Thematic maps | 10.00 | 32.50 | 62.50 | 100.00 | 21.05 | 44.16 | 44.62 | 100.00 |
| Physical maps | 10.00 | 2.50 | 4.17 | 0.00 | 14.47 | 16.88 | 9.23 | 0.00 |
| Historical maps | 10.00 | 30.00 | 2.08 | 0.00 | 15.79 | 1.30 | 9.23 | 0.00 |
| Cartograms | 0.00 | 27.50 | 0.00 | 0.00 | 2.63 | 7.79 | 6.15 | 0.00 |
| 3D models | 0.00 | 0.00 | 2.08 | 0.00 | 0.00 | 3.90 | 0.00 | 0.00 |
| City maps | 0.00 | 0.00 | 0.00 | 0.00 | 3.95 | 0.00 | 6.15 | 0.00 |
| Croquis | 0.00 | 5.00 | 2.08 | 0.00 | 6.58 | 1.30 | 12.31 | 0.00 |
| Grids | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.54 | 0.00 |
| Projections | 20.00 | 0.00 | 8.33 | 0.00 | 2.63 | 0.00 | 7.69 | 0.00 |
| Topographic map | 10.00 | 0.00 | 2.08 | 0.00 | 9.21 | 0.00 | 1.54 | 0.00 |

**Table 9.** Types of cartographic representations (%) in the Ukrainian textbooks according to geographical subdisciplines (source: authors).

| | TB14-17 (mean) | TB18-21 (mean) |
|---|---|---|
| Maps and map skills | 3.54 | 18.67 |
| Physical geography | 42.48 | 36.10 |
| Human geography | 19.47 | 14.52 |
| Regional geography | 19.47 | 18.26 |
| Other | 15.04 | 12.45 |

Seventh-grade (TB15) geography primarily uses photos and an almost equal share of figures and cartographic representations to introduce the general regional geography of continents and oceans. The last two years of lower secondary education shift the scale by juxtaposing Ukraine with the world. Thereby, physical geography remains limited to grade eight (TB16), whereas both the eighth- and ninth-grade textbooks (TB16, TB17) introduce content on human geography. In qualitative terms, visuals show a similar distribution: photos complemented by numeric and cartographic representations.

A closer look at the typology of cartographic representation reveals some similarities across the three geographical subdisciplines (Table 9). In quantitative terms, content on physical geography entails almost half of all cartographic representations featured in the four textbooks, followed by an equal share for human and regional geography. Chapters dedicated to other areas, such as the history of geography, the universe, and the solar system, accounted for an additional 15% of all cartographic representations. Within the individual subdisciplines, thematic maps dominate. Physical geography uses the most diverse types of cartographic representation. For example, physical maps (except for one) are all featured in chapters exploring physical-geographical content, which shows yet another layer of hyperspecialisation.

### 4.3.2 Before the war: the 2010s

The four textbooks published during the 2010s reflect a more consolidated Ukrainian educational system with an established textbook market. Despite coloured editions, the textbooks maintained an overall poor quality and remained less user-friendly.

Ukrainian geography textbooks published in the 2010s contain, on average, 1.78 visuals/page (Table 7). Despite somewhat similar page numbers, there is a decreasing trend, with the sixth-grade textbook (TB18; 2.42 visuals/page) entailing, on average, more than twice as many visuals per page as its ninth-grade counterpart (TB21; 0.9 visuals/page).

Seven types of visuals support student learning (Table 7) across the grades. Satellite images are the only visuals missing from the eighth- (TB20) and ninth-grade textbooks (TB21). Photos, figures, and cartographic representations constitute the dominating visuals to a varying extent. While cartographic representations maintain a fairly similar share, other visuals show an irregular distribution across the grades. For example, figures make a strong contribution in sixth (TB18), tables and charts in ninth grade (TB21). Photos constitute the majority of visuals in grades seven (TB19) and eight (TB20) but also account for almost half of all visuals in grade six (TB18) and more than a third of those included in the ninth-grade textbook (TB21). Looking at the grades, sixth-graders mainly work with photos and figures, while ninth-graders combine photos with different numerical sources. Meanwhile, seventh- and eighth-grade textbooks heavily rely on photos.

With a share of 0.93% of all cartographic representations (Table 8), maps not only make the second-lowest contribution but also cluster in the seventh grade (TB19) and are missing from the ninth-grade textbook (TB21). However, together with map-like representations, cartographic representations make a humble contribution to geographic education in most grades, reaching their lowest count in the final grade (TB21). Concerning typology, thematic representations account for almost half (42%) of all cartographic representations, followed – at a greater distance – by physical maps and globes. Furthermore, diversity decreases with each grade, with the ninth-grade textbook (TB21) only containing 23 thematic representations along with a physical and a topographic map.

The four Ukrainian textbooks published in the 2010s maintain the topical distribution in Section 4.3.1. Sixth-grade physical geography (TB18) also features general knowledge of the universe, the history of geography, and selected content on human geography (population geography). Cartographic representations only play a marginal role (Table 8). The thematic emphasis of seventh-grade geography (TB19) is the regional geography of the continents and oceans – primarily introduced through photos and an almost equal share of figures and cartographic representations. The two textbooks (TB20 and TB21) dedicated to Ukraine's physical and human geography heavily rely on photos for visualisation, though to a varying extent. The eighth-grade textbook (TB20) also includes physical-geographical content, so cartographic representations and figures play a more substantial role.

Concerning the distribution across geographical subdisciplines (Table 9), in quantitative terms, a chapter dedicated to physical geography contains the most diverse cartographic representations. In contrast, human geography uses the least amount and variety of cartographic representations from the three main subdisciplines. Furthermore, chapters introducing cartographic content and map skills only partially consider all types of cartographic representations. For example, thematic maps are only subsequently introduced. Concurrently, a range of representations (projection types, city maps, and grids) remain limited to the chapter introducing cartographic content and map skills.

## 5. Discussion

Following the fall of the Iron Curtain, cartographic representations in geography textbooks experienced various changes in the post-socialist and post-Soviet spaces. Comparing the three case studies highlights several similarities but also some particularities of each.

The most striking common change is that geography textbooks became *colourful*. Textbooks printed during socialism refrained from using colour, mainly because of economic reasons. While photos were kept at a minimum, an additional scarcely used colour only emphasised and highlighted selected visual content. Despite the many disadvantages caused by the restricted use of photos, visuals featured in geography textbooks throughout the 1990s and the early 2000s had a range of advantages. For example, the restrictions on the number and types of visuals required a meticulous planning process involving reasoning why a specific content required visuals instead of lengthy descriptions in continuous text. In addition, specialised draughtsmen produced the visuals, warranting a unified look of most visuals in the individual textbooks and across the grades.

The second common change that accompanied the introduction of coloured editions was a *more intensive visualisation*. The average number of visuals per page in all three countries increased dramatically. However, the increased visualisation went along with various alterations, such as slight changes in the textbook size (Romania), new page layouts (in all three countries), a slight increase in length (for selected grades in each of the three countries), and a reduced share of the continuous text. In this aspect, the 21 textbooks analysed in this study are hybrid structures,[70] mirroring the very process of transformation. On the one hand, textbooks hold on to tradition and maintain elements of the past.

[70]Göttlicher and Janík, *Drei Dekaden nach dem Fall des Eisernen Vorhangs*.

Concurrently, innovation impacts their content and design, leading to redefined textbooks that connect elements of the past with novel ones, forming hybrid products.

A *significant diversification of visual types* is the third common change in geography textbooks. While this diversification is welcome and it certainly contributes to closing the gap between students' media usage and visuals featured in textbooks, learning geography would require, particularly from digitally available textbooks, additional types of discontinuous text (e.g. movies, navigating social media, programming, etc.). In this aspect, geography textbooks once again constitute hybrid structures; however, they are chronically lagging behind students' media consumption and skills. It seems that textbook authors and editors in the three countries continue to rely mainly on photos, even at the beginning of the 2020s. This strategy ultimately weakens geography's potential as a media-intensive subject that addresses global challenges by connecting them to students' everyday realities.

Along with similarities, the results of this study also uncovered a range of differences. One of the striking differences concerns the changes affecting cartographic representations in the geography textbooks of the three countries over three decades of transformation. Despite their central role in geography as a school subject, *cartographic representations*, in general, and maps, in particular, followed two main development paths. On the one hand, in Romania, the share of cartographic representations *decreased* by almost 40%; however, the current editions still entail the highest share compared to the other two countries. While photos (with the exception of Ukraine) benefited most from this development, all other visuals also increased in share, leading to lesser photo dominance than Hungary and Ukraine. On the other hand, changes affecting cartographic representations in the Hungarian and Ukrainian textbooks remained under one per cent. In Hungary, the already modest share of cartographic representations experienced a minor decrease. The share of photos increased at the expense of figures and numeric visuals. In Ukraine, the lowest share of cartographic representations experienced minimal growth. While the share of photos decreased to the benefit of figures, their share in the early years of transformation was already higher compared to the other two countries, possibly because of the slow publication of the textbooks stretching across the second half of the 1990s and most of the 2000s.

A closer look at five aspects within the *types of cartographic representations* adds further nuances to the photo. First, physical maps – often located outside a chapter dedicated to physical geography – enjoy an increased share across the sample. Based on the evidence presented in this paper, it is difficult to explain this trend. A possible hypothesis is the vanishing wall map from the geography classroom and the need to replace it in an accessible way, using physical maps solely for purposes of visualisation without any direct connection to physical-geographical content. Second, despite their reduced share, thematic maps maintain their central role, securing a broad topical visualisation across geographical topics, regions, and subdisciplines. Third, across the sample, starting with the second set of textbooks published in the 2010s and 2020s, thematic maps make space for novel cartographic representations. This welcome change constitutes a first step in offering novel ways to gain access to the world using cartographic representations. Concurrently, and this constitutes the fourth aspect, even these novel cartographic representations fall behind the available options in (digital) cartography. It remains open why publishers opted for PDF files instead of digital native

textbooks, allowing for the integration of WebGIS applications and means to collect, process, visualise, and alter spatial data for and within cartographic representations. Finally, several cartographic representation types vanished from the geography textbooks of the three countries. The representations primarily supported student learning in map drawing, a finding that reinforces the results[71] concerning an alarming decline in textbook tasks supporting map drawing and production. Without further evidence based on the tasks, it remains a hypothesis whether analogue map drawing is on the verge of disappearing from geography textbooks and novel (Web)GIS-based map production is yet to enter these resources.

A second main difference arises from the distribution of cartographic representations across the geographical subdisciplines. For example, physical maps increased in share, but often outside of chapters dedicated to physical geography. Such distribution patterns require further analysis of the interplay between different types of cartographic and other representations, tasks, and editorial decisions during textbook production.

Cartographic rigour constitutes the third main difference. The share of maps and map-like representations is the prime indicator of cartographic rigour. Apart from Romania, most cartographic representations tend to lack mandatory elements, such as scale, orientation, or even a legend. However, leaving such defining elements of a map unconsidered can potentially have disastrous effects on map skills and, ultimately, navigation skills (including using digital devices with navigation apps). Previous studies[72] have already reported similar findings in primary school. Therefore, future studies should also analyse textbook tasks and inquire about editorial decisions concerning a preference for map-like representations instead of maps.

Finally, the lower secondary geography textbooks of the three countries dedicate different attention to cartographic content and, presumably, map skills. Map skills require, on the one hand, cartographic content and, based on this, progressive skill development and consolidation across the different grades. This task is even more important in times of curricular reform, jeopardising independent subjects by introducing compound subjects (e.g. social studies, social science, science). The evidence of this study points to an urgent need to evaluate geography textbooks on the contribution of their cartographic representations to map skill development. Previous studies on different countries, from both post-socialist space and beyond,[73] showed questionable map skill development and consolidation strategies.

## 6. Conclusions

This paper aims to explore the change of cartographic representations in lower secondary geography textbooks in two former socialist countries (Romania and Hungary) and in the post-Soviet space (Ukraine).

[71]Péter Bagoly-Simó and Jaume Binimelis, "Maps and Map Skill Progression in Primary Geography in International Comparison," *Journal of Geography Education* 49, no. 4 (2021): 211–27, https://doi.org/10.18452/25367.
[72]Bagoly-Simó and Binimelis, "Maps and Map Skill Progression in Primary Geography in International Comparison."
[73]Hemmer, Hemmer and Bagoly-Simó, "Orientation Without Spiral Curriculum?"; Bagoly-Simó, "1989 and All That"; and Bagoly-Simó "Still Red and in War or Just Poor?"

Each textbook of the sample constitutes a unique artefact of a hybrid structure emerging from post-socialist or post-Soviet transformation.[74] The evidence shows that textbook editors and authors seem mindful of the shifting frameworks and chances for improved textbooks, including visualisation and design/layout. However, the evidence also shows that over three decades since the fall of the Iron Curtain, geography textbooks seem to be stuck in a phase of *(visual) compensation*. This phase seems marked by a certain acknowledgement of and openness to alternative solutions, but without reimagining the geography textbooks. Some of this development is deeply rooted in post-socialist path-dependencies, such as institutions and stakeholders still controlling textbook content and design.[75] Concurrently, Behnke[76] repeatedly showed that German textbooks also fall short of basic requirements considering design, layout, and accessibility, which places the challenges within a broader global context and outside of the former socialist countries.

Visual compensation is an understandable reaction in geography, a visual subject by definition. However, the impact of photos dominating most textbooks raises a range of pedagogical questions, ultimately questioning the cost of visual compensation when viewed against decreasing figures and numeric and cartographic representations. This study's evidence underlines the need for future studies spotlighting both the impact of changes in visualisation and the educational reasoning behind implementing such changes in the first place.

The alarmingly low share of maps compared to map-like representations raises yet another essential question for geography: how will the eroding cartographic rigour impact students' spatial perceptions and thinking? Traditionally, the three countries explored in this study relied differently on maps and map-like representations, the latter missing key map elements, such as scale, orientation, or legend. The evidence in this study cannot explain this development but points to the need for further investigation of the effects of the different mixes of cartographic representations and potential compensatory strategies in the classroom and beyond.

Finally, and closely tied to the quality and typology of cartographic representations, is the educational dimension of map skill acquisition, development, and consolidation. This study only constitutes the first step in this direction by focusing on cartographic representations. However, the findings allow for the hypothesis that there are similar challenges to those described by studies[77] dedicated to textbook tasks tied to map skills. Therefore, the next step will focus on the educational dimension of the cartographic representations and their change in time.

The limitations of this study are manifold. The focus on only three countries of the diverse post-socialist and post-Soviet space, the sole focus on lower secondary education, the missing latest Ukrainian textbooks due to the war, the emphasis on visuals alone (instead of text-visual integration[78]), and the decision to leave the

[74]Finke, *Nomaden im Transformationsprozess*.
[75]Bagoly-Simó, "1989 and All That."
[76]Yvonne Behnke, "Well Designed Digital Textbooks–Users' Requirements," in *Textbooks and Educational Media: Perspectives from Subject Education*, ed. Péter Bagoly-Simó and Zuzana Sikorová, IARTEM 2015 (Cham: Springer, 2021), 235–48, https://doi.org/10.1007/978-3-030-80346-9_14.
[77]Hemmer, Hemmer and Bagoly-Simó, "Orientation Without Spiral Curriculum?"; Bagoly-Simó and Binimelis, "Maps and Map Skill Progression in Primary Geography in International Comparison."
[78]Behnke, "Well Designed Digital Textbooks–Users' Requirements."

educational dimension untouched are just some of them. Future research should address these and other aspects, preferably considering map skills and on the grounds of cartographic knowledge. Such endeavours will undoubtedly require additional methodological approaches, such as interviews with stakeholders designing, writing, producing, and using textbooks and classroom studies with students of different age groups.

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