IEA Research for Education 17
A Series of In-depth Analyses Based on Data of the International Association for the Evaluation of Educational Achievement (IEA)

Žaneta Džumhur
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Dinaric Perspectives on PIRLS 2021

Prerequisites and Conditions for Teaching and Learning to Read

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Volume 17

The International Association for the Evaluation of Educational Achievement (IEA) is an independent nongovernmental nonprofit cooperative of national research institutions and governmental research agencies that originated in Hamburg, Germany in 1958. For over 60 years, IEA has developed and conducted high-quality, large-scale comparative studies in education to support countries' efforts to engage in national strategies for educational monitoring and improvement.

IEA continues to promote capacity building and knowledge sharing to foster innovation and quality in education, proudly uniting more than 60 member institutions, with studies conducted in more than 100 countries worldwide.

IEA's comprehensive data provide an unparalleled longitudinal resource for researchers, and this series of in-depth peer-reviewed thematic reports can be used to shed light on critical questions concerning educational policies and educational research. The goal is to encourage international dialogue focusing on policy matters and technical evaluation procedures. The resulting debate integrates powerful conceptual frameworks, comprehensive datasets and rigorous analysis, thus enhancing understanding of diverse education systems worldwide.

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Editors

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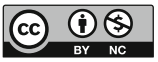

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Series Editors' Foreword

The International Association for the Evaluation of Educational Achievement (IEA) is dedicated to enhancing global knowledge about education systems and providing high-quality data to support education reform and improve teaching and learning outcomes. Our major studies in literacy, mathematics, science, citizenship, and digital literacy—notably TIMSS, PIRLS, ICCS, and ICILS—have set benchmarks for international comparative studies in education.

These studies have generated extensive datasets on student achievement, along with contextual information offering considerable explanatory power. While the resulting reports contribute significantly to educational research, IEA's goal of supporting education reform requires a deeper understanding of education systems and the factors influencing student learning.

To this end, IEA facilitates secondary analysis of our datasets through:

- Software tools like the International Database Analyzer
- Support for publications, including the peer-reviewed journal "Large-scale Assessment in Education"
- A biennial international research conference fostering exchanges between researchers.

The *IEA Research for Education* series further capitalizes on our unique datasets, providing focused reports on specific topics produced by teams of leading scholars selected through an open tender process.

The Progress in International Reading Literacy Study (PIRLS) 2021 marks a significant milestone in understanding reading achievement and the factors associated with it within the Dinaric region. As an international comparative assessment, PIRLS provides rich insights into fourth-grade reading comprehension across diverse educational contexts. This volume, "Dinaric Perspectives on PIRLS 2021," offers a multidimensional examination of the findings from PIRLS 2021, showcasing the achievements, challenges, and nuances of reading literacy in the Dinaric region. It builds on the foundation laid by the earlier volume focusing on TIMSS

2019 mathematics, extending the exploration of educational practices and outcomes in this unique and complex part of Southeastern Europe.

The Dinaric region—represented in this volume by education systems of Albania, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, and Slovenia—presents a diverse and dynamic educational landscape. This analysis of PIRLS 2021 data explores how national curricula, teacher qualifications, home environments, and digital learning contexts are associated with students' reading literacy outcomes. The collaboration between National Research Coordinators, IEA experts, and researchers from the region has yielded a body of work that is not only significant for local policymakers but also offers valuable insights for a broader international audience interested in comparative education and educational assessment.

The first chapter introduces the PIRLS assessment in the Dinaric region, setting the stage by outlining the historical and cultural contexts that shape education across the participating education systems. It emphasizes the importance of PIRLS in providing a benchmark for student achievement in reading comprehension and highlights the regional cooperation that has been instrumental in gathering and analyzing data. This introductory chapter provides readers with the necessary background to understand the subsequent discussions on curricula, teaching practices, and student performance.

In Chap. 2, the focus shifts to an analysis of the national curricula for language literacy in the Dinaric education. It reveals both similarities and disparities among the education systems, examining how the curriculum design is associated with students' reading skills and preparedness for assessments like PIRLS. The discussion underscores the need for a greater emphasis on non-linear and informational texts within the curriculum to align more closely with the reading demands students face in the international assessment.

The third chapter provides a comparison of texts used in PIRLS with those found in mother tongue textbooks across the region. This comparative approach sheds light on how well students are prepared for the types of reading tasks they encounter in PIRLS. The findings indicate significant variation in the types of texts used, with a tendency toward literary rather than informational texts, suggesting an area where curriculum developers might enhance students' readiness for international assessments.

Chapters 4 and 5 consider factors associated with student achievement, such as teacher qualifications, professional development, and well-being. The studies presented highlight the strong association between teacher quality and student reading outcomes, emphasizing the importance of targeted professional development. Additionally, the association between well-being and reading achievement is explored, particularly in light of socio-economic disparities and the effects of the COVID-19 pandemic, which has exacerbated existing inequities.

In Chap. 6, the authors provide a detailed analysis of how home resources, parental engagement, and early literacy activities are related to students' reading performance. Their findings reveal significant variations across and within education systems, suggesting that tailored interventions considering students' backgrounds could foster more equitable educational opportunities. The chapter also emphasizes

the differential association of socio-economic factors, highlighting the need for context-specific strategies to support reading literacy.

The association between the COVID-19 pandemic and education is further explored in Chaps. 7 and 8, which discuss the shift to digital learning and the challenges faced during data collection for PIRLS 2021. The pandemic brought unprecedented disruptions, and the responses of the Dinaric education systems highlighted both resilience and the need for greater digital preparedness. These chapters reflect on how digital tools were integrated into teaching and learning and the implications for future educational practices.

Finally, Chap. 9 addresses mode effects in PIRLS 2021, comparing reading outcomes between digital and paper assessments in Croatia and Slovenia. The layered findings underscore the complexities of transitioning to digital assessments and the implications for educational policy and practice. The discussion of digital self-efficacy and its relationship to reading achievement provides valuable insights into how technology can be effectively leveraged in education.

This volume represents the collaborative work of researchers, educators, and policymakers across the Dinaric region. It offers an overview of factors associated with reading literacy, identifying both strengths and areas for potential improvement. By contextualizing the findings within international large-scale assessments, the authors provide insights into how regional characteristics may influence educational outcomes.

The insights presented here are not only relevant for those working within the Dinaric region but also offer lessons for the global educational community. As countries around the world strive to improve literacy and educational equality, the experiences and findings documented in this volume serve as both a reflection of the current state and a guide for future actions. We hope that this book will inspire further research, dialogue, and policy initiatives aimed at enhancing the quality of education for all learners.

Coventry, UK — Seamus Hegarty
Bloomington, IN, USA — Leslie Rutkowski

Acknowledgments

In February 2018, the European Commission presented the new Western Balkans Strategy, stressing the European future of the region. At that moment, there had already been work in progress on IEA's Trends in International Mathematics and Science Study (TIMSS 2019), marking a milestone in terms of the participation of the Western Balkans region. This joint experience has facilitated peer learning in the region, and the resulting datasets assisted the first volume of "Dinaric Perspectives" and the consequent translation of its chapters into Croatian, Bosnian, Montenegrin, and Serbian languages. While the first volume, *Dinaric Perspectives on TIMSS 2019,* was built on collaboration among the TIMSS 2019 National Research Coordinators, the National Study Centers personnel, and the IEA team represented by researchers from IEA's Research and Analysis Unit (RandA), this second and final volume, *Dinaric Perspectives on PIRLS 2021,* trialed another approach and extended the expertise to colleagues across Europe with vast experience in analyzing IEA data in the areas deemed as important by the regional experts. We hope both publications create interest as well as provide motivation for further comprehensive investigations of the data and study materials in support of regional progress toward achieving high-quality universal primary education.

Most of the education systems analyzed in this second volume participated in IEA's Progress in International Reading Literacy Study (PIRLS) 2021 for the first time. As a result, it was necessary to start by investigating the national curricula and the PIRLS framework while also paying attention to the national contexts and differences. PIRLS 2021 was a challenging study to implement against the backdrop of the COVID-19 pandemic, which distorted the functioning of education systems globally and led to many challenges that are tackled in this volume.

This volume aims to provide a baseline for monitoring the recovery from the COVID-19 pandemic, enabling education stakeholders and authorities to develop appropriate measures to address the most pressing education needs, as well as providing insight into future developments and advancements. Additionally, we hope that stakeholders obtain inspiration and encouragement from identifying similarities and differences between the neighboring education systems.

It is beyond our scope to capture the richness of ideas, interactions, partnerships, and collaborations associated with the support received from people and institutions for PIRLS 2021 that this publication ultimately benefited from. These acknowledgments will be an imperfect attempt at recognizing those who generously gave their time, thoughts, and efforts to this publication.

Let us start with the support and engagement of the European Commission (EC). Here, our recognition goes to the Directorate General for Education and Culture (DG EAC) of the EC, represented by Unit C.3 dedicated to international cooperation led by Filip Van Depoele. Participation fees for PIRLS 2021 international testing of primary students in reading for the Western Balkans region were funded by the European Commission project EAC-2018-0712. Throughout the project lifetime—impacted and prolonged by the COVID-19 pandemic—we benefited from support and guidance from many colleagues working in the C.3 Unit, and we would like to acknowledge and thank Benedicte Einarsen, Nina Nikolova, Paola Ottonello, Unni Kvernhusvik Sagberg, and Savino Rua for their hard work and responsiveness.

We also thank the many individuals who were involved with the implementation of PIRLS 2021 across the region, starting with the Grade four students responding to questionnaires and the reading assessment, their parents, teachers, and school principals from the sampled schools and classes. The testing sessions would not be possible without the effective organization from the many school coordinators and test administrators.

Additionally, the contributions, effort, and persistence of experts from national ministries of education and institutions where PIRLS 2021 National Study Centers and National Research Coordinators (NRCs) were located were immense. Namely, we would like to show our appreciation to the following colleagues from the Western Balkan region:

In Albania, we are very grateful to all specialists from the Assessment Directory, who contributed to the implementation of PIRLS 2021. Special gratitude to the PIRLS NRC until November 2021, Rezana Vrapi, as well as to the Director of the Assessment Directory, from the Education Services Center, Agim Alia, who provided a valuable contribution to the PIRLS assessment as well as extensive information on Albania's education system.

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In Kosovo, our special thanks go to Nizafete Bardhi and Fatmir Elezi, who worked hard to make PIRLS 2021 implementation a reality and kindly provided valuable contextual information about their educational system to support multiple chapters in this publication.

In Montenegro, the Examination Center managed the implementation of PIRLS 2021, and the Director of the Examination Center, Dragana Dmitrović, provided the necessary support. We extend our deepest gratitude to all Examination Center's

colleagues, especially the Data Manager, Tatjana Krekun, who assisted with data collection and management. Graphic Designer Svetlana Miličković supported the preparation of all PIRLS instruments. Furthermore, we thank Dragana Nenadović, who organized the training for scorers and ensured the quality of the scoring process.

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Around the world, many researchers from many nations worked together on PIRLS 2021, sharing experiences, solving challenges, and contributing to PIRLS 2021 data and other resources.

At the international level, we extend our cordial thanks to the PIRLS 2021 Study Directors, Ina Mullis and Matthias von Davier from the TIMSS and PIRLS International Study Center at Boston College, and to their hard-working colleagues, who supported and encouraged the novel National Research Coordinators from the region: Ann Kennedy, Ieva Johansone, Katherine Reynolds, Erin Wry, and Pierre Foy.

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Competing Interests The authors have no competing interests to declare that are relevant to the content of this manuscript.

Contents

Chapter 1
Assessing Reading Achievement in the Dinaric Region: An Introduction

Surette van Staden, Paulína Koršňáková, and Jan-Philipp Wagner

1.1 Introduction to the Dinaric Region

This publication is the second volume from the *IEA Research for Education* series focusing on international large-scale assessment study results from the Dinaric region. Like the first volume, "Dinaric Perspectives on TIMSS 2019" (Japelj Pavešić et al., 2022), this book is a collaboration between the National Research Coordinators from the region, IEA (International Association for the Evaluation of Educational Achievement), and other researchers working on IEA data. "Dinaric Perspectives on PIRLS 2021" extends the use of IEA data for developing a multidimensional and culturally sensitive perspective on IEA studies in the region. This volume concludes the effort to introduce IEA studies to the regional audience as well as to engage the regional audience in using IEA data, as initiated by the previous volume dedicated to IEA's Trends in International Mathematics and Science Study (TIMSS) 2019 data.

The narrower term, Western Balkans, is used by the institutions of the European Union (EU) to refer to those partner economies in the Balkans that are not members of the EU (Commission of the European Communities, 2008). In this context, the

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Western Balkans include Albania, Bosnia and Herzegovina, Kosovo,[1] Montenegro, North Macedonia, and Serbia.

This publication uses a geographical approach to defining the boundaries of the region of interest. Geographically speaking, the Western Balkans are connected by the mountain ranges of the Dinaric Alps that stretch from the Julian Alps in Slovenia to the Šar Mountains on the borders of Albania, Kosovo, and North Macedonia. The name is derived from Mount Dinara (1831 m), which is located at the border of the Dalmatian part of Croatia and Bosnia and Herzegovina. Using this approach, the publication follows the definition of the region that was provided in the previously published Dinaric report on TIMSS 2019 (Japelj Pavešić et al., 2022).

The constituencies of the Dinaric region are diverse. The Dinaric Alps comprise an area of approximately 100,000 km^2 along more than 6000 km of coastline, including the entire area facing the Adriatic Sea, which naturally connect Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia, Kosovo, Albania, and North Macedonia. While the geographical units share many common cultural elements and the characteristics of the natural environment are similar, they vary in size and population. As of 2022, Serbia, with a population size of 6843 million people, is the largest in the region, followed by Croatia (3899 million) and Bosnia and Herzegovina (3271 million). Albania, North Macedonia, and Slovenia have populations of more than two million people, while Kosovo and Montenegro represent the smaller of the populations at 1873 million and 619, 211, respectively.[2]

1.2 The Progress in International Reading Literacy Study

The IEA Progress in International Reading Literacy Study (PIRLS) is an international large-scale assessment (ILSA) that measures student achievement in reading. Directed by the TIMSS & PIRLS International Study Center at Boston College, PIRLS assesses students' reading comprehension in their fourth year of schooling when children transition from learning to read to reading to learn (Mullis et al., 2023). For most education systems, the fourth year of education translates to grade four. PIRLS provides participating education systems with valuable systemic information about the intended, implemented, and attained curricula and trend growth from one cycle of assessment to the next. This information is imperative for policy decision-making and system-wide educational planning.

PIRLS builds on earlier IEA studies in reading literacy, namely the reading comprehension component of the Pilot Twelve-Country Study (Foshay et al., 1962), the reading comprehension component of the Six Subject Survey (Thorndike,

[1] This designation is without prejudice to positions on status and is in line with UNSCR 1244/1999 (United Nations, 1999) and the International Court of Justice (ICJ) Opinion on the Kosovo declaration of independence (Borgen, 2010).

[2] https://www.britannica.com/place/Dinaric-Alps.

1973), and most importantly, the 1991 Reading Literacy Study (Elley, 1992; Elley, 1994). The first PIRLS assessment took place in 2001, and since then, the study has been conducted every 5 years (2001, 2006, 2011, 2016, and 2021), providing valuable insights into trends in students' reading comprehension over time. Throughout this period, the number of education systems participating in PIRLS has grown gradually, with 65 education systems participating in PIRLS 2021 (Mullis & Martin, 2019).

As outlined in the PIRLS 2021 assessment frameworks (Mullis & Martin, 2019), the assessment adopts a broad definition of reading literacy that encompasses reading for literacy experience (i.e., reading for pleasure) and reading to acquire and use information (i.e., reading to do). Within these purposes of reading, PIRLS furthermore assesses different processes of comprehension by means of reading passages, namely (1) focusing on and retrieving explicitly stated information, (2) making straightforward inferences, (3) interpreting and integrating ideas and information, and (4) evaluating and critiquing content and textual elements. The assessment frameworks are revised for every study cycle, considering expert input from the participating education systems as well as the PIRLS reading development group. Reading passages are accompanied by multiple-choice and constructed-response questions (up to a maximum of three points) aimed at testing students' comprehension of the passages. Reading achievement in PIRLS is reported by five plausible values (PV's), addressing the detail that the assessed fourth-graders only respond to two reading passages from a total of 18 that make up the PIRLS reading assessment repertoire. All PIRLS results are interpreted against an international center point of 500 and a standard deviation (SD) of 100.

PIRLS is complemented by questionnaires that are administered to the sampled students, their teachers, school principals, and parents in order to collect valuable background information on the factors that affect learning, such as student attitudes, instructional practices, school resources, and parental education (Mullis & Martin, 2019). The PIRLS questionnaire development group ensures that questions in the questionnaires are updated each cycle if needed. National contributions to the PIRLS 2021 encyclopedia (Reynolds et al., 2022) illustrate the extent to which the PIRLS assessment instruments align with the reading curricula and national standards in the participating education systems.

PIRLS employs advanced sampling methodology to ensure that the national student samples are representative of the respective national student populations. PIRLS 2021 required a minimum sample of 150 schools and 4000 students from intact classrooms for each participating education system (Almaskut et al., 2023). The study is grade-based rather than age-based, and the target population is defined as "all students enrolled in the grade that represents four years of schooling counting from the first year of ISCED[3] Level 1, providing the mean age at the time of testing is

[3] ISCED refers to the International Standard Classification of Education, a statistical framework for organizing information on education maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

at least 9.5 years" (Almaskut et al., 2023: p. 3.3). As a result of the sampling procedures, the PIRLS 2021 results can be used to make comparisons between the participating education systems in terms of their students' reading achievement, as well as comparisons of reading achievement within a given education system over time.

The PIRLS 2021 assessment came with two innovations. The first innovation relates to the adoption of a new assessment design that is adaptive to larger, heterogeneous groups of students. As explained by Martin et al. (2019), the PIRLS 2021 instruments contain two levels of assessment booklet difficulty (more difficult and less difficult). While each participating education system administers both types of assessment booklets, the ratio between more difficult and less difficult booklets varies with the reading achievement level of the respective student population as measured during the PIRLS 2021 field trial. The other innovation refers to the transition from paper-based administration using printed test booklets to computer-based administration in a digital environment (Mullis et al., 2019). Digital reading assessment materials are based on the ePIRLS tasks that were piloted in PIRLS 2016. For PIRLS 2021, Albania, Kosovo, Montenegro, North Macedonia, and Serbia administered the assessment on paper, while Croatia and Slovenia opted for the digital assessment (Mullis et al., 2023).

As is common practice in ILSAs, every PIRLS cycle consists of two study phases: field trial and data collection. During the field trial, newly developed assessment material is trialed, and sampling procedures, instrument preparation, field operations, and data processing are tested. The analysis of field trial data provides insights into the necessary refinements of the study instruments. Likewise, a review of the field trial procedures allows for adjustments to the procedures for sampling, instrument preparation, field operations, and data processing. The data collection then usually takes place 1 year after the field trial.

In 2021, PIRLS was affected by the unprecedented COVID-19 pandemic. Virtually all education systems participating in the assessment faced disruptions such as school closures, extended periods of remote and home schooling, and shortened school years (Reynolds et al., 2022). These disruptions posed considerable challenges for collecting data in the sampled schools and necessitated the extension of the international data collection period by 2 years. Nonetheless, high-quality, comparable data were collected in most education systems, making PIRLS 2021 the only ILSA that collected internationally comparative fourth grade achievement results during the pandemic (Mullis et al., 2023).

At the national level, PIRLS 2021 was implemented by national study centers led by a dedicated national research coordinator (NRC). NRCs and national study center staff were tasked with the coordination of the PIRLS data collection in their respective education systems, including sampling and school recruitment, adaptation and translation of the PIRLS instruments, national field operations, scoring, data management, and reporting. Internationally, these tasks included contributing to the PIRLS assessment frameworks, contributing to the PIRLS item development, contributing to the PIRLS encyclopedia, representing the education system at PIRLS

meetings, and serving as the contact person responsible for all study-related activities (Johansone, 2023).

1.3 PIRLS and Reading Achievement in the Dinaric Region

1.3.1 Previous International Assessments of Reading Literacy in the Dinaric Region

The Dinaric region first participated in IEA's ILSAs when former Yugoslavia took part in the Pilot Twelve-Country Study in 1959–1961. In addition to reading comprehension, this project assessed the subject areas of mathematics, geography, science, and non-verbal ability (Foshay et al., 1962). However, none of the successor states of former Yugoslavia participated in the Six Subject Survey (1970–1971) or the Reading Literacy Study (1990–1991). Prior to the 2021 cycle, participation in PIRLS has been scarce in the Dinaric region: Slovenia has participated in all previous PIRLS cycles (2001, 2006, 2011, 2016), Croatia participated in PIRLS 2011, and North Macedonia participated in PIRLS 2001 and PIRLS 2006; all the other Dinaric education systems did not take part in the earlier PIRLS cycles.

Aside from PIRLS, education systems in the Dinaric region have also participated in the Organisation for Economic Co-Operation and Development's (OECD, 2020) Programme for International Student Assessment (PISA), with Slovenia participating as the only OECD member state and all other education systems in the region participating as non-member states. PISA's aim is to measure 15-year-old students' ability to read along with their science and mathematics knowledge (OECD, 2019). While the PISA framework for reading differs from the PIRLS framework, its scaling is also set at a mean of 500 using item response theory methods. The PISA 2018 results mirror the PIRLS 2022 results, with the best performance in the Dinaric region obtained by Croatia (479) and Slovenia (495). Achievement results for Albania (405), Montenegro (421), and Serbia (439) follow in much the same order as the PIRLS 2021 results. The average achievement results for Bosnia and Herzegovina (403), Kosovo (353), and North Macedonia (393), complete the picture for the Dinaric region (OECD, 2019). The PISA results (OECD, 2019) highlight the importance of the early assessment of reading comprehension, as done by PIRLS. Early assessment of reading comprehension at grade four serves as an important monitoring tool for further education and an accurate predictor for the improvement, decline, or stability of the education system in later years.

1.3.2 Implementing PIRLS 2021 in the Dinaric Region

In this regional context, it is a considerable achievement that Albania, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, and Slovenia completed data collection activities in PIRLS 2021, given the challenges and disruptions brought by the COVID-19 pandemic. This effort was greatly supported by the European Commission among others; however, participation did not materialize for Bosnia and Herzegovina (who were on track to take part in PIRLS 2021) due to political reasons.

1.3.3 Similarities and Differences in the National Language Curricula Structure

Information about the community contexts was collected through a curriculum questionnaire completed by the national research coordinators. Based on this questionnaire, each participating education system prepared a chapter for the PIRLS 2021 encyclopedia (Mullis et al., 2023), summarizing the structure of its education system, the reading curriculum and reading instruction in primary school, teacher-education requirements, and assessment and examination practices. The curriculum questionnaire was completed by the NRCs and other specialists from the national research centers of each participating education system. It asked about the education system's reading curriculum, including national policy on reading, goals and standards for reading instruction, time specified for reading, provision of books and other literary resources, and the impact of the COVID-19 pandemic.

The national curricula and programs of the Dinaric region differ by the structure of the national mother tongue curriculum and programs, which stems not only from educational policies but also from the non-linearity of subjects. The mother tongue is a means of communication and a language of instruction. Therefore, language expression at school and in everyday life depends on the success of knowing the mother tongue.

In Albania, the curriculum is structured into a core curriculum and an elective curriculum. The core curriculum consists of areas/subjects that society (the state) expects any student who completes pre-university education to have studied. The core curriculum is the same for all students regarding type, number, and learning outcomes. The elective curriculum is provided by the school and is chosen by students according to their curriculum and career interests. The choice begins in first grade and advances throughout schooling. In Croatia, the curriculum is presented as a catalog of education goals tailored separately for each subject, grade, and teaching unit; the syllabus contains the education plan for all subjects from grades one to eight. In North Macedonia, the curriculum for all compulsory and elective subjects in primary education is defined at the national level. The curricula for all languages taught in the fourth grade have a similar structure and determine various elements such as goals of teaching, learning outcomes, basic concepts, etc.

In Montenegro and Serbia, the curriculum is based on results, i.e., on the learning process and achievements of students. In Slovenia, teachers are completely autonomous regarding subject-specific didactics and the methods used for teaching. Optionality can be described in two ways: (1) optional/elective subjects that schools with different education levels need to (or can) offer that students can choose; and (2) optionality is characterized by open curricula where part of the education program is determined by the schools themselves and with social partners, local and regional associations, and the economy. These are especially for vocational and professional programs at the upper secondary level. On the contrary, the content framework of the textbook is determined by the subject-specific syllabus (which is determined nationally).

Curriculum in the Dinaric region are defined as official documents containing programs of study and may include any or all of the following: learning content, learning objectives, achievement targets, guidelines on pupil assessment, or model syllabuses.

The education systems of the Dinaric region have begun curriculum reforms aimed at the functionality of knowledge and the development of home competencies. According to NRC answers in the PIRLS 2021 curriculum questionnaire, the actuality of the curriculum according to which students attended mother tongue classes in 2021 is different. The curricula in Croatia, Macedonia, and Slovenia were introduced in 2006, 2008, and 2011, respectively. Throughout these years, Croatia and Slovenia made revisions to their curricula, while Macedonia introduced a new curriculum in 2021, after the PIRLS 2021 assessment took place. The other three education systems—Albania, Montenegro, and Serbia—use more recent language curricula, introduced in 2014, 2017, and 2018, respectively. In Albania, Croatia, North Macedonia, and Slovenia, reading is presented as a part of the curriculum for language instruction. In Montenegro, reading is integrated across the curriculum and in Serbia, reading is presented as a separate curriculum area.

1.3.4 Characteristics of Language Curriculum Structure in the Dinaric Region

All the examined curriculum documents begin by explaining the importance of the mother tongue, both as a curriculum subject and for personal development. Language literacy refers to the ability to express ideas, feelings, facts, and opinions orally and in writing in the mother tongue in different social, cultural, and communicative contexts (in the family, at work, and socially). The value of language development as a first principle of mother tongue is outlined in all the jurisdictions' curriculum documentation.

In Albania, mother tongue teaching is not divided by subject areas but by competences. In Croatia, in addition to language teaching, literature and language culture is in the domain of media culture. Likewise, in North Macedonia, media

culture is an integral part of the curriculum for the mother tongue. In Montenegro, the teaching of the mother tongue is taught through language and literature. In Slovenia and Montenegro, the mother tongue curriculum is realized through communicative language competence. In Serbia, mother tongue teaching is a combination of language teaching and teaching literature, while both are functionally connected through teaching the culture of expression. The following section details each education system's language curriculum, followed by a description of their respective responses to the COVID-19 pandemic.

1.3.4.1 Albania

Albania participated for the first time in PIRLS in 2021. According to Vrapi and Alia (2022), Albania implemented a reformed language and reading curriculum in 2014. The reformed curriculum is based on a competency approach and supports student development in competencies, learning areas, and learning outcomes (based on European guidelines). The key competencies in the reformed curriculum are organized into the following areas:

1. Communication and expression competence
2. Competence in thinking
3. Competence in studying to learn
4. Competence for life, entrepreneurship, and the environment
5. Personal competence
6. Civil competence
7. Digital competence

The goals of the Albanian language course program in basic education are: (1) to develop the skills to speak, listen, read, and write different types of literary and non-literary texts; (2) to cultivate critical and creative thinking through literary and non-literary texts; (3) to search, find, critically judge, and use information obtained from the media and the internet; (4) to have an appreciation for the Albanian language and world literature through the study of representative writers of different periods (the text suitability is determined by the age of the students); (5) to discover how thought, the spiritual world, and the personality of man are shaped through literary and non-literary texts; (6) to possess the right knowledge, skills, abilities, and attitudes about the Albanian language system; (7) to respect the Albanian language as a value of national culture and as a means of communication. For literary and non-literary texts, the ratio for teaching time is 70 percent for the communication and expression competence and 30 percent for the competence in thinking is suggested. (Kurrikula, 2017; Mihajlovska et al., 2024). Students in Albania gain knowledge and skills about the language system, with emphasis given to the following competencies: listening to different texts (5 h), speaking in order to communicate and to learn (5 h), reading different literary and nonliterary texts (75 h), reading for personal and functional purposes (30 h), and the right use of language (60 h).

In March 2020, when the World Health Organization officially declared the COVID-19 pandemic, all school lessons in Albania switched to online classes. For the remainder of the 2020–2021 academic year, teaching took place in school, online, or by combining the two methods. In February 2021, some lower and upper secondary education schools in major cities closed for 2 weeks (until the end of February) and conducted online lessons to cope with the effects of COVID-19 before reopening in March 2021 (Vrapi & Alia, 2022).

1.3.4.2 Croatia

The first major school reform project known as the Croatian National Education Standard (hrvatski nacionalni obrazovni standard [HNOS]) started in Croatia in 2005 (Elezović & Bosnić, 2022), after which the Syllabus for Primary School (nastavni plan i program za osnovnu školu) was designed and implemented in 2006. This syllabus contains the education plan for all subjects from grades one to eight and was in effect at the time both PIRLS 2011 and PIRLS 2021 were conducted in grade four in Croatia.

The Croatian Language Syllabus promoted by Ministry of Science, Education and Sports (2006) was used to foster students' ability to read, understand, and, after evaluating what was read, develop their way of thinking about the given information throughout primary school education. It emphasized that the fundamental goal of the study of the Croatian language was to prepare students for effective communication that would enable them to acquire knowledge in all subjects and engage in lifelong learning. Therefore, tasks in all domains focus on achieving this fundamental teaching goal. The Croatian Language Syllabus sets particular themes (key terms and tasks) for its four correlating domains: language, language expression, literature, and media culture. The instruction time was 175 h per school year, or five 45-minute Croatian language classes per week. As a means of expression and communication, language in Croatia is considered the basis for the intellectual, moral, emotional, spiritual, social, aesthetic, cultural, and physical development of the individual. Language supports students with coping and advancing in their personal lives and the wider community. It is expressed through cultural heritage and the culture of living, which includes the values, norms, and customs of the individual's community.

According to Elezović and Bosnić (2022), Croatia experienced a partial lockdown from March 16 to June 5, 2020, due to COVID-19. Closure of primary schools for grades one to four lasted 8 weeks, including the 10-day Easter holidays, i.e., from March 16 to May 8, 2020. For the rest of the 2019–2020 academic year, all schools reopened for a combination of alternating face-to-face instruction and online distance learning. For most of the academic year 2020–2021, primary grades one to four continued to use face-to-face instruction at school (Elezović & Bosnić, 2022).

1.3.4.3 Kosovo

Kosovo follows a curriculum where language and communication classes take up one-third of the total curriculum for public schools. Students in Kosovo's public schools take classes in their native language as well as their first foreign language, which is usually English. Schools are required to teach English for at least three classes per week in each grade, starting in preschool and continuing until the last grade of upper secondary school. Schools typically teach English through games, songs, and drawings, with an emphasis on speaking.

Digital learning experiences in Kosovo prior to COVID-19 were small-scale and uncoordinated. In 2018, only one in every five school directors reported that an online learning platform was available in their school (22%) (OECD, 2020). Then, following school closures in March 2020, digital learning became an urgent priority to reach children.

1.3.4.4 Montenegro

The curriculum followed in Montenegro states that mastery of all other subjects is dependent on mastery of the mother tongue. The stated learning outcomes for all mother tongue languages spoken in Montenegro—Montenegrin-Serbian, Bosnian, and Croatian—and literature are realized within the framework of four communication activities: listening, reading, speaking, and writing. In this way, students master communicative language competence and thus acquire the basics for reading, media, information, and intercultural literacy, which are prerequisites for personal development, successful schooling, and lifelong learning and prepare students for social and business life. The subject language and literature's two main focus areas—language and literature—each have subareas. There are three subareas within language instruction: (1) reading non-artistic texts of various types (these include media and information literacy); (2) creating texts based on class texts (oral and written expression); and (3) grammar and spelling (Radović, 2022). The subareas in literature instruction include: (1) reading and interpreting literary and artistic texts; (2) creating texts based on class texts (oral and written expression); and (3) adopting literary theoretical concepts (determined by age). Grammar and spelling in the mother tongue, along with a systematic literacy program in Cyrillic and Latin, are also key elements of language instruction. Of the 170 h a year for the mother tongue in Montenegro, 90 h are planned for language teaching, 60 h for literature teaching, and 20 h for the so-called open part of the curriculum (Zavod Za Shkolstvo, 2017).

Montenegro's response to the COVID-19 pandemic meant forced school closures; however, according to Radović (2022), the top priority was to protect every student's right to an education. During the COVID-19 lockdown, students, parents, and teachers were challenged by poor digital skills, network and accessibility issues, a lack of training, as well as resistance to change. The 2019–2020 academic year was completed online with a few different scenarios prepared for the 2020–2021

academic year. The first scenario suggested a "normal" entry into schools at the beginning of the new school year. However, that did not happen, and the new school year was delayed to October 1, 2020, instead of September 1, 2020. To reduce the number of students in the same building at the same time, the second scenario followed a hybrid approach, where groups of students had face-to-face classes alongside online teaching. The third scenario was online education for a minimum of a term, depending on the epidemiological situation. In Montenegro, all the above-mentioned scenarios occurred during the COVID-19 pandemic. The 2021–2022 academic year started with all schools open; students had regular classes, but the classes were shortened to 30 minutes (Radović, 2022).

1.3.4.5 North Macedonia

North Macedonia follows a specific curriculum adopted in 2007 for all languages taught in fourth grade (Macedonian, Albanian, Turkish, Serbian, and Bosnian). All curricula have the same structure and differ only in those parts that are specific to the respective language (Mihajlovska, 2022). According to the central curriculum, teaching the mother tongue allows students to develop an interest in learning and applying the mother tongue as seen as a basic means of communication and artistic expression. Learning the mother tongue is considered the most characteristic feature of national identity. In primary education, the mother tongue is taught 5 hours per week (180 h per year) in grades one to five. Students who participated in the PIRLS 2021 assessment attended classes in their mother tongue and thus followed the mother tongue curriculum.

The curriculum determines the learning outcomes, basic concepts, activities, and methods in teaching, standards for assessment of student achievements, and standards for teaching staff. Through learning the mother tongue, students become acquainted with the structure and system of the language and develop the skills of listening, reading, writing, oral and written expression, comprehension, experience, and interpreting literary and other texts. The goals are specified in four program areas with several sub-areas, i.e., language (grammar and spelling), reading, literature and assigned reading (literature: prose, poetry, selected titles and texts, and assigned reading), expression and creation (oral expression and written expression), and media culture. Recommendations for the use of the annual number of teaching hours (180 hours per year, 5 h per week) by subject areas: language—70 h; reading, literature and assigned reading—70 h; expression and creation—30 h; media culture—10 h, and subjects can be connected to each other (Bureau for Development of Education [BDE], 2008).

Education in North Macedonia was also severely affected by COVID-19. On March 11, 2020, the government suspended all classes with physical presence in all educational institutions, and the Ministry of Education published free digital platforms, applications, and content for home learning on its website. According to Mihajlovska (2022), in March 2020, the National TV Service (MRTV) also started broadcasting an educational program, "TV Classroom," with content prepared by

teachers in different subjects. After declaring a state of emergency, the North Macedonian government issued a decree to organize teaching through distance learning, and on March 24, 2020, the National Platform for Support of Distance Learning, EDUINO, was introduced and promoted.

1.3.4.6 Serbia

In Serbia, the curriculum consists of three areas for grade four students: literature, language, and language literacy. Reading classes are held in all three areas. By the end of grade four, reading-related outcomes for students include the following: read different types of texts with comprehension; briefly explain their impressions and opinions; respect different points of view; paraphrase a text from different roles and perspectives; notice the basic tone of the literary text (e.g., happy, sad, funny); notice the conflict of people in a dramatic text; read the text with respect to the intonation of the sentence or verse; expressively recite a poem and read a prose text; interpret dramatic texts; connect the information expressed in a linear and nonlinear text and draw a conclusion from it; structure the text correctly; and participate in the elaboration of contents and working methods (Randjelovic et al., 2022).

The goals of learning the Serbian language are for students to master the basic laws of the Serbian literary language for proper oral and written expression, foster awareness of the importance of the role of language in the preservation of national identity, and be able to interpret selected literary and other artistic works from both Serbian and world heritage to foster the traditions and culture of the Serbian people and the development of interculturality. Key goals of teaching literature are to develop students' ability to read literary texts with understanding, encourage a love for reading, develop a sense of a text's beauty and value, and cultivate taste and perseverance in reading and experiencing a literary work. It is necessary for teachers to nurture students' ability to describe their experience of reading literary works to help them express their opinions, to understand the various characteristics and actions of characters, and to make judgments about those characteristics and actions.

In Serbia, it is considered that reading takes time, perseverance, and dedication—characteristics needed for further learning. Reading literature encourages empathy as students immerse themselves in the outside world and experience it emotionally. Reading literature strengthens students' national and cultural identity as they learn about their own literature and culture as well as the literature and culture of other nations. The curriculum for teaching and learning the Serbian language is based on results, i.e., on the learning process and achievements of students. For students in fourth grade, the curriculum consists of three areas: literature, language, and language literacy. Reading classes are held in all three areas. The recommended number of hours per year per subject area are: literature—80 h, language—50 h, and language literacy—50 h. All areas are intertwined, and none of them can be studied in isolation and without cooperation with other areas (Official Gazette of the Republic of Serbia, 2019).

In response to the COVID-19 pandemic, Randjelovic et al. (2022) state that the shutdown of Serbian schools began on March 16, 2020. This lasted until May, followed by partial shutdowns, where students went to school in smaller groups only to take final examinations. By September and October 2020, parents were given the decision whether to send their children to school or keep them at home. The second full shutdown began on November 1 and lasted until January 2021. For the remainder of the 2020–2021 academic year, a hybrid model of instruction was implemented throughout Serbia, which meant that some students went to school while others stayed home and participated in distance learning (Randjelovic et al., 2022).

1.3.4.7 Slovenia

Finally, in Slovenia, the main objectives of compulsory basic education align with the end of each of the three cycles at grades three, six, and nine. Reading is not a separate school subject but is included within the Slovenian language subject, where the syllabus is prepared around the three cycles of compulsory basic education (Klemenčič Mirazchiyski, 2022). There are no separate hours prescribed for teaching reading. Instead, the main goal of the Slovenian language subject is to develop the ability to communicate, which comes from considering nonliterary and literary texts that are chosen based on the age suitability of the students in the three cycles. Nonliterary texts are used for 60 percent of the subject hours, and literary texts are used for 40 percent (the exception is first grade, where nonliterary and literary texts are used for an equal number of subject hours).

The objectives of compulsory basic education in Slovenia are realized through language and literature lessons. These lessons focus on four communicative activities: listening, reading, speaking, and writing. The purpose of language lessons is to develop communication skills in the Slovenian (literary) language, i.e., the practical and creative mastery of all four communication activities, as well as understanding language system foundations. In literature classes, students encounter artistic/literary texts, and through them, in addition to communication skills, students develop their experiential and creative imagination, evaluation, and intellectual skills. Through visual arts, students perceive cultural, ethical, and spiritual dimensions, which are essential for cultural, patriotic, and civic education as well as strengthening intercultural and social skills. The contents of the curriculum are both mandatory and optional.

Klemenčič Mirazchiyski (2022) describes how the Slovenian system adapted its timetable over a period of 2 years to mitigate the risk caused by the COVID-19 pandemic. In switching to remote teaching and learning, schools regularly received messages and guidance from both the Ministry of Education, Science, and Sport (2018) and the National Education Institute of Slovenia on different points related to remote schooling, organization, and health measures. A number of resources to support remote teaching and learning were already available to schools before the COVID-19 pandemic, such as systems for reporting student grades, virtual learning environments, or learning management systems; the use of these increased with the

enforcement of remote learning. Additional digital lessons and learning materials were developed by different stakeholders (e.g., teachers), and some publishing houses shared a variety of materials, such as electronic and interactive textbooks (Klemenčič Mirazchiyski, 2022).

1.3.5 Contextualizing Overall PIRLS 2021 Results for the Region

The optimal value of participation in international large-scale studies is the opportunity to analyze the microdata to give meaning to results beyond that of assigning importance to league table standings. While overall scores are often driven by aptitude, learner motivation, and socioeconomic status, ILSAs have the potential to provide a contextual reflection of the nature of performance and the nature of trend change in the ever-changing Dinaric region. Here, it is important to acknowledge that participation in PIRLS 2021 has been the first encounter with an international reading assessment that compares attainment across diverse education systems based on a specific framework. The PIRLS frameworks were not used by educators and curriculum developers, at least not in the way that could influence any compliance. Hernández-Torrano and Courtney (2021) highlight four points of concern that must be considered when analyzing ILSA data, namely:

1. The possibility of ILSA to encourage regional and global isomorphism, i.e., the similarities in educational structures, policies, pedagogies, and curricular content across jurisdictions and cultures. In this regard, it is argued that for regional (Dale, 2000) and global (Meyer et al., 1992) educational homogenization, it is difficult to identify the extent to which ILSAs themselves drive isomorphism (Johansson, 2016) or whether commonalities across curricula happen to exist.
2. Results are prone to be reported in an uncritical way.
3. The misuse of causal language when reporting results.
4. Its possibility of being exclusionary in terms of the expertise needed to use and interpret measurement devices, establishing consequential and other forms of validity.

In the context of this book, the challenge has been to examine the similarities and differences of the PIRLS's framework and instruments compared to the national curricular documents, textbooks, and didactical approaches of teachers in the Dinaric region. In regard to Hernandez-Torrano and Courtney's above-mentioned second concern, it is important to note that results are not only prone to being reported in an uncritical way but could be ignored based on a lack of understanding of their origin or when deemed unsatisfactory. The following two chapters consider how reading described in the PIRLS 2021 framework and reading instruction in the region relate to each other.

Table 1.1 PIRLS 2021 results in the Dinaric region

Education system	Overall results	Standard error (SE)	Average result is significantly higher or lower than the centerpoint of the PIRLS scale
Croatia[a]	557	2.5	▲
Slovenia	520	1.9	▲
Serbia	514	2.8	▲
Albania[b]	513	3.1	▲
PIRLS scale centerpoint 500			
Montenegro	487	1.6	▼
North Macedonia	442	5.3	▼
Kosovo	421	3.1	▼

Notes: [a]It has to be noted that all participating education systems collected data according to the original plan from February to July 2021, with the exception of Croatia, which had a delay in data collection. Due to the challenges on operations that COVID-19 posed, Croatia only collected data from September to December 2021. This delay in assessment meant that Croatian students were tested at the beginning of grade five

[b]Issues identified in Albania's data quality led to reduced comparability and framework coverage (Mullis et al., 2023)

***National PIRLS 2021 results are*:**

▲ Higher than the centerpoint

▼ Lower than the centerpoint

In presenting the PIRLS 2021 results and findings based on PIRLS data, this book sets an example on how to address the third above-mentioned concern. It does this by providing a thorough selection of used methods, interpretation, and analysis beyond overall achievement scores. We hope that through this volume we will provide invitation, substantial information, and motivation to researchers from the region to access and use the data to answer questions important to them. Additionally, the chapter(s) references provide links to publications that document the data in detail.

Table 1.1 provides the overall PIRLS 2021 results for each of the education systems in the Dinaric region. This presents an overall context of achievement against the PIRLS international centerpoint of 500 (Mullis et al., 2023) as a point that is stable across assessment cycles.

At the time of the PIRLS 2021 data collection, there was substantial variation across education systems in how primary school operations were affected by the COVID-19 pandemic. Some education systems still experienced school closures, and others modified how they provided in-person instruction (Mullis et al., 2023). In this regard, school principals were asked the extent of disruption to normal school operations by the number of weeks. In Albania, 13 percent (SE = 2.9) of school principals indicated that school operations were affected for more than 8 weeks. Similarly, in Kosovo, only 10 percent (SE = 2.7) of school principals reported severe disruption. Larger percentages were reported by school principals in North Macedonia (26%, SE = 4.1) and in Croatia, where these reports were much higher, with 35 percent (SE = 4.4) of principals of grade four students indicating that instruction was disrupted for more than 8 weeks. Even higher were reports for Serbia

(33%, SE = 4.2) and Slovenia, with as much as 83 percent (SE = 3.4) of school principals reporting disruption to normal school operations by more than 8 weeks (Mullis et al., 2023).

Despite disruptions for more than 8 weeks as reported by more than a third and more than three quarters of school principals, respectively, Table 1.1. indicates that Croatia, followed by Slovenia, were the best performing education systems in the region. According to Mullis et al. (2023), these students were comparatively older. However, without any information about the reading achievement of the students in Croatia at the end of the fourth grade or their activities over the summer months, the PIRLS 2021 data in and of itself cannot be used to disentangle the extent of the impact of the delayed assessment on students' reading achievement.

1.4 Overview of the Chapters

This volume consists of nine chapters. Following this introductory chapter, Chap. 2 focuses on issues of the Dinaric region's national curricula on language as a basic guideline for teaching and students' achievement in reading comprehension against the background of the IEA's tripartite curricular model of an intended, implemented, and attained curriculum as developed for the Trends in International Mathematics and Science Study (TIMSS) (Schmidt & Cogan, 1996). Chap. 3 contrasts textbooks in the Dinaric region against the expectations set by the PIRLS 2021 reading assessment passages and the PIRLS 2021 assessment framework to identify the extent to which students in the Dinaric region are adequately prepared by their written curriculum to respond to PIRLS passages. While issues of PIRLS 2021 translation form a close link to the topics of the textbooks as presented in Chap. 3, translation of the assessment instruments falls beyond the scope of this chapter and elsewhere in the volume. Chapter 4 provides a comparative perspective for the Dinaric region in terms of teacher qualifications, professional development, teaching quality, and student reading achievement. Chapter 5 delves into issues around grade four students' wellbeing and its relation to reading literacy. Chapter 6 shifts the focus to the relevance of home situations for students' reading achievement and attitudes towards reading, while Chap. 7 explores digital competences and IT equipment as prerequisites for schooling in times of educational disruption. Chapter 8 details PIRLS 2021 in the context of COVID-19 response rates and data. The volume concludes with Chap. 9 by revealing differences between paper and electronic reading achievement in PIRLS 2021 in Croatia and Slovenia.

This volume has limitations. First, being a lack of research (and researchers) on grade four reading assessment in many of the education systems included in the volume. Second, since PIRLS data is very rich, the topics covered in the included chapters are only scratching the surface of what could be possible. This volume is ultimately a call to action, urging readers to actively engage with the subsequent chapters and contribute to efforts aimed at improving reading achievement in the Dinaric region.

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Chapter 2
National Curriculum on Language as a Basis for Teaching and Students' Achievement in Reading Comprehension

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2.1 Introduction

The purpose of this chapter is to review the main language curricula characteristics in the Dinaric region, especially the various national education policies focused on reading comprehension, and to compare the similarities and differences that may affect students' achievement. The education systems of the Dinaric region are a challenge for educational researchers because of the characteristics that represent a set of similarities and differences between and within the systems. Similarities arise from geographical and cultural proximity (language, tradition, religion, etc.), but also from the fact that the systems have a common past, which implies that in a certain period of their development they had a common educational system. At the same time, the similarities coexist with the differences, due to the (mostly) different pace of political and economic development. The fact that Croatia and Slovenia are part of the European Union while the others are aspirants for membership speaks volumes for the differences in the pace of development.

The common past and existing close relations between individuals and the states as a whole make a colorful and multicultural region in the most positive sense of the term. Such social diversity is an excellent basis for the production of creative

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educational solutions that will nurture the differences in language, tradition, and culture, and at the same time, is a great challenge for educational policymakers who have to ensure quality education and equal opportunities for all children, regardless of their social and economic background.

Even a partial and brief overview of education systems allows one to see the enormous efforts and ambitions of the Dinaric region to follow the trends in education worldwide and continually implement updates to their educational policies through a number of strategic documents, curriculum improvements, and the production of quality professional teaching materials and teacher training (MESS, 2018; Radović, 2022; Randjelovic et al., 2022; Vrapi & Alia, 2022). All changes are mainly aimed at teaching and learning that develop analytical and critical thinking, stimulate students' creativity, and develop skills that are a basis for acquiring knowledge in other subjects and are relevant and necessary for success in life. In order to interpret results from international large-scale assessments (ILSAs), it is important to know the extent to which the assessment reflects what students have had an opportunity to learn. This aspect is the basis for this chapter.

In the recent years, education systems of the Dinaric region placed a special emphasis on the implementation of the European competencies for lifelong learning and, especially, the literacy competence, the first of the eight key competencies adopted by the European Parliament and the Council of the European Union (Ministry of Education, Science and Sport [MESS], 2021; Republic of Slovenia – Court of Audit, 2020; Randjelovic et al., 2022; Karalic et al., 2021). Literacy competence, defined as a combination of knowledge, skills, and attitudes, relates to the mother tongue (i.e., the language of instruction) and includes knowledge of reading and writing and a solid understanding of written texts, mastery of a certain vocabulary and grammar, and knowledge of the functions of the language, as well as the ability to use the main types of verbal interaction in spoken and written form. Focus on the development of students' language literacy by policymakers is practically implemented through the work of teachers, but its effects can be assessed through the students' achievements. One of the increasingly common ways to measure effects and improve them in the future is to find and understand the connections between student achievements at ILSAs, as in the PIRLS study, and the national educational context from which they emerge.

2.2 Reading Literacy and PIRLS in Europe

In 2000, the European Union adopted the Lisbon Strategy, which was revised in 2005 with an emphasis on knowledge, innovation, and human capital. In 2016, the European Declaration of the Right to Literacy was published, stating that "everyone in Europe has the right to acquire literacy." Furthermore, "European Union Member, candidate, and associate States should ensure that people of all ages, regardless of social class, religion, ethnicity, and gender, are provided with the necessary resources and opportunities to develop sufficient and sustainable literacy skills and

knowledge in order to effectively understand and use written communication in print and digital media." (Valtin et al., 2016, p. 5).

In 2016, and revised later in 2018, the European Council adopted a Recommendation on Key Competences for Lifelong Learning (European Commission, 2019). This recommendation provides a common European reference framework on eight key competences for lifelong learning, the first of which is focused on literacy. As defined in the framework, "literacy is the ability to identify, understand, express, create, and interpret concepts, feelings, facts, and opinions in both oral and written forms, using visual, sound/audio, and digital materials across disciplines and contexts. It implies the ability to communicate and connect effectively with others in an appropriate and creative way." The development of literacy competence is considered the basis for further learning and linguistic interaction." (European Commission, 2019, p. 8).

Similarly, in 2015, at the World Economic Forum, world leaders adopted the Incheon Declaration. This declaration constitutes the commitment of the education community to Education 2030 and the 2030 Agenda for Sustainable Development, recognizing the important role of education as a main driver of development (UNESCO, 2016). Later in the year, this initiative was finalized and provided the Education 2030 Framework for Action, which was adopted by 184 Member States and the education community at UNESCO. The framework provides a structured pathway to making education accessible to all. Through partnerships, policy guidance, capacity development, monitoring, and advocacy with the Education 2030 framework as a roadmap, UNESCO aims to coordinate the international community to achieve the education goals set by Sustainable Development Goal (SDG) 4 to ensure quality education for all, ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UNESCO, 2017).

The Education 2030 Agenda for Sustainable Development places learning outcome indicators at the heart of the international education-monitoring framework. The global indicator 4.1.1 uses the percentage of students who meet a minimum level of reading proficiency at grades two or three and at the end of primary education. With its system of benchmarks, IEA's Progress in International Reading Literacy Study (PIRLS) delivers a reliable, internationally recognized measurement tool for reading achievement, directly informing the 4.1.1 global indicator. PIRLS, conducted every five years since 2001, is recognized as the global standard for assessing trends in reading achievement at the fourth grade. PIRLS 2021 was the fifth assessment cycle for this study and thus provides 20 years of trend results (Mullis et al., 2023).

> The need for measurement in education, for the purpose of raising quality, was taken over and introduced into educational systems from industry, with the aim of improving and standardizing the quality of education at the national level, but also of educational systems at the international level. The establishment of a quality system is necessary in all areas of activity and work, naturally also in education, which has a long-term impact on the development of society as a whole. (Karalic et al., 2020, pp. 293–306).

The results of measuring reading literacy as an educational outcome are one of the measures of the quality of education in a certain education system. The

determination of reading literacy in the PIRLS and the OECD's Program for International Student Assessment (PISA) studies emphasizes the importance of reading for active and critical participation in society, which is promoted by the student's ability to critically consider the information they read and use it for different purposes. The development of adequate reading literacy is crucial for learning in all other subjects; therefore, it is essential for education systems to assess and follow the students' reading skills development at an early stage and see how this relates to reading instruction. PIRLS assesses the reading capacity of students in their fourth year of compulsory schooling and also collects extensive information about home support for literacy, curriculum and curriculum implementation, instructional practices and school resources.

Many education systems have used PIRLS survey data to reform their education systems. In Norway, the PIRLS 2006 results led to an earlier start for reading instruction, early interventions for weak learners, and continued emphasis on reading throughout the entire primary level. Slovenia has engaged in large-scale reforms during the past 10 years (e.g., transitioning from an 8- to 9-year elementary school system to improve students' literacy skills), and the Ministry supports and widely uses the TIMSS and PIRLS results to monitor the impact of the reforms in a global context. The Russian Federation has participated in a number of IEA studies over the last 20 years and considers participation in TIMSS and PIRLS important in evaluating the quality of education in the country (Mullis & Martin, 2012). Spain has launched a national goal to promote reading and the use of libraries in response to results from PIRLS, PISA, reading literacy, and national reading assessments (Mullis & Martin, 2012).

2.3 Purpose of the Chapter and Research Questions

As mentioned earlier, the education systems of the Dinaric region have participated in PIRLS (and ILSAs in general) at varying frequencies. Slovenia has so far participated in all cycles of PIRLS; North Macedonia and Croatia also participated but with interruptions; and Albania, Kosovo, Montenegro, and Serbia participated for the first time in 2021. Therefore, for most of the systems, it is not possible to make a multi-year or multi-cycle comparative review of the development of education through the prism of PIRLS achievements, nor to make comparisons between systems in relation to previous achievements. One cycle of the study is not enough to draw general and final conclusions about the similarities and differences of education systems, but still, PIRLS 2021 is a solid basis and valuable opportunity for more detailed comparisons of the treatment of reading comprehension as an important educational aspect.

The purpose of this chapter is to review the main language curricula characteristics in the education systems of the Dinaric region, especially national educational policies towards reading comprehension, and to compare them in order to find similarities and differences that may affect students' achievement. We also partly

compare the national curricula with the PIRLS Framework in order to ascertain the attention dedicated to reading comprehension processes that are the basis of PIRLS assessment and how these are integrated into curricula. The analysis will be focused on three main aspects and, respectively, three research questions.

1. *How much instructional time is dedicated to language teaching and, particularly, reading as a part of the language curriculum?*
2. *What are the main characteristics of the national language curricula dedicated to reading comprehension and mother tongue education?*
3. *Which purposes for reading and reading comprehension processes are emphasized in the language curriculum?*

The obtained findings can be a basis for further research on the factors that affect students' achievement and the further improvement of the quality of national curricula, especially in promoting reading comprehension.

2.4 Conceptual Understanding of Curricula

When structuring the chapter, we had in mind the tripartite curriculum model. This model has been applied since the very beginning of the IEA's Trends in International Mathematics and Science Study (TIMSS) and has been continuously developed since. In the last cycles of TIMSS, participating education systems have the opportunity to receive the results for each topic that is part of the TIMSS assessment framework and can also obtain specific results for those tasks that reliably reflect the topics represented in their national curricula as well as those tasks that belong to a specific topic domain but are not fully covered in the national curricula. The tripartite curriculum model represents an excellent opportunity for establishing a connection between educational policies, teaching practices, and results (UNESCO, 2013). This model distinguishes between three levels of the curriculum, namely:

- The intended curriculum (official curriculum/planned curriculum)
  A set of formal documents that specify what the relevant national education authorities and society expect that students will learn at school in terms of knowledge, understanding, skills, values, and attitudes to be acquired and developed and how the outcomes of the teaching and learning process will be assessed.
- The implemented curriculum (curriculum in action/taught curriculum)
  The actual teaching and learning activities taking place in schools through interaction between learners and teachers, as well as among learners, e.g., how the intended curriculum is translated into practice and actually delivered.
- The attained curriculum
  A curriculum that indicates the knowledge, understanding, skills, and attitudes that learners acquire as a result of teaching and learning, assessed through different means and/or demonstrated in practice.

These three levels represent what students are expected to learn as defined by countries' curriculum policies and publications and how the education system should be organized to facilitate this learning; what is actually taught in classrooms, the characteristics of those teaching it, and how it is taught; and, finally, what it is that students have learned and what they think about learning these subjects (Mullis & Martin, 2017). The extensive and detailed data has been used as a basis for a large number of informal analyses about the effectiveness of national curricula, including wider international studies that employ the framework of the IEA's tripartite model of curriculum development. In this way, curriculum development could employ even more thorough, rigorous data-gathering methods to document what countries intend to teach (Houang & Schmidt, 2008).

The tripartite model of the IEA cannot be applied in the PIRLS study as explicitly as in the TIMSS study because reading comprehension is an ability that is often not described at all in the national curriculum or is not described explicitly as other language topics that are part of it. Also, the method is very complex, and combining all its elements needs more extensive research in all involved countries. Therefore, we selected and adapted only the first element of the tripartite model (the intended curriculum). This will not indicate explicit connections between all levels but will give us at least a basic idea and starting information for possible future research on the connections between all the elements of the tripartite model.

2.5 Methods and Data

In this chapter, we used mostly qualitative document analysis of the available documents in order to address the research questions and to achieve the goals of the chapter. As stated by Bowen (2009), documents can provide data on the context within which research participants operate and are often used in combination with other qualitative research methods as a way of triangulation. That is, to seek convergence and corroboration through the use of different data sources and methods. The choice of a qualitative method is closely related to the type and variety of materials used in the research, i.e., the way some of the data are described in the national curricula, PIRLS 2021 encyclopedia, and curriculum questionnaire.

To address research question 1 (*how much instructional time is dedicated to language teaching and, particularly, reading as a part of the language curriculum?),* we selected a few variables from the PIRLS 2021 curriculum questionnaire that can illustrate the reading-related perspectives of educational policymakers towards reading comprehension (Table 2.1). These variables show information that is extracted from the curricula (as the percentage of time dedicated to reading) or the information indirectly included in the curricula (as the emphasis on reading processes) as assessed by the national research coordinators (NRCs).

In order to address research question two (*what are the main characteristics of the national language curricula dedicated to reading comprehension and mother tongue education?*), it was necessary to collect all relevant information about the

Table 2.1 Variables used from the PIRLS 2021 curriculum questionnaire—reading module

Instrument	Question (variable ID)	Values/response options
Curriculum questionnaire	Q2. How is reading addressed in the curriculum? a) Reading is presented as a part of the curriculum for language instruction (READ02A) b) Reading is presented as a separate curriculum area (READ02B) c) Reading is integrated across the curriculum (READ02C)	Q2: Yes/no and able to provide comments
	Q3. A) In what year was the 2020/2021 language/reading curriculum introduced into classrooms? (READ03A)	Q3 A: Year is specified
	Q3 B) Is the language/reading curriculum currently being revised? (READ03B)	Q3 B: Yes/ no; if yes, NRCs provide an explanation
	Q4: Does the curriculum specify a percentage of total instructional time to be devoted to language/reading instruction at the fourth grade of primary/elementary school? (READ04)	Q4: Yes/no; if yes, the percentage is specified
	Q7: During the fourth grade, how much are the following reading processes emphasized in the language/reading curriculum? a) Focus on and retrieve explicitly stated information (READ07A) b) Make straightforward inferences (READ07B) c) Interpret and integrate ideas and information (READ07C) d) Examine and evaluate content, language, and textual elements (READ07D)	Q7: 1 = major emphasis; 2 = some emphasis; 3 = little or no emphasis
	Q8: How much emphasis does the language/reading curriculum place on the following purposes for reading? a) Reading to improve reading skills and comprehension (READ08A) b) Reading for literary experience (READ08B) c) Reading to acquire information (READ08C) d) Reading for enjoyment (READ08D)	Q8: 1 = major emphasis; 2= some emphasis; 3 = little or no emphasis

Source: PIRLS 2021 curriculum questionnaire data downloaded from https://pirls2021.org/data/

intended curriculum in the Dinaric region and review the structure, main goals, and the standards included in the respective national language curricula. We used the official and publicly available curricula of Albania (Kurrikula, 2017), Croatia (the Ministry of Science, Education and Sports of the Republic of Croatia [MSES], 2006), Montenegro (Zavod Za Shkolstvo [ZSh], 2017), North Macedonia (Bureau for Development of Education [BDE], 2008), Serbia (Official Gazette of the

Republic of Serbia, 2019), and Slovenia (Ministry of Education, Science and Sports [MESS], 2018) that were used in the fourth grade when the PIRLS main testing was conducted (school year 2020/2021). We also looked at the chapters in the PIRLS 2021 encyclopedia, which offer rich information about the education systems of all fifty-seven (plus eight benchmark) participants (Reynolds et al., 2022). Of particular note were those chapters that describe the education systems of Albania (Vrapi & Alia, 2022), Croatia (Elezović & Bosnić, 2022), Montenegro (Radović, 2022), North Macedonia (Mihajlovska, 2022), Serbia (Randjelovic et al., 2022), and Slovenia (Klemenčič Mirazchiyski, 2022). We singled out the main elements and characteristics of the curricula in these education systems, which we then compared to see possible similarities and differences between them. We used the descriptive method in combination with a tabular overview of certain characteristics. Kosovo does not have a chapter in the PIRLS encyclopedia, and an overview of official curriculum documents could not be accessed in English. Therefore, their data are not included in this research.

To address research question 3 (*which purposes for reading and reading comprehension processes are emphasized in the language curriculum?),* we used the estimations of NRCs' answers to question 8 in the PIRLS 2021 curriculum—reading module as an indication of which purposes for reading and reading comprehension processes are emphasized in the language curriculum in each education system in the Dinaric region as part of mother tongue education.

2.6 Results

2.6.1 Instructional Time Dedicated to Language Teaching and Reading

All education systems in the Dinaric region stipulate the number of teaching hours (instructional time) for the entire school year in a separate document (teaching plan or similarly named documents) that lists all teaching subjects, and the weekly and annual number of teaching hours. The number of teaching hours for each subject is a mandatory element in all curricula. As such, teaching time is an unavoidable part of any curriculum analysis because it shows the intention of educational policymakers, in this case, time that is devoted to the mother tongue.

According to Eurydice data for the school year 2022/2023, reading, writing, and literature are the subject areas that generally account for the largest proportion of instruction time at all education levels in European countries. In primary education, the minimum instruction time recommended for this subject area covers, on average, 25% of the curriculum, ranging from 15 to 38% depending on the country (Eurydice, 2023).

PIRLS 2016 showed that in participating education systems, reading instruction was a high priority in fourth grade. On average, 27% of instructional time was

Table 2.2 Recommended language instruction time for the education systems in the Dinaric region

Education system	Language instructional hours per week	Total instructional hours per week	Percentage (%)
Albania	131	656	19.97
Croatia	131	473	27.70
Montenegro	128	546	23.44
North Macedonia	80	461	17.35
Serbia	135	621	21.74
Slovenia	131	686	19.10

Source: Eurydice (2021)

devoted to language instruction, including reading, writing, speaking, literature, and other language skills, which averaged to 242 hours of instruction per year, while 18% of the total instructional time was devoted to reading alone, including reading instruction across the curriculum, which averaged to 156 hours per year (Mullis & Martin, 2017).

As shown in Table 2.2, the time recommended for language instruction for the education systems in the Dinaric region is within the average time for European countries, and it ranges from 19.1% in Slovenia to 27.7% in Croatia. The percentage is the lowest in North Macedonia, due to the academic year 2020/2021 being affected by COVID−19, as the teaching hours lasted 30 minutes instead of the usual 40 minutes.

About half of all participating PIRLS 2021 education systems specify a specific percentage of instructional time that is devoted to reading; among these, two-thirds of the education systems' curricula specify that 25% of instructional time or more should be devoted to reading instruction. In the Dinaric region, specifically, Croatia, Montenegro, and North Macedonia do not specify any percentage devoted to reading. According to NRCs' answers on question four in the PIRLS 2021 curriculum questionnaire-reading module, Albania, Slovenia, and Serbia recommend teachers use a specific percentage of the language instructional time on reading, i.e., Albania (25%), Slovenia (30%), and Serbia (40%).

Although the time devoted to the mother tongue is similar in all Dinaric region education systems, the attitude towards reading is obviously different. It cannot be said with certainty that teachers who have received precise reading instructions are more focused on reading instruction compared to teachers who do not receive any reading instructions at all. The same or a similar number of hours dedicated to a specific teaching subject or a specific ability is not the only prerequisite for achieving the same or similar results. Previous research shows that a larger number of lessons can result in higher achievements, but this research also shows that the number of lessons is accompanied by additional factors, such as different school environments, different teachers' attitudes, and different behavioral aspects (e.g., school discipline). Additionally, the differences in the effectiveness of instructional time can also be the

consequence of differences in pupil aptitude (time needed to learn), etc. (Cattaneo et al., 2017).

Due to the above-mentioned factors that have already been found to affect the results, in this chapter we can only state that the education systems in the Dinaric region have similar instructional time for the mother tongue, this starting point can be the basis for further in-depth analyses of the possible impact on student achievement.

2.6.2 Main Characteristics of the National Language Curricula Dedicated to Reading Comprehension

Learning outcomes are the expected results, indicators of what the student should know, understand, can and do at the end of the class, cycle, or level of education, i.e., what they learned during the teaching process. Learning outcomes are introduced into education to ensure the quality of the teaching process and knowledge. In the Dinaric region, the outcomes of mother tongue teaching are formulated in accordance with the defined objectives of the subject. In this section, we present how reading literacy for the mother tongue is outlined by the curriculum for the fourth grade of primary school in each education system.

2.6.3 Albania

In the Albanian curriculum, subject competencies are imbued with key competencies. Table 2.3 shows the results for the subject's reading literary and non-literary texts competency for the fourth grade of primary school (Kurrikula, 2017).

Table 2.3 Student outcomes for reading literary and non-literary texts in Albania for the fourth grade of primary school

Competency: Reading literary and non-literary texts
Student: – uses reading strategies to understand literary texts (poems, folk songs, poems, fables, stories, novels, legends, fairy tales, children's novels, dramas) or non-literary (short instructions, narratives, arguments, articles in newspapers and magazines about children); – distinguishes the theme, message, and main ideas in literary texts (poems, folk songs, poems, fables, stories, novels, legends, fairy tales, novels for children, etc.); – analyzes simple elements in a text, such as: subject, characters, environment, or spaces where events take place, etc.; – distinguishes figurative language from non-figurative language; – finds in a text: rhyme, comparison, hyperbole, epithet; and – distinguishes and analyzes the topic, ideas, and structure of the non-literary text (instruction, announcement, etc.).

In the Albanian curriculum, recommended methods, strategies, and techniques such as the discussion of prior knowledge, cubing, pyramid diagrams, guided reading, guided imagination, forecasting with anticipatory terms, concept mapping, discussion grids, author questions, learning journals, brainstorming, etc., serve as an incentive for students in the learning process and guarantee for good results. It is also important for the student to work with learning situations where justifications or answers to questions are required, such as "Why?" "Is it always true?" "What happens when…?" etc. In this way, students are encouraged to reflect on their actions and undertake new situations. Through learning situations, the student explores, applies, and integrates knowledge and language skills and acquires the intellectual skills necessary to develop creative and critical thinking. There are two basic criteria of the teaching process: teaching is focused on the student, and learning should be interactive.

2.6.4 Croatia

The national framework curriculum defines basic educational values, the goals of education, the principles and goals of educational areas, the evaluation of student achievements, and the evaluation and self-evaluation of the implementation of the national curriculum. Cross-curricular topics and their goals are also briefly described. Expected student achievements (see Table 2.4) for educational fields per cycle have been determined and the subject structure of each educational area is indicated (MSES, 2006).

Primary language instruction in Croatia is considered in context. In communication situations, the student is expected to apply different listening, speaking, reading, and writing strategies to express and convey information, ideas, attitudes, and values and familiarize themselves with communication etiquette. A literary text is read and compared with other texts for personal and educational reasons, synchronic and diachronic. Reading a literary text encourages students' personal development, develops aesthetic criteria, allows reflection on the world and oneself, and allows the exchange of views and opinions on what has been read. Special emphasis is placed on reading for pleasure as well as for necessity; this is cultivated through a reading skills culture that enables the student to freely choose texts for reading. Students are encouraged to express themselves creatively according to their own experience and literary text. Reading literacy and reading, according to the 2006 syllabus, implied reading, understanding, and interpreting literary texts or passages. Additionally, students are introduced to other text types at the level of recognizing and noticing basic stylistic features. However, diagrams, schematic illustrations, tables, or maps are used mainly in the teaching of natural science and are not usually associated with reading literacy. The traditional notion of reading did not integrate reading digital text or reading from digital devices.

Table 2.4 Student outcomes for reading in Croatia for the fourth grade of primary school

1. Preparing for reading	2. Applying strategies for reading	3. Understanding different types of texts (traditional and electronic form)	4. Reading out of necessity, with interest, and with pleasure
Students will:			
– choose the topic, form, sources, and purpose for reading and independently select simpler non-literary and literary-artistic texts – distinguish and describe the importance of reading with simpler non-literary and literary-artistic texts, assigned and independently chosen, due to their own interests and needs in everyday life – differentiate and select key words and ideas, language features, and basic features of simpler non-literary and literary-artistic texts, assigned and independently selected	– distinguish, select, and apply a greater number of cognitive, metacognitive, and social-affective strategies before and during the reading of simpler non-literary and literary arts texts, assigned and independently selected – differentiate and separate necessary, essential, interesting data, and important details from simpler non-literary and literary-artistic texts, assigned and independently selected – master the techniques of reading different types of simpler non-literary and literary-artistic texts, assigned and independently selected, according to age – adopt and apply a greater number of independent and collaborative learning strategies in the inter professional environment	– spot, differentiate, and describe key words, ideas, and linguistic features of simpler non-literary, literary, and artistic texts, assigned and independently selected – while reading, evaluate the content, language data, and theoretical data about the text for different purposes by using simpler non-literary and literary-artistic texts, assigned and independently selected – interpret and independently evaluate unknown simpler non- literary and literary- artistic texts, assigned and independently selected	– acquire an interest and a positive attitude towards reading in an interprofessional environment and outside it – acquire the culture of reading in an interprofessional didactic situation and outside of it, depending on the age – recognize the importance of simpler non-literary and literary-artistic texts, assigned and independently chosen, from everyday life – evaluate your choice and the reasons for the pleasure of reading simpler non-literary, literary, and artistic texts, assigned and independently selected – adopt basic frameworks for building a valid personal choice for reading simpler non-literary and literary-artistic texts, assigned and independently selected

2.6.5 Montenegro

The curriculum in Montenegro emphasizes reading and writing but does not prescribe how much time teachers should devote to each component. Table 2.5 shows the outcomes that explicitly relate to reading literacy (ZSh, 2017).

Within the Montenegrin, Serbian, Bosnian, and Croatian mother language and literature courses in Montenegro, students perceive (listen and read) and analyze and create (speak and write) age-appropriate nonfiction texts. By working on a text, students develop their cognitive and creative abilities and communication skills and get to know the basic differences in the acceptance and creation of non-artistic and artistic texts. Also, they adopt grammatical terms and spelling rules that form the basics of language as a system. When processing non-artistic texts, the subject is connected with the student's experience and prior knowledge and with the content and activities of the subjects: nature and knowledge of society. Students speak or write texts about themselves and their social and natural environment, listen to or read and analyze popular scientific texts, and interpret tables, graphs, and diagrams when they are part of those texts. The reading content in the second cycle of elementary school depends on the activities and tasks that are carried out in class. Although the frontal form of work (e.g., listening to a radio show, the teacher's introduction to a new teaching topic) and the individual form of work (e.g., silent reading, correcting mistakes, rewriting the text) are didactically appropriate for certain teaching situations, substantial time is also dedicated to collaborative work, e.g., working in larger and smaller groups or in pairs. In this way, students develop their own abilities and acquire permanent knowledge through active forms of learning; for example, during the activity itself, students develop the ability to exchange opinions (e.g., discuss a problem, coordinate opinions, form a group opinion, present it to others, and argue and defend themselves).

Working on artistic texts in the second cycle of elementary school is based on the communicative model of literary education. The main goal is to preserve the student's interest in reading and listening to artistic texts and to develop the abilities of creative dialogue with the artistic text. Working with artistic texts during the fourth grade is considered the period in which the child is still eager to hear a good story, and this motivation should be used in the teaching of literature. Thinking about reading strategies helps the student to not only better understand the texts they read

Table 2.5 Student outcomes for reading literacy in Montenegro for the fourth grade of primary school

Language teaching
Educational outcome two At the end of the teaching cycle, students will be able to extract and classify the most important data after listening or reading and analyzing short non-artistic texts, compare and supplement them, and then remember and use them in new situations (learning by reading). *Learning outcomes* During learning, the student will be able to: – read and analyze shorter non-artistic texts with understanding; – recognize the purpose and topic of the text; – produce oral and written answers to the teacher's questions about the content of the text; – in the text, select key concepts and important data related to them and enter them into the prepared concept map; and – determine the basic features of shorter non-artistic texts.

(continued)

Table 2.5 (continued)

Teaching of literature
Educational outcome one At the end of the teaching cycle, the student will be able to listen to or read a literary and artistic text with understanding, evaluate it, and distinguish between a literary and artistic text and a non-artistic text. *Learning outcomes* During learning, the student will be able to: – with the encouragement of the teacher, express observations, thoughts, and feelings after listening to or reading a literary and artistic text and connect the content of the text with his own experience; – state similarities and differences between literary and artistic text and own experience; – compare his observations, thoughts, and feelings with the observations of other students; and – demonstrate listening/reading strategies.
Educational outcome two At the end of the teaching cycle, the student will be able to observe and compare literary characters, analyze their actions, and identify with them. *Learning outcomes* During learning, the student will be able to: – observe and name the main and secondary characters in a literary and artistic work and compare them; – recognize character traits of characters and recognize several character traits in certain literary characters; – identify with one of the literary characters (is able to identify with that literary character who is similar to them in at least one specific feature, i.e., with a character whose life circumstances are similar to their own); – observe and explain why someone did something (motivation of literary characters); – observe and comment on the positive values of the characters' actions; and – distinguish and understand the character's behavior that is not in accordance with the behavior they would choose in a similar situation.
Educational outcome three At the end of the teaching cycle, the student will be able to demonstrate understanding of and experience the textual reality by noticing the elements of the plot. *Learning outcomes* During learning, the student will be able to: – find explicitly given information from the text; answer the questions, Who? What? When? Where...? – determine the location of the action; – determine the time of action; and – indicate the chronological sequence of events—recognize the beginning, the central part of the story, and its ending.

but also helps them to remember the information from the texts more easily. Learning strategies focus on the preparation for reading as well as the different stages of reading the text (e.g., before and after). At the start of reading the text or book, strategies refer to looking at the text, book, pictures, titles, and subtitles to gather meaning by activating existing knowledge and predicting the upcoming text.

2.6.6 North Macedonia

The curriculum of North Macedonia contains outcomes, content, key concepts, activities, and methods (Bureau for Development of Education [BDE], 2008). Table 2.6 shows the outcomes that explicitly relate to reading literacy.

The Macedonian language curriculum enables integrated planning with the teaching of the following subjects: familiarization with the environment, mathematics, art education, music education, and physical education.

Some of the activities and methods for reading, literature, and reading materials include:

- Text analysis exercises (following the leading questions)
- Exercises for compositional analysis (according to the text plan)
- Exercises for localizing the place and time of the event
- Exercises for character analysis (external description)

An example of a class exercise: The teacher chooses a text from the textbook (reading book) and divides it into several units. For each unit, they prepare two questions for the students to answer. The teacher carefully formulates the question respecting the chronology of the story (students' answers direct analysis of the text). To support the learning outcomes, the following instruction is suggested for this example:

- Discussion on reading texts outside the prescribed teaching contents.
- Acquaintance with the basic biographical data of the author of the reading.
- Exercises for independent discovery of thematic and ideological basis in the work.
- Discussion about the text with an argumentative presentation about the characters and events in the text.
- Exercises for localization of events in time and space take place.

Table 2.6 Student outcomes for reading literacy in North Macedonia for the fourth grade of primary school

Outcomes for the program area: reading, literature, and reading materials
Student: – reads expressive artistic and scientific popular texts; – reads the text through roles; – analyzes the text; – makes a plan for text analysis independently; – can determine the place and time of the event; – can describe a character with unusual external features; – can recognize a revealing poetic image in a lyrical poem; – recognizes comparison as an expressive tool (no definition); – when reading lyrical poems, expresses their own feelings; – independently reads works of Macedonian and world literature; – reveals the thematic-ideological basis in the work; – answers and asks questions about the reading and text; – argues about the characters and events in the text; and – determines the place of the event in time and space.

2.6.7 Serbia

The Serbian language teaching and learning program in the fourth grade of primary school consists of three subject areas: literature, language, and language culture. Educational standards for the end of the first cycle of elementary school contain achievement standards for the following areas: speaking culture, reading skills, and reading comprehension, written expression, grammar and lexicology, and literature (Official Gazette of the Republic of Serbia, 2011). The subject areas of the Serbian language in the standards and in the programs are not harmonized because curricular reforms have been started before the revision of the first cycle of primary school standards is planned. Table 2.7 shows the student outcomes related to language learning.

In language classes, students master the grammar and spelling rules of the standard Serbian language, which they will apply in written and spoken communication. When teaching literature, the teacher's main focus is to develop the students' ability to read literary texts with understanding, encourage a love of reading, build a sense of the beautiful and valuable, cultivate taste, and nurture perseverance in reading and experiencing a literary work. In conversations with students, teachers are encouraged to support the students' ability to describe the experience of the literary works read, to express their opinion about them, to understand the various characteristics and actions of the characters, and to pass judgment on their actions and characteristics, as well as on the various events in the text. Literature lessons can be supplemented by using digital content. The basic forms of oral and written expression (retelling, talking, and describing) represent fundamental program contents for improving and nurturing the students' language culture. In the fourth grade, students should be encouraged to recount, talk, and describe both in a concise and extensive way, both orally and in writing.

By studying different types of texts—linear and non-linear—through designing, organizing, and implementing numerous activities, students' reading competence is improved. In particular, students should be directed to think about the texts, to analyze them, to express their opinion about a certain text in a linguistically correct and clear way, as well as to draw a conclusion by connecting the information presented in the text. Teachers should provide students' with reading strategies to do when first encountering the text, such as, for example, finding, connecting, and interpreting information, as well as reflection and evaluation (Karalic et al., 2021).

Table 2.7 Student outcomes for Serbian language learning for the fourth grade of primary school

Outcomes for language learning
Upon completion of the class, the student will be able to: – read and understand different types of texts; – briefly explain their impression and opinion, respecting different points of view; – distinguish literary types: humorous folk song, fables and stories about animals, short stories, children's novels, and dramatic text; – determine the topic, sequence of events, time, and place of events in the text; – name the positive and negative qualities of the characters; – spot and separate the basic elements of a lyric poem (verse, stanza, rhyme, and rhythm); – interpret the ideas of a literary work; – recognize situations of violation/fulfillment of children's rights and stereotypes in literary works; – notice personification and understand its role in a literary work; – distinguish description, narration (in first and third person), and dialogue in a literary work; – retell the text from different roles/perspectives; – notice the basic tone of the literary text (bright, sad, humorous); – notice the opposition of faces in the dramatic text; – read the text respecting the intonation of the sentence/verse; – expressively recite a poem and read a prose text; – perform dramatic texts; – adopt positive human values based on the literary works read; – connect the grammatical concepts covered in the previous classes with the new teaching contents; – distinguish words that change form (nouns, pronouns, adjectives, numbers, verbs) and notice those that are always in the same form; – determine the basic clauses; – distinguish the type of word from the function of the word in the sentence; – respect and apply basic spelling rules; – correctly write all three models of administrative speech; – use the basic forms of oral and written expression: retelling, talking, and describing; – use words of the same form but different meanings, as well as words of the same meaning, but different forms; – recognize the meaning of words and phrases used in everyday communication; – write a postcard, greeting card, or private letter; – adjust the language expression to the communicative situation—formal and informal; – connect the information presented in the linear and non-linear text and draw a conclusion based on them; – correctly structure the text; and – participate in proposing content and ways of working.

2.6.8 Slovenia

The curriculum for the Slovenian language is divided into three educational cycles. The ten-year-olds who participated in the PIRLS study are in the second cycle of elementary school (Ministrstvo za solstvo in sport [MSS], 2011). Table 2.8 shows the student outcomes related to language learning.

Since all the texts are only suggested for the realization of the objectives of the literature lesson, the teacher can replace them with other, in their opinion, more appropriate texts at their own discretion. In the third cycle of elementary school, the list of suggested texts for consideration in the lessons is also added to the list of texts for home reading. The choice is left to the teacher, preferably in agreement with the students.

Teaching students to accept and then create nonfiction texts is suggested through the following activities:

- Students prepare to read a text of a given type (for example, with the help of the teacher, they revive their prior knowledge of the predicted text type and topic, present their experience with reading similar texts, express their expectations, choose an appropriate strategy for reading the text, etc.).
- Students accept (through reading, listening to, or watching) the text; pay attention to the text through non-verbal illustrations and non-verbal companions of writing/speaking.
- With the help of the teacher, students analyze the text (mainly circumstantial, inflectional, and semantic, as well as the word-syntactic and substance) and evaluate its effectiveness, relevance, comprehensibility, and correctness.
- With the teacher's guidance, students recognize, present, and summarize the characteristics of a given text type.
- If the lesson plan also includes the creation of a text of the same type, the students prepare for it (for example, they present their experience in creating similar texts and their problems in doing so, present the characteristics of a given text type, choose an appropriate communication strategy, create a plan, illustrations, etc.).
- Students write a text or create a written basis for a speaking performance.
- After writing and speaking together with their classmates and the teacher, students evaluate their text and the texts of their classmates and justify their opinion; if necessary, they correct errors in their text and rewrite the text.
- In a guided conversation, students assess the effect of the acquired knowledge on their ability to receive and create texts of a given type and, following the teacher's instructions, students create a plan for improving these abilities.

Literary lessons in the second cycle of elementary school (grades 4–6) are also based on the communicative model of literary education, the main goal of which is to maintain the student's interests in reading and listening to artistic texts and to develop the ability to have a creative dialogue with artistic texts. In literature lessons, students specifically develop their receptive skills by reading, listening to, or watching artistic texts and speaking and writing about them, and by (re)creating artistic texts. In the process of solo interpretation of texts, students develop the ability to experience, to understand and to evaluate literary texts, analyze the literary text, and then synthesize knowledge about the text and express value judgments about it and justify them. Students also compare and evaluate individual literary texts. Solo reading (and literary education in general) must remain focused on the student even in the second educational period, which means that the most important task of the teacher is to mediate, to maintain the child's conviction in literature and also with themselves, which is in fact the strongest motivation for reading fiction at all.

Table 2.8 Student outcomes for Slovenian language learning with a focus on the fourth grade of primary school

Second cycle (grades 4 to 6) with a focus on the fourth grade
At the end of fourth grade, students learn to do the following: – Identify the speaker and addressee (and their social role), recognize the intention of the message, evaluate whether its manner is polite, and amend the text with the appropriate words and expressions when needed; – Answer teacher questions about the possible or expected reaction of a character and justify their opinions; – Give their opinions about the context of the text they have read on their own and discuss these opinions in class; – Read short informative passages (e.g., descriptions of their peers' lifestyles, a description of an animal or a person, current news); – Read and complete forms and read public announcements (e.g., prices on a list); – Write short informative passages by themselves, such as a description of animals or their own experiences, by first writing a draft, adding detail, and finally writing a passage; – Read their own written work and compare it with their peers' work; – Understand the plot of the story, even if the time perspective fluctuates (e.g., interchanging the past and present, chronological, or retrospective mood); – Draw conclusions about the outcome if something is missing from or untold in the story; and – Recognize topics, relate, and compare text with a common topic. Specifically, young readers are expected to be able to do the following by the end of fourth grade: – Read text aloud and interpret content orally; – Connect fictional worlds with the real world and their own experience; – Identify the fictional characters, specific character traits (when concrete), or the circumstances in which characters' lives are similar to their own experiences; – Consider the author's point of view and perceive various perspectives of fictional characters, even if the students do not identify with these perspectives; and – Detect different character traits (when consistent), identify and explain character reactions, even if a character's behavior is different from their own.

2.7 Purposes for Reading and Reading Comprehension Processes Emphasized in the PIRLS 2021 Framework

Only a small number of countries that participate in PIRLS treat reading instruction as a separate curriculum area. In most cases, reading is incorporated into language instruction. Reading literacy as a separate subject area is not represented in the curricula of the Dinaric region, but it is an integral part of all curricula to a greater or lesser extent. The PIRLS 2021 assessment framework is organized according to two overarching purposes for reading: for literary experience and to acquire and use information. The framework also describes four cross-cutting reading comprehension processes: retrieving, straightforward inferencing, interpreting and integrating, and evaluating and critiquing.

Twenty-nine countries (including benchmarking participants) that participated in PIRLS 2021 placed a major emphasis on all four of these purposes (Fishbein et al., 2023). Content coverage in PIRLS involves 50% literary texts and 50% informational texts, as well as 20%, 30%, 30%, and 20% of the four cross-cutting reading comprehension processes (Mullis et al., 2023).

National language curricula have different structures than those stipulated in the PIRLS framework as their purposes are different, and reading comprehension is one of many goals. However, taking into account that the PIRLS framework is based on what is expected to be included in the mother tongue curricula, a large part of the questions from the curriculum questionnaires refer to the treatment of reading comprehension, that is, the purposes of reading and reading comprehension processes.

2.7.1 *Purposes of Reading in the Dinaric Education Systems Curricula*

For most of the education systems in the region, fourth grade language/reading curricula place at least some emphasis on four broad purposes of reading: improving reading skills and comprehension, literary experience, acquiring information, and enjoyment.

The curricula that are in focus for this chapter have most of the elements of the PIRLS 2021 Framework, but the emphasis on various elements is different. During the analysis of the curricula, we did not make an additional assessment of how much emphasis Dinaric region education systems put on purposes for reading; instead, we looked at the NRCs answers to question R8 in the PIRLS 2021 curriculum questionnaire (R8: *"How much emphasis does the language/reading curriculum place on the following purposes for reading?"*).

The NRCs estimated how much emphasis was placed on four purposes of reading in their national curricula (at three levels: "major emphasis," "some emphasis," and "little or no emphasis"). According to the data shown in Table 2.9, all education

Table 2.9 Emphasis placed on the PIRLS 2021 framework purposes for reading in the Dinaric region education systems

Education system	Reading to improve reading skills and comprehension	Reading for literary experience	Reading to acquire information	Reading for enjoyment
Albania	●	⊙	●	⊙
Croatia	●	●	●	⊙
Montenegro	●	⊙	●	⊙
North Macedonia	⊙	●	○	⊙
Serbia	○	⊙	⊙	○
Slovenia	●	●	●	⊙

Notes: ● Major emphasis, ⊙ Some emphasis, ○ Little or No emphasis

Table 2.10 Relative average achievement for reading purposes in the Dinaric region education systems

Education system	Overall PIRLS average scale score		Literary					Informational				
			Average scale score		Difference from overall PIRLS score			Average scale score			Difference from overall PIRLS score	
Slovenia	520	(1.9)	522	(2.1)	2	(1.6)		519	(2.1)	-1	(0.8)	
North Macedonia	442	(5.3)	442	(5.4)	0	(1.7)		439	(5.6)	−3	(1.1)	▼
Serbia	514	(2.8)	518	(2.9)	4	(1.4)	▲	511	(2.5)	−2	(1.3)	
Albania	513	(3.1)	516	(3.3)	3	(1.3)	▲	509	(3.2)	−4	(1.8)	▼
Montenegro	487	(1.6)	491	(1.9)	4	(1.4)	▲	483	(1.9)	−4	(1.0)	▼
Croatia	557	(2.5)	567	(2.8)	11	(1.4)	▲	553	(2.6)	−4	(1.1)	▼

Notes: ▲ Purpose score significantly higher than overall PIRLS score, ▼ Purpose score significantly lower than overall PIRLS score, () Standard errors appear in parentheses. Because of rounding, some results may appear inconsistent
Source: PIRLS 2021 results https://pirls2021.org/results

systems place different emphasis on different purposes. Slovenia and Croatia have some emphasis on reading for enjoyment, while major emphasis was given on the other three purposes. Serbia, on the other hand, gave little or no emphasis on reading for enjoyment and reading to improve reading skills and comprehension, while North Macedonia gave little or no emphasis on reading to acquire information. None of the education systems place major emphasis on reading for enjoyment.

The PIRLS 2021 international results in reading include subscales for the reading purposes and comprehension processes. The subscales are based on only half the assessment items, making them somewhat less robust than the overall reading achievement results based on the entire scale (Mullis et al., 2023). Relative average achievement in literary and informational purposes in comparison to overall average achievement for all participating countries can be seen in Tables 2.10 and 2.11. Here, we extracted only the results applicable for the Dinaric region.

As can be seen in Table 2.10, Slovenia is the only one of the education systems in the Dinaric region whose individual purposes scores are not significantly higher or lower than its overall PIRLS score. Serbia has higher relative achievement in literary purpose, while North Macedonia has lower relative achievement in informational purposes. Albania, Croatia, and Montenegro, have a similar situation; their relative strength in the literary purpose is accompanied by a relative weakness in the informational purpose.

Table 2.11 Emphasis on reading comprehension processes in the intended language/reading curricula in the Dinaric region education systems

	Focus on and retrieve explicitly stated information		Make straightforward inferences			Interpret and integrate ideas and information			Examine and evaluate content, language, and textual elements	
Education system	Retrieve explicitly stated information from a sentence or phrase	Locate and reproduce details from a clearly defined section of text	Connect two or more pieces of information or ideas	Identify main ideas	Recognize plot sequences and character traits	Describe the overall message or theme	Compare information within and across texts	Make generalizations and draw inferences with text support	Describe the style or structure of a text	Determine the authors perspective or intention
Albania	●	●	●	●	●	●	●	⊙	⊙	○
Croatia	●	●	●	●	●	●	●	●	⊙	○
Montenegro	●	●	●	●	●	⊙	○	⊙	⊙	○
North Macedonia	○	○	○	○	○	○	○	○	○	○
Serbia	●	●	⊙	○	●	●	⊙	⊙	⊙	⊙
Slovenia	●	●	●	●	●	●	⊙	⊙	●	⊙

Notes: ● Major Emphasis, ⊙ Some Emphasis, ○ Little or No Emphasis

2.7.2 *Emphasis on Reading Comprehension Processes in the Curricula in the Dinaric Region*

PIRLS 2021 assessed four broad-based processes of comprehension typically used by fourth-grade readers: focus on and retrieve explicitly stated information; make straightforward inferences; interpret and integrate ideas and information; and evaluate and critique content and textual elements. The PIRLS 2021 international results in reading present relative achievement for retrieving and straightforward inferencing and interpreting, integrating, and evaluating, which are a combination of the four processes, more specifically explained as:

– Retrieving and straightforward inferencing (often related to a small portion of the text) is based on combining the items categorized as "focus on and retrieve explicitly stated information" and "make straightforward inferences" (50% of the items); and
– Interpreting, integrating, and evaluating (often related to larger portions or the entire text) is based on combining the items categorized as "interpret and integrate ideas and information" and "evaluate and critique content and textual elements" (50% of the items)." (Mullis et al., 2023).

The reading comprehension processes were further detailed in 10 items (as illustrated in Table 2.11). NRCs estimated the emphasis placed on these processes in their national curricula (at three levels: "major emphasis," "some emphasis," and "little or no emphasis"). Of the total number of participating countries and benchmark participants that completed the curriculum questionnaire, 11 participating countries placed a "major emphasis" on all 10 items, three participating countries placed "some emphasis" on all items, and in one participating country "little or no emphasis" was placed on all items (Fishbein et al., 2023). The NRCs for all other participants estimated that there was a different emphasis for the 10 items, i.e., a combination of two or three levels. Estimates were taken from NRCs' answers to question R7 in the PIRLS 2021 curriculum questionnaire (R7: *"During the fourth grade, how much are the following reading processes emphasized in the language/reading curriculum?")*.

For the purpose of this chapter, we extracted only the results for Dinaric region education systems. According to the data shown in Table 2.11, all education systems put different emphasis on different processes, except for North Macedonia, where there was "little or no emphasis" on all the processes reported.

Relative average achievement in the more straightforward processes and in the more integrative comprehension processes compared to average reading achievement overall can be seen in Table 2.12 in the PIRLS 2021 international results in reading. In this section, we extracted only the results applicable to the Dinaric region.

As illustrated by Table 2.12, Slovenia has the only education system that has no significant differences between the overall PIRLS average scale score and the average achievement in all reading comprehension processes. North Macedonia has no significant differences in the average achievement in retrieving/inferencing

Table 2.12 Relative average achievement for reading comprehension processes in the Dinaric region education systems

Education system	Overall PIRLS average scale score		Retrieving and straightforward inferencing					Interpreting, integrating, and evaluating				
			Average scale score		Difference from overall PIRLS score			Average scale score		Difference from overall PIRLS score		
Albania	513	(3.1)	508	(3.4)	−4	(2.2)	▼	518	(3.1)	5	(1.9)	▲
Croatia	557	(2.5)	552	(2.6)	−4	(1.4)	▼	561	(2.7)	5	(1.2)	▲
Montenegro	487	(1.6)	484	(1.9)	−3	(1.3)	▼	491	(2.4)	4	(1.8)	▲
Serbia	514	(2.8)	510	(3.0)	−3	(1.4)	▼	516	(2.7)	3	(1.4)	▲
Slovenia	520	(1.9)	520	(1.9)	0	(0.7)		519	(1.8)	0	(0.9)	
North Macedonia	442	(5.3)	443	(5.4)	1	(1.1)		439	(6.0)	−3	(1.3)	▼

Notes: ▲ Process score significantly higher than overall PIRLS score,▼ Process score significantly lower than overall PIRLS score () Standard errors appear in parentheses. Because of rounding some results may appear inconsistent
Source: PIRLS 2021 results https://pirls2021.org/results

comprehension processes but shows relative weakness in the interpreting/integrating/evaluating comprehension processes. The other four education systems (Albania, Croatia, Montenegro, and Serbia) show a relative strength in the interpreting/integrating/evaluating comprehension processes, but at the same time they show a relative weakness in the retrieving/inferencing comprehension processes compared to their reading achievement overall.

Such results can be particularly interesting for further in-depth analysis of the national curricula, especially in Albania, Croatia, and Montenegro, because, according to the estimates of the NRCs, in their curricula, major emphasis is put on the processes where the results show relative weakness compared to those processes where the results show relative strength. Considering a new curriculum has been adopted in North Macedonia (Bureau for Development of Education [BDE], 2021), it remains to be seen whether in the next PIRLS 2027 cycle there will be an improvement in the results and whether the situation with "little or no emphasis" on all reading comprehension processes in the curriculum will be overcome.

2.8 Conclusions

Younger students' reading in and out of school can be broadly described as either reading stories or reading materials that provide information. As younger students develop their literacy skills and are increasingly required to read to learn through the curriculum, reading for information may become more frequent and useful. The analysis of the curricula within the Dinaric region shows that a greater focus of teaching on non-linear and non-artistic texts is needed. Also, it is necessary to work

on raising the awareness of all teachers about the importance of reading and that "every teacher is a teacher of reading."

The role of assessment in driving curriculum improvement efforts, particularly in relation to initiatives such as national examinations and the development of student achievement standards, is undisputed. In recent years, the importance of using assessment data to inform curriculum revisions and ensure alignment with educational goals has gained momentum across the region. While Slovenia and Croatia's education systems are the only two in the Dinaric region that have national reading strategies, the awareness of the importance of reading has become quite prevalent in recent years, and one could assume that PIRLS was a direct and indirect cause for this development (MESS, 2021; Karalic et al., 2021).

In Slovenia, the National Strategy for the Development of Reading Literacy for the period of 2019–2030 is based on the 2006 strategy and has been updated in accordance with the advancement of the profession, based on the results of Slovenian students participating in PISA and PIRLS, as well as the results of Slovenian projects in the field of reading literacy (Reynolds et al., 2022).

In Croatia, several state ministries introduced programs to promote the reading culture, culminating in the National Strategy to Revive Book Reading 2017–2022 (Ministry of Science and Education, 2019). In 2021, the PIRLS main study coincided with Croatia's year of reading in 2021, which was marked by numerous activities, such as national and international events and scientific conferences.

Due to the low achievement of students participating in PIRLS in North Macedonia, special emphasis was placed on language literacy in the new Primary School Law (2019) and in the national testing program (2020), and mother tongue curricula were expanded to improve comprehension (2021) (Ministry of Education and Science, 2021). The Ministry of Education, Institute for Education Quality and Evaluation, prepares and conducts national examinations that are administered on the same date throughout Serbia (Randjelovic et al., 2022). National examinations are conducted in grades three and seven in elementary school and in grade three in high school.

After the adoption of new student achievement standards for the end of primary and secondary school in Serbia, the revision of the curriculum begins. Student achievement standards are aimed at developing key competencies for lifelong learning and functional knowledge. In 2024, the Institute for Education Quality and Evaluation (IEQE) planned "Creating a national program and action plan for the development and evaluation of reading, mathematics, science and digital literacy" in order to improve the functional knowledge of students (Randjelovic et al., 2022). Yet, more initiatives are needed that raise literacy at all levels of society. Launching national plans for the development of reading literacy can raise awareness of the importance of reading in schools and society as a whole and bring educational resources to school libraries and students' family environments.

While the information described in Sect. 2.5 on methods and data enabled an investigation on the similarities and differences between the PIRLS 2021 framework and national curricula, it has also restricted the conclusions. First, Kosovo has not been included in the chapter due to the unavailability of documents providing the

necessary facts for the chapter investigations. Second, there could be additional information not accounted for because it was not available in the PIRLS 2021 curriculum questionnaire nor in the PIRLS 2021 encyclopedia chapters. Finally, the authoring team lacked language skills and contextual knowledge to include Albania in the formulation of conclusions relying exclusively on the documents available in English (Council of Europe, 2017).

This chapter illustrated that even if it is not possible to make direct connections between relative average achievements in reading purpose/comprehension processes and the estimations of NRCs on the emphasis given to reading purposes/processes in the curricula, the overviews shown in this chapter can be an interesting source for researchers for further in-depth analysis of the student's reading achievement on different types of texts. An analysis of students' enjoyment when reading different types of PIRLS passages, connected with teachers' professional development needs and the teachers' practice for strengthening students' comprehension abilities, may prove valuable. The overviews in this chapter can also be useful to education policymakers during the process of revising national curricula, not just as a reminder of how important it is to highlight reading comprehension as a part of the curricula, but also as a reminder that the curriculum should contain clear guidelines for teachers about the importance of different purposes of reading, using different types of texts, especially informative texts, and using different strategies for developing reading comprehension processes in order to improve students achievements.

The findings from this chapter apply to six education systems from the Dinaric region and can be a useful starting point for other education professionals whose interest is closely related to reading comprehension, as well as for educational policymakers and teachers from other countries facing similar challenges.

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Chapter 3
Comparing Texts Used in PIRLS With Mother Tongue Textbooks in the Dinaric Region: Are Students Well Prepared to Take the Test?

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3.1 Introduction

Reading comprehension is one of the basic conditions for lifelong learning and supports the general quality of life for the individual. Acquiring this important skill in the earliest stages of students' education is therefore essential. Teaching literacy skills can be implemented in lessons focusing on the native language but also in all other subjects in which reading comprehension is needed. The development and application of quality curricula, textbooks, and effective teaching methods undoubtedly positively affect students' motivation to read for pleasure, which in turn will strengthen their reading abilities and will prepare the grounds for higher achievement in all other subjects, including achievement in high- and low-stakes tests, such as international large-scale assessments (e.g., PIRLS). Providing the means for high-quality teaching of literacy skills is therefore a topic of utmost importance for educational policymakers.

Textbooks are among the most important tools for teachers and students in everyday teaching and learning. It is therefore essential that they are of high quality, reflect the teaching objectives of the subject, correspond to the age of the students, and align with current technological trends. The IEA Progress in International

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Reading Literacy Study (PIRLS) focuses on reading comprehension in an international comparative framework, developing text passages for the study through a collaborative effort from an international team of experts in reading literacy. The PIRLS test aims to cover a range of four reading comprehension skills, ranging from the ability to focus on and retrieve explicitly stated information, make straightforward inferences, interpret and integrate ideas and information, and evaluate and critique content and textual elements. In this chapter, we compare the proportion of text types and lengths of mother tongue textbooks used in the Dinaric region with the PIRLS 2021 text passages.

Initial findings show that all education systems insist on the high quality of textbooks, which is expressed in laws and by-laws that specify strict rules for the production and approval of textbooks (Eurydice, 2011). These documents prescribe the necessary qualifications of the authors, the mandatory connection with the curricula, the structure of the textbooks, the scientific accuracy of the contents, the appropriateness of the contents for the students' age, the technical quality of the supporting materials, and a number of other conditions, for example, the laws on textbooks in Croatia (Zakon HR, 2022). North Macedonia (Republic of North Macedonia Ministry of Education and Science, 2008-2018), and Serbia (Official Gazette of the Republic of Serbia, 2018). The textbook authors have the freedom to choose specific content, as long as the text meets the required conditions. This chapter reviews whether the texts in the mother tongue textbooks are similar to the PIRLS 2021 reading passages to make a case for the role of textbooks in adequately preparing grade four students to respond to the PIRLS reading comprehension test.

The commitment of the education systems in the Dinaric region to provide conditions for students' higher achievement in reading comprehension can also be reviewed through their participation in PIRLS. Despite the high appreciation of PIRLS, only some of the education systems have continuous participation (Slovenia), while the rest either joined the study for the first time in the last cycle (Serbia, Kosovo, Montenegro, and Albania) or did not participate in the study at all (Bosnia and Herzegovina) or participated in PIRLS intermittently (Croatia and the Republic of North Macedonia). This situation is not the result of the attitude of educational professionals towards PIRLS but is mainly due to the lack of human and financial resources for participation.

3.1.1 Textbooks as Basic Teaching Material

Textbooks are educational materials created by one or more authors to provide students with comprehensive knowledge in various fields (Rachmijati & Cahyati, 2020). The content of the textbook is derived from the curricula for each subject and is the initial source of information for students and teachers. As basic teaching material for achieving educational goals and standards of knowledge, textbooks are produced for each education system according to established rules. Therefore,

textbooks represent standardized teaching material used in classes. Yet, Seifert (2021) states that:

> … by necessity, textbook authors engage in interpreting a specific curriculum and transforming it into texts and concrete tasks that teachers and students may then carry out, textbooks may be perceived as acting as mediators between the curriculum intended by policy makers and the curriculum implemented by the teachers (Valverde et al., 2002). In this way, textbooks may thus provide support for teachers in instructing reading comprehension as prescribed by the national curriculum. However, as textbook authors also have a certain amount of freedom in how they set about implementing the national curricula, textbooks may in fact be very different from each other. In addition, textbooks often only offer rather limited coverage of the topics or tasks that need to be addressed (Kahl, 2000; Maijala & Tammenga-Helmantel, 2017; Richards, 2014). In terms of reading comprehension, for example, Beerwinkle et al. (2018) showed that language lesson textbooks in the United States covered skills and strategies addressing reading comprehension only rather sporadically. (Seifert, 2021, p. 386).

3.1.2 The Diversity of Texts Used in PIRLS

Using different types of texts for teaching has numerous benefits. The ability to understand different forms of text, such as informational, literary, instructional, or argumentative texts, can help students foster critical thinking skills on what they read.

For this reason, the PIRLS 2021 reading comprehension passages make provision for a variety of texts that relate to two purposes of reading, namely grade four students' abilities to read for enjoyment or to read for informational purposes (Mullis & Martin, 2019).

For these purposes, a group adaptive design was implemented, where all assessment passages were grouped into three groups, namely easy, medium, and difficult passages, with three literary and three informational passages at each level of difficulty (Mullis & Martin, 2019). Twelve of these passages were used in PIRLS 2016 and were re-administered in PIRLS 2021 for trend purposes, while six passages were newly developed and field tested for the first time in the administration of PIRLS 2021. This process means that a total of 18 passages were used in the PIRLS 2021 cycle.

According to Mullis and Martin (2019), distinct differences between the easy, medium, and difficult categories are essential. The easy passages consisted of approximately 500 words, with an average of 78% correct responses required. These passages were characterized by relatively accessible texts with a clear, linear structure, explicit meanings, simply described characters, everyday vocabulary, and straightforward sentence structures. The medium group of passages, at approximately 700 words, required an average of 66% correct responses across the learner population and was characterized by texts of intermediate complexity. The difficult group of passages, at approximately 850 words, was characterized by complex text that allowed for layers of meaning, plot twists, development of characters, and

abstract ideas. Imagery and figurative language categorized these passages as difficult, with only 40% average correct responses required.

To ensure that the same assessment was administered, all 18 passages were used, but in varying proportions of difficulty depending on the average reading ability of the student population. These abilities were estimated from prior PIRLS results or from the field trial for countries that participated in PIRLS 2021 for the first time. Higher-performing countries therefore administered more achievement booklets with higher levels of difficulty, while lower achieving countries administered more achievement booklets with lower levels of difficulty. Mullis and Martin (2019) make two important points when describing the PIRLS 2021 assessment framework:

1. The PIRLS 2021 reading achievement tests include reading passages that range in difficulty, but the assessment design allows for achievement to be reported across countries on the same achievement scale.
2. PIRLS 2021 includes ePIRLS, a transition from paper-based booklets to assess students by means of computer-based tasks. The computer-based assessment, ePIRLS 2021, exposed students to the same reading passages and questions as the paper-based assessment but provided a virtual environment (similar to the internet) for the assessment to which children have become more accustomed, as internet reading increasingly becomes a key component of curricula worldwide.

In PIRLS 2021, Albania, Kosovo, Montenegro, North Macedonia, and Serbia administered the assessment on paper, while Croatia and Slovenia opted for the digital assessment (Mullis et al., 2023).

In the PIRLS 2021, for the education systems that administered paper-based assessment, each student was presented with one booklet containing two passages, while for ePIRLS administration, some students were presented with two ePIRLS tasks and some with one ePIRLS informational passage followed by one ePIRLS task. Taking into account that out of seven of the education systems in the Dinaric region, five participated in the paper-based assessment and two in ePIRLS (Croatia and Slovenia), for the purposes of this book we decided to review the characteristics of the paper-based PIRLS assessment. For the paper-based PIRLS 2021 assessment, the distribution of texts and booklets is as follows:

– An equal number of literary and informational texts were used (nine literary and nine informational texts).
– All literary and informational texts belong to one of the three levels of difficulty: easy, medium, and difficult, as described earlier.
– Eighteen booklets were obtained in total. Every booklet contains two texts, one literary and one informational. Each text (passage) appeared in two booklets and was paired with a different passage each time.
– The 18 booklets have two levels of difficulty: more difficult booklets composed of two difficult passages or one medium and one difficult passage, and less difficult booklets composed of two easy passages or one easy and one medium passage.

– 12 of 18 PIRLS passages are linear, continuous texts (first, the entire text is placed in the booklet, and then it is followed by the questions), and six are linear, split texts (several questions related to the previously given text are placed after every page of the text).
– Given the time constraints of the assessment (two parts of 40 minutes each for reading the texts and answering the questions), the passage length generally averages from about 500 to 800 words.

Students who are aware of different types of texts can also apply the knowledge and skills to interpret and integrate ideas and information to form their own conclusions by examining and evaluating the content, language, and textual elements of the text. Knowing the type of text allows students to organize their thoughts on the text and to know how to receive the information they read. If the students recognize the type of text, they will know whether they can use the information obtained within the framework of a literary experience to retell the story or within the framework of an informational experience to create their own conclusions about what they read. Using different types of texts gives students the opportunity to learn new information and use it in different situations. In addition, diverse texts provide multiple perspectives that encourage students to reexamine information that helps them better understand their world.

In the past, several scholars (Chall, 1967; Cheatham & Allor, 2012; Valencia et al., 2014; Castles et al., 2018) looked at texts used in the teaching of reading, which directly affect student achievement. In these studies, in addition to the student's early reading ability, other factors that influence student reading are also considered. Text complexity appears as a topic that is closely related to the full length of the text, with emphasis on the length of words and sentences. Comprehension of the text depends on the structure itself, which includes the sentence length. Long texts are more difficult to comprehend if they are written with long sentences. When communicating with this type of text, students are expected to have good fluency and reading speed to be able to detect the key words they need to understand what they have read.

3.2 Purpose of the Chapter and Research Questions

This chapter aims to compare the PIRLS 2021 text passages in different languages with mother tongue textbooks from the education systems in the Dinaric region. We posit that students may face limitations in their readiness to successfully participate in the PIRLS assessment if they haven't been exposed to PIRLS-like texts within the textbooks used in their schooling. Reviewing the mother tongue textbooks used in the teaching process in the Dinaric region education systems will give insights into the characteristics of reading materials that students receive on a daily basis at school. The findings on those reading materials will be compared with certain characteristics of PIRLS passages to find out if they are an adequate basis for

involving students in assessments such as PIRLS. This chapter will cover two main research questions.

1. What is the proportion and length of literary and informational texts in mother tongue textbooks used in the Dinaric region compared to the proportion and length of the passages used in the PIRLS assessment?
2. How does the translation and adaptation of the PIRLS text passages into the languages of instruction in the Dinaric region affect the length of these passages?

3.3 Methods and Data

In order to address the research questions and to achieve the set goals, in this chapter we used data obtained from different sources. First, we examined all the literary and informational reading passages that were used in PIRLS 2021 with an interest in their length in terms of words and characters of the text. Tabular reviews and frequencies were used to compare the proportion and average length of the texts in mother tongue textbooks with the proportion and average length of PIRLS text passages, the length of the passages in English compared with the length in other languages, and the length of the passages with the same languages used in different countries. The types of instruments used in the analysis and the data collected for this work are shown in Table 3.1.

Secondly, mother tongue textbooks used in the Dinaric region in the fourth grade of the 2020/2021 school year were examined by the National Research Coordinators (NRCs) from the respective countries. In order to compare the texts represented in the PIRLS assessment with the mother tongue textbooks, we asked the respective NRCs to collect data from mother tongue textbooks used in their education systems. Due to unforeseen circumstances, we could not include data on the textbooks that

Table 3.1 Types of instruments used in analysis and data collection

Instrument	Type of data
Mother tongue textbooks* (maximum of three per participating education system) PIRLS booklets (18 passages)	– The number and proportion of literary and informational texts – The average length of literary and informational texts – The length of the longest literary text and longest informational text
PIRLS passages in English and for all the languages used in Dinaric region education systems	– The length of PIRLS passages in English – The length of PIRLS passages used in Dinaric region education systems (after translation)

Note: * Considering that in all students in the Dinaric region education systems use different textbooks for different teaching subjects, and the focus in this chapter is exclusively on mother tongue textbooks, any further comparison refers exclusively to mother tongue textbooks used in the 2020/2021 school year, regardless of whether in some cases only the term textbooks is used

were used in Montenegro. The following criteria guided the selection of mother tongue textbooks:

- If more than three textbooks were used in the specific education system in the fourth grade in the 2020/2021 school year, NRCs selected only three textbooks that were most often used.
- If less than three textbooks were used (as in Albania and North Macedonia), data were collected from all available textbooks. An exception was made only for Croatia, where four textbooks were examined because two of the most frequently used ones are from the same publisher.
- North Macedonia has the only education system in which the PIRLS assessment was conducted in two languages of instruction, and therefore the data from all three textbooks were used (two in the Macedonian language and one in the Albanian language).
- In order to be able to compare textbooks that are in different forms (printed and/or electronic), the NRC collected data only from the printed versions of the textbooks. In North Macedonia, only printed textbooks were used. In most of the other education systems, textbooks existed in electronic and printed versions.
- For each mother tongue textbook, the NRC selected and counted only those texts that are similar in purpose and structure to the PIRLS passages. This decision means that those types of texts that are not in prose form and are not an independent entity were not taken into account (i.e., texts such as poetry, assignments, descriptions of illustrations and figures, etc.) and were excluded from counting. There was no minimum or maximum word limit; it was only important that the texts were literary or informational and that they were a completed story or a meaningful part of a story. For all literary and informational texts, the NRCs were asked to determine the total number, the average length (characters and words), and the length of the longest text in the textbook.
- NRCs used only the basic forms of textbooks, without including additional documents such as reading books or exercise books that are commonly used in all Dinaric region education systems. During the collection of the data, an exception was made in Croatia, because for Croatian textbooks, the reader is an integral part of the textbook, and the texts cannot be physically separated. This exception affects the total number of texts but does not impair comparability.
- When counting the number of characters and words in the selected texts from the textbooks and in the PIRLS passages, only the following elements were taken into account: the basic text, the title, the name of the author and the illustrator (if any), and the legends for the photos and illustrations. All other elements (questions, footnotes, exercises, clarifications, etc.) that can be found in some of the PIRLS passages and regularly in the textbooks are not taken into account.

The word count was done by extracting the texts from approved final, graphically arranged booklets for each education system (Adobe Acrobat PDF version) to MS Word that registers the number of words and characters (with spaces) of a plain text. After extracting the passages, all the graphical elements that were unnecessary (e.g., two spaces in a row) or misused characters (e.g., a space before punctuation marks)

were deleted. Despite several checks, small technical inaccuracies are possible (e.g., a transferred or not transferred space at the end of a paragraph); however, these do not significantly affect the total number of words and characters.

3.4 Results

3.4.1 Comparing the Mother Tongue Textbooks Used in the Dinaric Region with PIRLS Passages

Mother tongue textbooks are much more complex documents than the PIRLS achievement booklets, not only because of the purpose for which they were made but also in terms of the structure of the document, the type, number, and length of the texts, the representation of different aspects of language instruction (besides reading), and many other features. The mother tongue textbooks used in the Dinaric region differ significantly between each education system, not only because of the differences between the languages but also because of the differences in the basic structure from which they derive, that is, the curricula (for more information about the curricula, see Chap. 2).

According to the data in Table 3.2, there are differences between mother tongue textbooks from the different Dinaric region education systems, but also between mother tongue textbooks used within one system:

- In the textbooks used in Albania, the average length of literary texts and the length of the longest literary text are similar, but one textbook has double the number of literary texts. The number of informational texts in both textbooks is the same, but there is a difference in the average length of the texts (270 versus 427 words).
- In Croatia, in three out of four textbooks, literary texts have similarities in the number of texts, the length of the longest text, and the average length of texts (between 266 and 272 words). In the case of informational texts, there are differences in the average length of the texts (between 112 and 234 words), as well as differences in the number of texts represented (between 5 and 44 texts).
- One of the three textbooks used in Kosovo contains, on average, the longest informational texts (575 words), compared to all other Dinaric region education systems. The average length of the texts in this textbook is almost double compared to the other two textbooks used in Kosovo.
- In the two Macedonian language textbooks used in North Macedonia, the average length of the literary texts is similar, but there is a difference in the number of texts used (between 32 and 68 texts). Of note, these textbooks do not contain informational texts at all. There are informational texts in the Albanian language textbook, but their average length (179 words) is lower than the average length of literary texts (294 words).

Table 3.2 The number and the length of the texts used in the mother tongue textbooks from the education systems in the Dinaric region compared to PIRLS 2021 texts

Education system	Mother tongue textbook	Total number of texts	Literary texts					Informational texts				
			Number of texts	Average number of words	Average number of characters with spaces	Longest text (number of words)	Longest text (number of characters with spaces)	Number of texts	Average number of words	Average number of characters with spaces	Longest text (number of words)	Longest text (number of characters with spaces)
PIRLS	Booklets	18	9	688	3651	897	4817	9	747	4168	994	5622
Albania	Textbook 1	35	28	357	1933	478	2476	7	427	2397	607	3509
	Textbook 2	21	14	356	1841	596	3197	7	270	1193	509	2229
Croatia	Textbook 1	100	79	173	983	384	2039	21	167	1048	319	1861
	Textbook 2	119	75	266	1482	1060	5319	44	120	745	324	2025
	Textbook 3	93	88	270	1547	1070	6109	5	234	1609	370	2589
	Textbook 4	96	78	272	1569	769	4557	18	112	735	398	2540
Kosovo	Textbook 1	59	51	402	1143	453	1341	8	332	867	379	879
	Textbook 2	80	68	835	3622	863	4469	12	575	3270	822	4470
	Textbook 3	69	59	476	2520	599	3202	10	457	2522	533	2943

(continued)

Table 3.2 (continued)

Education system	Mother tongue textbook	Total number of texts	Literary texts					Informational texts				
			Number of texts	Average number of words	Average number of characters with spaces	Longest text (number of words)	Longest text (number of characters with spaces)	Number of texts	Average number of words	Average number of characters with spaces	Longest text (number of words)	Longest text (number of characters with spaces)
North Macedonia	Textbook 1(MKD)	32	32	291	1610	584	3182	0	0	0	0	0
	Textbook 2(MKD)	68	68	240	1365	526	2985	0	0	0	0	0
	Textbook 3(ALB)	40	30	294	1540	490	2509	10	179	985	299	1528
Serbia	Textbook 1	61	50	393	1684	2094	9199	11	144	705	309	1776
	Textbook 2	41	33	458	1943	4022	17940	8	447	2344	766	4053
	Textbook 3	56	44	375	1701	4029	18012	12	454	2545	798	4313
Slovenia	Textbook 1	48	48	435	2397	1119	5951	0	0	0	0	0
	Textbook 2	45	45	426	2368	1262	6954	0	0	0	0	0
	Textbook 3	54	48	439	2485	1168	6722	6	352	2032	753	4196

Notes: *MKD* Macedonian Language, *ALB* Albanian Language

– In the three textbooks used in Serbia, the average length of literary texts is similar (between 375 and 458 words), while there are differences in the average length of informational texts (between 144 and 454 words). These three textbooks contain the longest literary texts compared to all other education systems in the Dinaric region. In two textbooks, there are texts that are more than four times (4022 and 4029 words) longer than the longest literary text in PIRLS (897 words) and from 3.5 times (1262 words in the Slovenian textbook) to 10 times (384 words in the Croatian textbook) longer than the longest texts from other education systems.
– In the three textbooks from Slovenia, there is similarity in the data for literary texts, that is, similarity between their total number (from 45 to 54), their average length (from 426 to 439 words), and the average length of the longest text (from 1119 to 1262 words). Similar to North Macedonia, two of the three textbooks in Slovenia do not contain informational texts.

The results of the comparison of the number and the average length of literary and informational texts between PIRLS passages and texts in mother tongue textbooks are shown in Figs. 3.1 and 3.2.

According to Fig. 3.1, in all the textbooks from the education systems in the Dinaric region, there are a lot fewer informational texts compared to literary texts. In two out of three textbooks from North Macedonia and Slovenia, there are no informational texts. The representation of literary and informational texts was most evenly distributed across the three textbooks used in Kosovo (14% to 15%) and in Serbia (18% to 21%). The highest representation of informational texts can be found in one textbook used in Croatia (37%) and in one textbook used in Albania (33%). In none of the textbooks is an equal or nearly equal representation of informational texts and literary texts used, as applied in the PIRLS 2021 study (50% for each).

The differences in the average length of informational and literary texts between PIRLS 2021 passages and texts in the mother tongue textbooks in the education systems within the Dinaric region are shown in Fig. 3.2.

In all education systems in the Dinaric region (Albania, Croatia, Kosovo, North Macedonia, Serbia, and Slovenia), mother tongue textbooks contain texts whose average length is less than the average length of PIRLS 2021 passages. In the PIRLS study, the average length of informational texts is greater compared to literary texts (4168 vs. 3651 characters). Such a ratio of average length in favor of informational texts is found in 6 out of 18 analyzed textbooks (one textbook each in Albania and Kosovo and two textbooks each in Croatia and Serbia). In the remaining 12 textbooks, the average length of informational texts is shorter than the length of literary texts, or informational texts are not represented at all.

The comparison between the longest literary texts (see Table 3.2) shows that in all analyzed textbooks from Serbia and Slovenia and in two textbooks from Croatia, there is at least one literary text that is longer than the longest PIRLS literary text (*Oliver and the Griffin,* 897 words, 4817 characters). However, in two textbooks (one each in Croatia and Kosovo), the longest literary text is shorter even than the shortest PIRLS literary text (*The Summer My Father Was Ten*, 425 words, 2291 characters). In the 18 analyzed textbooks, there is not a single informational text that

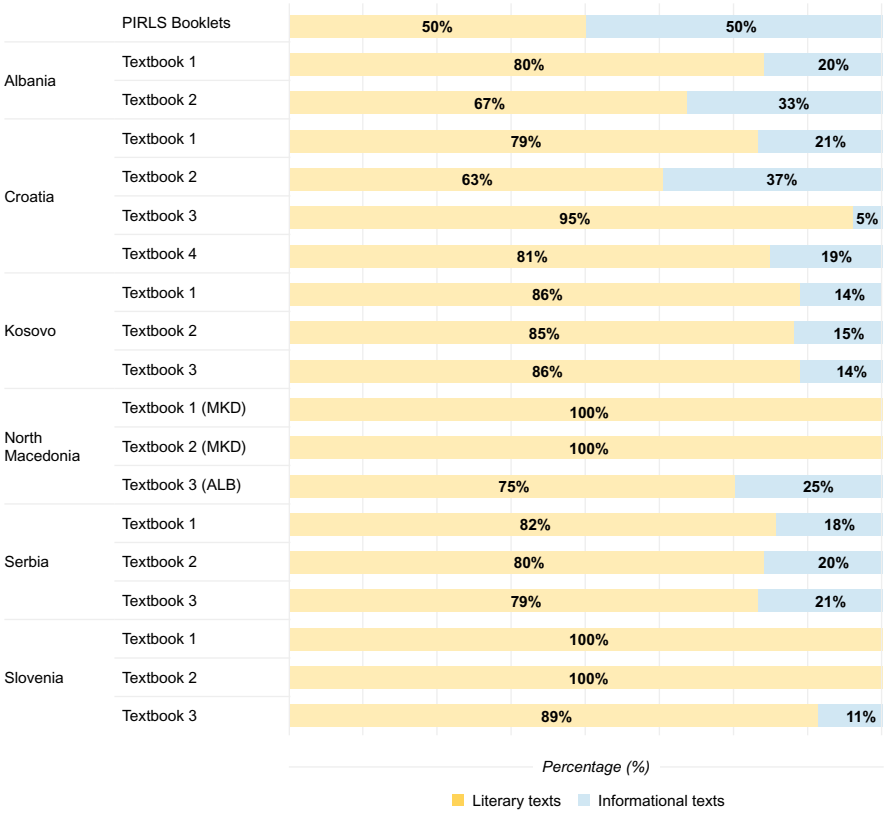

Fig. 3.1 Percentages of literary and informational texts in PIRLS 2021 and the mother tongue textbooks used in the Dinaric region

is longer than the longest PIRLS informational text (*The World's Bank for Seeds,* 994 words, 5622 characters). In addition, for four textbooks there are no informational texts at all; in eight textbooks the longest informational text is shorter than the shortest PIRLS informational text (*Training a Deaf Polar Bear*, 484 words, 2556 characters).

From the data shown above, the texts in some of the mother tongue textbooks used in the Dinaric region and the data from the PIRLS passages, it can be concluded that there are large differences in the content of textbooks from different education systems, but also differences between mother tongue textbooks within the same system, even though they are based on the same curriculum. Also, in the majority of mother tongue textbooks, there are fewer (and shorter) informational texts compared to literary texts, as well as compared to the PIRLS 2021 reading passages.

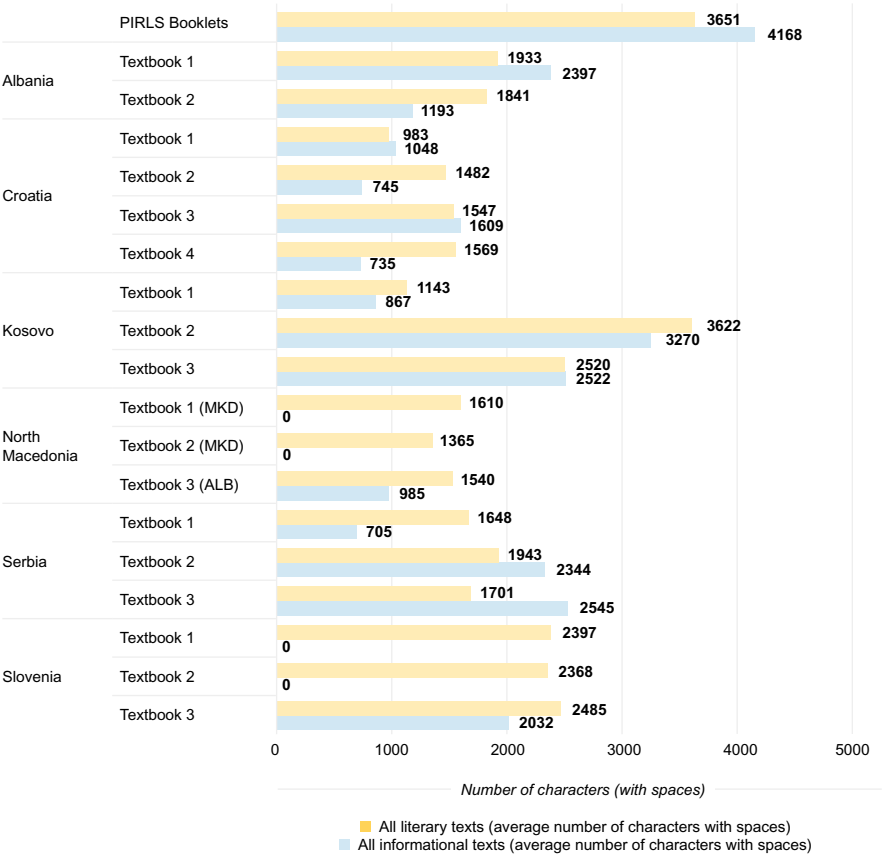

Fig. 3.2 Average number of characters (with spaces) of literary and informational texts in PIRLS 2021 and in the mother tongue textbooks used in the Dinaric region

3.4.2 Reflections on the Length of PIRLS 2021 Passages

Students' achievements in reading comprehension depend on many factors, such as the complexity of the texts and the previously acquired reading abilities of the students. For purposes of this chapter, we considered that the length of the texts may also have a certain impact, mainly on the time needed to read the texts during any assessment. In order to check whether significant changes occur in the length of the texts during the translation and adaptation of PIRLS passages from English to the languages in which the testing was carried out in the Dinaric region, we measured the length (number of words and number of characters with spaces) for all 18 passages that were used in the assessment and the difference (in %) of translated passages compared to their original international version used in the PIRLS 2021 instruments. The obtained data are shown in Table 3.3.

Table 3.3 Number of words and characters in the PIRLS 2021 passages in English and in the language translations from the Dinaric region

Type	Difficulty level	PIRLS passage	Characters and words	International (English)	Albania		Croatia		Kosovo		Montenegro		North Macedonia (MKD)		North Macedonia (ALB)		Serbia		Slovenia	
				No.	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Informational passages	Difficult	The World's Bank for Seeds	Characters	5622	6132	8.3%			6088	7.7%	6088	7.7%	6026	6.7%	6125	8.2%	5843	3.8%		
			Words	994	1045	4.9%			1039	4.3%	997	0.3%	974	−2.1%	1040	4.4%	981	−1.3%		
	Medium	Marie Curie Prize-Winning Scientist	Characters	5124	5564	7.9%			5559	7.8%	5508	7.0%	5557	7.8%	5571	8.0%	5373	4.6%		
			Words	862	963	10.5%			975	11.6%	886	2.7%	871	1.0%	953	9.5%	868	0.7%		
	Difficult	Icelandic Horses	Characters	4889	5254	6.9%	4867	−0.5%	5232	6.6%	4911	0.4%	5076	3.7%	5257	7.0%	4789	−2.1%	4744	−3.1%
			Words	870	937	7.2%	801	−8.6%	942	7.6%	843	−3.2%	836	−4.1%	945	7.9%	809	−7.5%	786	−10.7%
	Medium	Sharks	Characters	4728	5517	14.3%	4972	4.9%	5490	13.9%	4684	−0.9%	5057	6.5%	5468	13.5%	4540	−4.1%	4216	−12.1%
			Words	859	972	11.6%	835	−2.9%	975	11.9%	788	−9.0%	848	−1.3%	968	11.3%	771	−11.4%	718	−19.6%
	Difficult	Where's the Honey?	Characters	4719	5077	7.1%	4495	−5.0%	5118	7.8%	4397	−7.3%	5299	10.9%	5119	7.8%	4353	−8.4%	4252	−11.0%
			Words	870	887	1.9%	742	−17.3%	893	2.6%	734	−18.5%	877	0.8%	895	2.8%	743	−17.1%	698	−24.6%
	Easy	The Amazing Octopus	Characters	4105	4475	8.3%			4462	8.0%	4490	8.6%	4585	10.5%	4467	8.1%	4337	5.3%		
			Words	721	749	3.7%			748	3.6%	736	2.0%	735	1.9%	742	2.8%	711	−1.4%		
	Medium	How Did We Learn to Fly?	Characters	3082	3464	11.0%	3188	3.3%	3512	12.2%	3286	6.2%	3255	5.3%	3569	13.6%	3247	5.1%	3082	0.0%
			Words	544	599	9.2%	517	−5.2%	611	11.0%	561	3.0%	531	−2.4%	617	11.8%	551	1.3%	505	−7.7%
	Easy	Hungry Plant	Characters	2683	2989	10.2%			2995	10.4%	2593	−3.5%	2947	9.0%	3002	10.6%	2510	−6.9%		
			Words	519	542	4.2%			541	4.1%	434	−19.6%	492	−5.5%	541	4.1%	433	−19.9%		
	Easy	Training a Deaf Polar Bear	Characters	2556	3041	15.9%			3043	16.0%	2826	9.6%	2867	10.8%	3027	15.6%	2725	6.2%		
			Words	484	548	11.7%			552	12.3%	477	−1.5%	475	−1.9%	544	11.0%	471	−2.8%		

Literary passages	Difficult	Oliver and the Griffin	Characters	4817	5188	7.2%	4833	0.3%	5149	6.4%	4329	−11.3%	4886	1.4%	5187	7.1%	4530	−6.3%	4623	−4.2%
			Words	897	1010	11.2%	853	−5.2%	990	9.4%	763	−17.6%	822	−9.1%	1005	10.7%	792	−13.3%	831	−7.9%
	Difficult	Shiny Straw	Characters	4638	4998	7.2%	4362	−6.3%	4945	6.2%	4307	−7.7%	4662	0.5%	4997	7.2%	4278	−8.4%	4253	−9.1%
			Words	871	914	4.7%	747	−16.6%	902	3.4%	741	−17.5%	771	−13.0%	925	5.8%	744	−17.1%	768	−13.4%
	Difficult	The Ink Drinker	Characters	4294	4701	8.7%			4583	6.3%	4518	5.0%	4259	−0.8%	4609	6.8%	4435	3.2%		
			Words	815	878	7.2%			862	5.5%	808	−0.9%	732	−11.3%	863	5.6%	805	−1.2%		
	Medium	Empty Pot	Characters	4243	4483	5.4%	4222	−0.5%	4484	5.4%	4130	−2.7%	4367	2.8%	4505	5.8%	4094	−3.6%	4148	−2.3%
			Words	766	851	10.0%	731	−4.8%	849	9.8%	722	−6.1%	760	−0.8%	851	10.0%	730	−4.9%	733	−4.5%
	Medium	The Ostrich and the Hat	Characters	4164	4467	6.8%			4438	6.2%	4165	0.0%	4004	−4.0%	4489	7.2%	4101	−1.5%		
			Words	807	834	3.2%			842	4.2%	755	−6.9%	703	−14.8%	846	4.6%	757	−6.6%		
	Easy	Learning a New Language	Characters	3062	3383	9.5%			3390	9.7%	3064	0.1%	3016	−1.5%	3374	9.2%	2978	−2.8%		
			Words	570	640	10.9%			641	11.1%	575	0.9%	539	−5.8%	632	9.8%	558	−2.2%		
	Medium	Pemba Sherpa	Characters	2729	3167	13.8%	2951	7.5%	3171	13.9%	3131	12.8%	2985	8.6%	3167	13.8%	2799	2.5%	2919	6.5%
			Words	543	588	7.7%	522	−4.0%	593	8.4%	579	6.2%	529	−2.6%	592	8.3%	513	−5.8%	529	−2.6%
	Easy	Library Mouse	Characters	2619	2935	10.8%			2923	10.4%	2739	4.4%	2819	7.1%	2918	10.2%	2685	2.5%		
			Words	500	534	6.4%			529	5.5%	470	−6.4%	470	−6.4%	524	4.6%	458	−9.2%		
	Easy	The Summer My Father Was Ten	Characters	2291	2457	6.8%			2401	4.6%	2313	1.0%	2441	6.1%	2454	6.6%	2310	0.8%		
			Words	425	455	6.6%			445	4.5%	412	−3.2%	423	−0.5%	458	7.2%	411	−3.4%		

According to Table 3.3, the longest informational text in English is *The World's Bank for Seeds*, and the longest literary text is *Oliver and the Griffin*. In terms of difficulty, both texts are considered difficult texts. The shortest informational text is *Training a Deaf Polar Bear,* and the shortest literary text is *The Summer My Father Was Ten*. The two shortest texts belong to the category of easy texts.

Translation and adaptation of the English texts into the languages of instruction that were assessed in the Dinaric region caused increases or decreases in the number of words and characters (with spaces) compared to the texts in English:

- More words and more characters (for all texts in the Albanian language)
- Fewer words and fewer characters (for almost all texts in the Slovenian language)
- Fewer words and more characters (for the majority of texts in the Macedonian language)
- A combination of the previous three variants, i.e., fewer words and fewer characters, more words and more characters, or fewer words and more characters (for different texts in Serbian, Croatian, and the Montenegrin language)

The only missing variant is more words and fewer characters, which is only possible if the language has very short words, short enough to compensate for the difference in characters caused by the spaces between words. The differences in the number of words between the texts in English and each of the languages in the Dinaric region education systems are shown in Fig. 3.3.

In the Albanian language (ALB), which is the language of instruction in Albania, Kosovo, and for some students in North Macedonia, the number of words in all texts is higher than the number of words in English (between 1.9% and 12.3%). The larger number of characters (between 4.6% and 16.0%) derives from the length of the words, the larger number of words, and the increase in the number of blank spaces due to the larger number of words.

In the Macedonian language (MKD), which is the language of instruction for the majority of students in North Macedonia, in 12 texts the number of words is lower (between −0.5% and −13.0%) and the number of characters is higher (between 0.5% and 10.8%) than in the English language; that is, in the 12 texts; there are fewer but longer words. In the remaining six texts, there are only small deviations from the "rule" noticeable in the other 12 texts, that is, in three texts there is an increase in the number of words and characters (i.e., 1.9% more words and 10.5% more characters), and in the other three texts there is a decrease in both the number of characters and words (i.e., 4% fewer characters and 14.8% fewer words), compared to the texts in English.

In the Slovenian language, all texts have a lower number of words (between − 2.6% and − 24.6%) and characters (between −2.3% and − 12.1%) than the texts in English, with the small exception of two texts. In texts translated into Croatian, Montenegrin, and Serbian, many of the texts have fewer words and fewer characters than the English texts.

According to the data shown in Table 3.3 and Fig. 3.3, among informational texts, the largest increase in both the number of words and the number of characters occurred in the translations of the text *Training a Deaf Polar Bear* (12.3% more

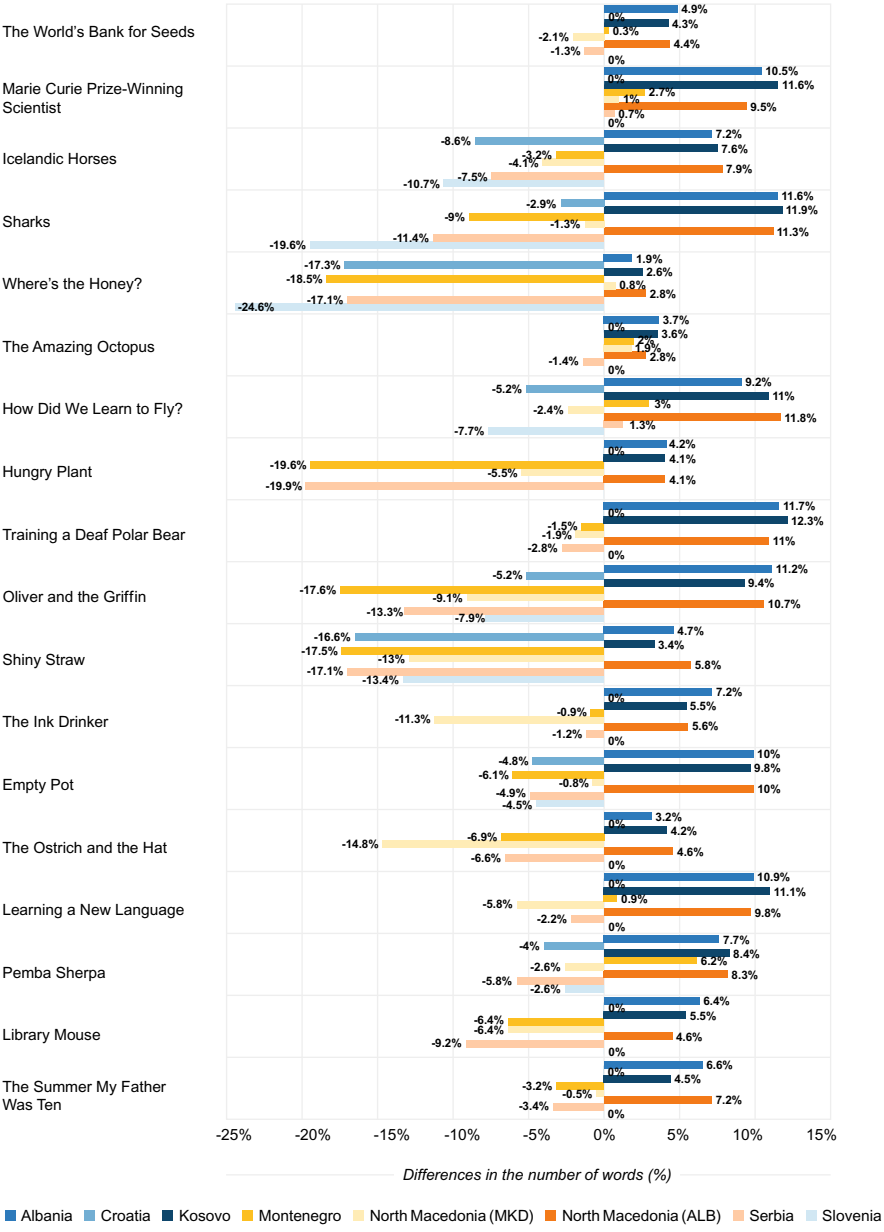

Fig. 3.3 Differences between the number of words in the texts in Dinaric region languages and the number of words in the texts in English

words and 16% more characters) from English into the Albanian language. Among literary texts, the largest increase also occurred in the translation from English into the Albanian language in the case of the text *Pemba Sherpa* (13.9% more characters and 8.4% more words). The largest decrease in both the number of characters and the number of words appears in the translation from English into Slovenian for the informational text *Where's the Honey?* (11% fewer characters and 24.6% fewer words) and in the translation from English to Montenegrin for the literary text *Oliver and the Griffin* (11.3% fewer characters and 17.6% fewer words).

There are many examples in the PIRLS passages that can illustrate potential causes of differences shown in Table 3.3. In this chapter, we use two sentences from the text *Empty Po*t as examples of the impact of the translation on the number of words and characters. This particular text was chosen because it is one of eight texts assessed in all Dinaric region languages, and it is the only one that will not violate the confidentiality of the exam materials, as it is one of the three released texts from PIRLS 2021 (Mullis et al., 2023).

Example 3.1 In English (16 words, 96 characters): Strong, powerful stalks soon emerged from the pots cared for by other children in Jun's village.

In Croatian (12 words, 69 characters): Iz posuda druge djece u Junovu selu rasle su snažne, moćne stabljike.

In Serbian (13 words, 71 characters): У саксијама друге деце у Ђуновом селу расле су снажне и моћне стабљике.

In Montenegrin (12 words, 69 characters): Из посуда друге дјеце у Јуновом селу расле су снажне, моћне стабљике.

Example 3.2 In English (20 words, 116 characters): The Emperor, wrapped in his silk robe, strode down the line of hopeful contestants, viewing each plant with a frown.

In Macedonian (18 words, 129 characters): Царот, завиткан во својата свилена наметка, тргна по низата надежни натпреварувачи, гледајќи го секое растение со намуртено лице.

In Albanian (22 words, 135 characters): Perandori, i mbështjellë me mantelin e tij të mëndafshtë, eci përgjatë vijës së garuesve që shpresonin, duke parë çdo bimë me vërejtje.

In Slovenian (16 words, 112 characters): Cesar, ovit v svileno oblačilo, je korakal ob vrsti nadobudnih tekmovalcev in namrščeno pogledal vsako rastlino.

Example 3.1 shows that even in a single sentence one can notice the similarity between the Croatian, Serbian, and Montenegrin translations and their differences compared to the English language, i.e., a reduction in both the number of characters and the number of words. Example 3.2 is a sentence that reflects the differences in the translation from English into Macedonian (the number of words decreases and the number of characters increases) and from English into Slovenian (both the number of words and the number of characters decrease). As in all other texts, the number of words and the number of characters increases during the translation from

English into Albanian. The sentence in Albanian is identical in the passages used in Albania, Kosovo, and North Macedonia (ALB).

PIRLS passages in Albanian (used in Albania, Kosovo, and partly in North Macedonia) are on average 8.3% longer compared to the international version in English (taking into account both words and characters). The passages in Slovenian are on average 7.9% shorter than English, while passages in Serbian and Croatian are on average shorter by 3.8% compared to the international version. Such differences, from a statistical point of view, are not particularly large, and it can't be considered that all students from one education system are therefore more disadvantaged compared to all of the students from another education system. But in practice, from the point of view of the students and their teachers, the differences are not so small and should be taken into account during further in-depth analyses of both mother tongue textbooks and PIRLS passages. For example, during the PIRLS 2021 assessment, part of the sampled students read the same texts at the same time, under the same conditions. If the length of the texts is compared only between the languages used in the education systems in the Dinaric region, the biggest difference exists in the translations of the text *Sharks*. The difference between the text in Albanian and the text in Slovenian is 23.6% in the number of characters (5517 vs. 4216 characters) and 26.1% in the number of words (972 vs. 718 words). Considering such examples, we cannot analyze the data only from a statistical point of view to say that there are no big differences if it is apparent that some of the students who participated in the same assessment had to answer the same questions related to a text that was 26.1% longer than the text read by some other students.

Moreover, even more in-depth analyses should be done at the national level, especially on the mother tongue textbooks and the overall context in which the teaching takes place. We cannot ignore the differences in the length of PIRLS passages, but at the same time, we cannot conclude that a longer length of the assessment reading text results in a low PIRLS achievement score.

3.5 Conclusions

The summarized findings regarding the structure of the textbooks and the impact of the translation on the length of the texts provide some answers to the research questions that are the focus of this chapter but also call for further research.

This chapter sought to address the proportion and length of literary and informational texts in mother tongue textbooks used in the Dinaric region compared to the proportion and length of passages used in the PIRLS 2021 assessment. A first important finding is the significant variation of mother tongue textbooks across and within countries regarding the sheer number, proportions, and lengths of literary and informational text passages.

Further, the representation of literary and informational texts in mother tongue textbooks shows little similarity to those in PIRLS 2021. In PIRLS, there is an equal

representation of literary and informational texts. In the mother tongue textbooks analyzed in this chapter, there is not near equal representation of those two text types. The maximum was observed in one Croatian textbook that has 37% informational texts, while four textbooks (two each in North Macedonia and Slovenia) have no informational texts at all.

Stakeholders who are responsible for textbook content should consider greater representation of informational texts in the basic versions of mother tongue textbooks as the simplest and most reliable way to bring opportunities for informational reading closer to students. Furthermore, schools and teachers may have the freedom to choose a textbook and should therefore be made aware of their responsibility and choices. Considering that students from Croatia achieved the highest overall PIRLS 2021 average scale score compared to other Dinaric region education systems, analyzing the Croatian experience might be useful. For instance, by using electronic textbooks with an integrated reader, that increases the number of available texts and the diversity of texts. However, students from Slovenia also have a high overall PIRLS 2021 average scale score, even though they use mother tongue textbooks that, in their basic version, do not contain informational texts at all. Given the relatively high achievement of Croatian and Slovenian students, it would be beneficial for other education systems in the region to determine other factors of success that may be worth copying. In Slovenia, electronic textbooks and additional learning materials such as reading books are used, and teachers are given clear instructions in the curricula that they should devote at least 30% of the teaching time in the mother tongue to reading (Fishbein et al., 2023). Slovenia is also one of the few education systems in the region that has a National Strategy for the Development of Reading Literacy (The Government of the Republic of Slovenia, 2019).

In the 2020/2021 school year, when the PIRLS 2021 assessment was conducted, students from North Macedonia, whose PIRLS 2021 average score is significantly lower than the centerpoint of the PIRLS scale, used exclusively printed textbooks. Since then, a new "Concept Note on Primary Education" (Republic of North Macedonia Ministry of Education and Science, 2021) was adopted, on the basis of which new curricula for mother tongue instruction were developed and electronic textbooks were introduced. This change can be interesting for further monitoring; that is, it can show whether the modernization of mother tongue textbooks will show an improvement in the achievements of students in the following cycles of PIRLS.

Regarding the length of literary and informational texts, the obtained data show that there is no similarity between the length of the texts used in the PIRLS 2021 assessment and those in the mother tongue textbooks of all education systems of the region. In the PIRLS assessment, the average length of informational texts is greater than the average length of literary texts. In most of the analyzed mother tongue textbooks, the exact opposite is found: the informational texts are not only less represented, but they are also usually shorter than the literary texts. These results provide pause to reflect on the question regarding the extent to which mother tongue textbooks assist in preparing students in the Dinaric region to adequately respond to the PIRLS reading assessment. The results related to changing the length of the texts during the translation can be the basis for deeper analysis of the translations, i.e.,

analysis of the complexity of the terminology used, the appropriate adaptation, the preservation of the language during the translation process, and other challenges to validity in translation (Peña, 2007). Considering that in the teaching of the mother tongue, apart from textbooks, many other types of written sources are used (reading books, children's magazines, etc.), it can be assumed that all students from the Dinaric region have opportunities to encounter texts with different structures and different lengths. Therefore, the data presented in this chapter cannot be considered the only information about what happens in each classroom but can be the basis for in-depth analysis of the quality of mother tongue textbooks in particular countries, as one of the factors to indicate student preparedness, also in the PIRLS assessment.

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Chapter 4
Teacher Qualifications, Professional Development, Teaching Quality, and Student Reading Achievements. A Comparative Perspective for the Dinaric Region

Trude Nilsen, Agim Alia, and Wangqiong Ye

4.1 Introduction

This chapter aims to describe and compare teacher qualifications, professional development (PD), and teaching quality in reading in the Dinaric region. We further examine how they are related and how they are related to reading achievement.

Reading competence, including reading comprehension skills and strategies, is an important competence and key to developing the so-called twenty-first-century skills (e.g., critical reasoning, creativity, problem solving, collaboration, and communication) (Trilling & Fadel, 2009). Reading competence is developed primarily within the context of school and especially in primary school. It is hence imperative that teachers are competent and that they provide high-quality instruction, as this has been shown to enhance students' learning outcomes (Darling-Hammond, 2000). Yet, most research on this has been undertaken in German-speaking countries and in the United States, and most often within the context of the subject domain mathematics (Baumert et al., 2010; Darling-Hammond, 2000; Kane & Staiger, 2012; Klieme et al., 2009). There is hence a *lack of research* on this in the Dinaric region on the subject of *reading*.

It is important for policymakers and stakeholders to know what aspects of teacher competence, such as their qualifications, are important for student reading outcomes in order to make evidence-based decisions for teacher education and school policy. Moreover, to make sure that the next generation is able to cope with future and

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present challenges, it is pertinent to assure high reading competence for the students. Without proper reading skills, it is difficult to partake in communication and collaboration, critically assess and understand information, or solve problems.

The present chapter will investigate teacher qualifications (e.g., educational level, specialization), PD, and teaching quality in the context of reading lessons. Teacher qualifications and PD are known to improve teaching quality and promote better learning outcomes for students in general (Darling-Hammond et al., 2017; Desimone et al., 2013; Goe, 2007; Nilsen et al., 2018; Yoon et al., 2007). In reading, teacher PD activities within areas such as the teaching of reading comprehension skills or strategies are important to student reading achievements (Basma & Savage, 2018). However, even if teacher competence is improved by PD, it would not benefit the students unless this competence is *transferred* into the *actual teaching* that takes place in the classroom. If the quality of their teaching is enhanced, students' outcomes generally improve (Blömeke et al., 2015; Nilsen & Gustafsson, 2016). Teaching quality is the most proximate to student learning outcomes and is defined as those aspects of instruction that are known to promote higher learning outcomes (Charalambous et al., 2021). Specifically, teaching quality includes what teachers do in their classroom, namely, their behavior (Charalambous et al., 2021; Praetorius et al., 2018). In general, certain aspects of instruction, or certain behaviors, are known to promote learning outcomes (Darling-Hammond, 2000; Praetorius et al., 2018).

Knowledge of which aspects of teachers' qualifications, PD, and which aspects of teaching quality promote students' reading achievement in the different education systems of the Dinaric region would be valuable; the education systems may learn from other education systems in the region because while they share common features, they also differ from one another (see PIRLS 2021 encyclopedia, Reynolds et al., 2022). Such shared knowledge may also inspire collaborations across borders to improve the quality of education and student competence. Further, the findings of the present study may advance the field of research on teacher effectiveness and teaching quality, as there is a lack of research on this in the context of the Dinaric region and within reading. The findings may also have an impact on educational policy, including teacher education.

4.2 Literature Review and Conceptual Framework

4.2.1 Teachers' Qualifications and Professional Development

This section first provides previous research on teacher qualifications and PD in general and then contextualizes these within the context of the Dinaric region.

Previous research on teacher qualifications and professional development.

Teacher competence is a broad measure and defined somewhat differently across studies. In the present study, we distinguish between the teaching going on in the classroom and the knowledge or competence that the teachers bring with them to the

classroom (e.g., Goe, 2007). The latter is often described as consisting of teacher content knowledge (their knowledge of the subject domain), teacher pedagogical content knowledge (their knowledge of how to teach the subject domain), and teacher pedagogical knowledge (their knowledge of teaching and pedagogy in general) (Baumert et al., 2010). Measuring these three aspects is challenging, especially across countries, as evidenced by the international large-scale assessment Teacher Education and Development Study (TEDS) (Blömeke, 2021; Blömeke & Delaney, 2014). Such measures require extensive tests of teachers' knowledge using test items assessing the three types of teacher content knowledge listed above. However, previous studies have found that indicators of teacher qualifications may *indirectly* measure teacher competence (Nilsen & Gustafsson, 2016). These indicators may include, for instance, teachers' educational level, the degree to which they have specialized within the subject domain in question, and their self-efficacy (ibid.). While these measures are only *indirect* measures of teacher competence and are less precise than direct assessment of teacher competence, they have proved to work well as proxies when direct assessment is unavailable (Connor et al., 2005; Nilsen et al., 2018).

Previous studies have found that these proxies may predict teaching quality and student achievement (ibid.). However, whether these studies are generalizable across countries and subject domains remains an open question. During their careers, teachers' competence and qualifications need to be further developed and kept up to date for teachers to continue to promote student learning. They are in need of constant professional development. The professional development (PD) of teachers has become the most important means of improving and maintaining teaching quality in many content areas, including reading (Wang et al., 2016). "The challenge is to devise professional development that helps teachers incorporate effective elements into their teaching and then supports their continued use of them" (Porche et al., 2012, p. 650). Holland (2005) argued for a focus on professional development initiatives that have direct effects on student achievement, which he identifies as those focused on "1) how students learn particular subject matter; 2) instructional practices that are specifically related to the subject matter and how students understand it; and (3) strengthening teachers' knowledge of specific subject-matter content." (p. 2).

4.2.1.1 Teacher Qualifications and Professional Development in the Dinaric Region

In the Dinaric region, most teachers of lower grades in primary school get their degree from teacher training faculties (Đerić et al., 2022). According to Đerić et al. (2022), in Albania, Croatia, Kosovo, and Serbia, teachers need a master's degree to teach in primary school, while a bachelor's is required in Bosnia and Herzegovina, Montenegro, and North Macedonia. Moreover, classes in all subjects in the Dinaric region are taught by one teacher.

Across the Western Balkans, initial teacher education programs tend to be theoretical, focusing on subject matter knowledge rather than practical preparation in student-centered teaching techniques and inclusive education (UNESCO, 2017).

4.2.1.2 Teacher Professional Development

It is important to prepare teachers for all the challenges they will face throughout their careers and hence to provide teachers with opportunities for PD. As the OECD's comparative review on teachers noted, "Effective professional development is on-going, includes training, practice, and feedback, and provides adequate time and follow-up support." (OECD, 2009, p. 49).

Teachers from the Dinaric are obliged to attend state-organized PD training courses (Đerić et al., 2022). In most cases, the teachers from the Dinaric region are free to choose the programs they wish to attend from a list of training programs approved by the state agencies. However, concerns have been raised about these programs in most Dinaric education systems, and previous research has shown that these concerns are similar across these education systems (for more on this, see Đerić et al., 2022).

4.2.2 Teaching Quality

4.2.2.1 Previous Research on Teaching Quality

Teaching quality is a wide concept, and different studies include different aspects. In Europe, a framework used extensively is the Three Basic Dimensions (TBD) framework. TBD includes the following three dimensions: (1) classroom management (e.g., discipline and time on task), (2) teacher support (e.g., clear and understandable teaching, variation of instruction), and (3) cognitive activation (e.g., challenging the students by encouraging class discussions, or encouraging students to express their opinion or show what they have learned) (Klieme et al., 2009; Praetorius et al., 2018). This framework is also similar to many used in, for instance, the United States (e.g., Hamre et al., 2013). It is further used in TIMSS and PIRLS.

These three generic aspects of teaching quality may take slightly different forms or vary across different subject domains (Senden et al., 2022). This is especially true for cognitive activation, which has been shown to be the aspect most dependent on the subject domain (Praetorius et al., 2018). In reading, and especially in primary school, challenging students would include instruction that promotes their reading comprehension skills and strategies, such as asking the students to support their understanding with text evidence (Duke & Pearson, 2009).

The strongest predictor of student achievement is that of classroom management (Pianta, 2013), but also the other two dimensions have been found to be related to

both student achievement and motivation (Fauth et al., 2014; Klieme & Nilsen, 2022).

4.2.2.2 Teaching Quality in the Dinaric region

There is very little research on teaching quality across the Dinaric region (Đerić et al., 2022). Using TIMSS data, Đerić and colleagues (2021) found very few significant relations between teaching quality and performance in mathematics and science in the Dinaric region. The authors explained this by challenges related to teacher education and PD, and by the traditional, teacher-centered approaches (e.g., asking students to memorize facts) taken by the Dinaric teachers. Similar results have been found in other studies (Duda et al., 2013).

4.3 Research Questions and/or Hypotheses

To address the aforementioned gaps in research and to inform educational policy and stakeholders, in this chapter, we ask the following research questions:

1. What characterizes teachers' qualifications, their PD, and their teaching quality in reading in the education systems in the Dinaric region, and to what extent does this vary across countries (education systems)?
2. How is teaching quality related to student reading achievement in the Dinaric region, and to what extent does this vary across these education systems?
3. How are teachers' qualifications and professional development related to their teaching quality and to student reading achievement in the Dinaric region? To what extent does teaching quality mediate the relation between teacher qualifications and PD and student reading achievement? To what extent do these relations vary across these education systems?

4.4 Methodology

4.4.1 PIRLS and the Data

PIRLS has a hierarchical design, as students are nested within classes that are nested within schools. The sampling is a two-stage cluster sample design, where schools are randomly picked with probability proportional to their size in the first stage. Then two classes are picked within each school in the second stage (von Davier et al., 2023). Only one class is selected in schools that have only one class. The sample of students is representative at the national level.

PIRLS' reading test covers a wide range of topics specified in the frameworks (Mullis & Martin, 2019). To spare the students from spending too much time on the

test, PIRLS uses a rotating matrix design of the reading items where each student receives only a subset of all the items. Therefore, the results from the students are merged to provide results at the national level in terms of five plausible values.

PIRLS assesses the two overarching purposes for reading that account for most of the reading done by young students both in and out of school: for literary experience and to acquire and use information. In addition, PIRLS assesses four broad comprehension processes within each of the two purposes for reading: to focus on and retrieve explicitly stated information, make straightforward inferences, interpret and integrate ideas and information, and evaluate and critique content and textual elements (Bruggink et al., 2022; Mullis & Martin, 2019).

In addition to reading assessment, the PIRLS school, teacher, student, and home questionnaires gather extensive information about the contextual factors at home and school that are associated with the teaching and learning of reading.

4.4.2 The Data Sample

The present study utilizes PIRLS 2021 data from Slovenia, Croatia, Serbia, Montenegro, Kosovo, Albania, and North Macedonia, the sample group characteristics are described in Table 4.1.

4.4.3 The Variables

The present study uses PIRLS 2021 data from the student questionnaire, the teacher questionnaire, and student achievement. The teacher and student questionnaires are available online.[1] Table 4.2 provides the variables used in the analyses. In addition, student achievement in reading, including all five plausible values, is included in the analyses.

4.4.4 Method of Analyses

4.4.4.1 Step 1. Preparing the Data

The data was prepared using the IDB analyzer (version 5) to merge the countries and the student and teacher data. Furthermore, SPSS (version 29) was used to reverse scales and code the missing data. Mplus (version 8.2) was utilized to explore the relationships among teacher qualifications, PD, teaching qualities, and their influence on student reading achievement.

[1] https://pirls2021.org/questionnaires

Table 4.1 Sample characteristics using PIRLS 2021 data

	Education system						
	Slovenia	Croatia	Serbia	Montenegro	Kosovo	Albania	North Macedonia
Number of students	5110	3937	4037	4489	4557	4213	2929
Mean age of students	9.95	11.16	10.57	9.89	10.10	10.07	9.89
Number of classrooms	262	259	221	355	232	207	197
Number of schools	197	153	169	140	150	177	148
Average scale score	520	557	514	487	421	513	442
2021 HDI	0.918	0.858	0.802	0.832	NA	0.796	0.770
2023 GDP per capita	32.214	20.537	10.849	11.289	5.641	7.058	7.384

Notes: *HDI* Human Development Index, *GDP* Gross Domestic Product

Table 4.2 The variables included in the study

Instrument	Question no.	Variable (name and description)	Response scale
Teacher questionnaire	G4	*Educational level*. Teacher level of education	From ISCED level 3 to 8
Teacher questionnaire	G5a	*Primary education*. Whether the teachers' main area of study was within primary education.	Yes, or no
Teacher questionnaire	G5b	*Secondary education*. Whether the teachers' main area of study was within secondary education.	Yes, or no
Teacher questionnaire	G7a	*PD*. Whether the teachers participated in different types of formal professional development in reading in the past two years. There are seven types of PD (e.g. *teaching reading comprehension skills or strategies*).	Yes, or no
Teacher questionnaire	G7b	*PD needs*. How the teacher would prioritize their need for future PD. The same seven types of PD as G7a.	Low, medium, high
Student questionnaire	R1	*Teacher support*. Students' perceptions of their teachers' instruction (e.g., *My teacher encourages me to say what I think about what I have read*).	4-point Likert Scale from *disagree a lot* to *agree a lot*
Student questionnaire	R2	*Classroom management*. Students' perceptions of their teachers' instruction (e.g., My teacher has to keep telling us to follow the classroom rules).	4-point scale from *never* to *every or almost every lesson*
Student questionnaire	A composite variable	*SES*. Home resources for learning. A composite variable consisting of the number of books and number of children's books at home, parents' education, and occupation	Lower, middle, higher

Note**:** SES (socioeconomic status) is measured as a composite variable (see https://pirls2021.org/results/context-home/socioeconomic-status)

4.4.4.2 Step 2. Analyzing the Data

To answer our research questions using PIRLS 2021 data, several methodological issues must be addressed. First, there are five plausible values for reading achievement that have to be taken into account in the correct manner, which we did by using multiple imputation in the software Mplus (see, e.g., Rutkowski et al., 2013). Second, seeing how one important aim is to explain achievement in terms of teacher variables, it is further necessary to do a two-level analysis with students at the within

level and classes at the between level. Such an approach is pertinent because variation in, for example, teacher professional development would explain differences between classes, more so than differences between students (Marsh et al., 2012). Furthermore, the data is hierarchical in nature, with students nested with classes, nested within schools. A multi-level approach would make sure standard errors are correctly estimated (Scherer, 2022).

4.4.4.3 Step 3. Sampling Weights

Sampling weights are employed in the analyses of PIRLS data to ensure that results accurately represent the entire population of interest, accounting for variations in the probability of selection for certain units, such as schools, classrooms, or students. This helps reduce bias, enhances the precision of estimates, and enables valid generalizations and comparisons across countries. It is hence important that the weights are taken into account properly (Mang et al., 2021; Meinck, 2020). Following the suggestion of Rutkowski et al. (2010), we manually calculate weights for classrooms and students as prescribed, and these weights are utilized in all regressions.

4.4.4.4 Step 4. Latent Variables

The constructs need to be founded on theory. However, the items pertaining to a question in the questionnaire in PIRLS don't always measure the same concept according to our theoretical framework. Hence, it is necessary to measure the concepts using latent variables. This way, it is possible to pick the items that measure the concept and create a latent variable. The reliability and validity of the latent variables need to be evaluated.

4.4.4.5 Step 5. Comparability Across Countries (Education Systems)

Comparing findings across education systems is sometimes problematic due to different cultures. Students may have different understandings of the questions and items and may also have a different response style (e.g., a tendency to choose the extremes of a response scale). Hence, it is important to evaluate to what extent the measures are comparable across countries. This is done by measurement invariance analyses. If the measures are comparable, the research questions necessitate a multigroup approach. This means to compare across groups, and in this case, the groups are countries. By including all the countries simultaneously in one model, one may estimate whether differences are significant.

The analyses were done under the structural equation modeling (SEM) framework in Mplus 8 (Muthèn & Muthèn, 1998–2017) for five reasons: (1) This framework allows for multiple imputations of the five plausible values in the correct

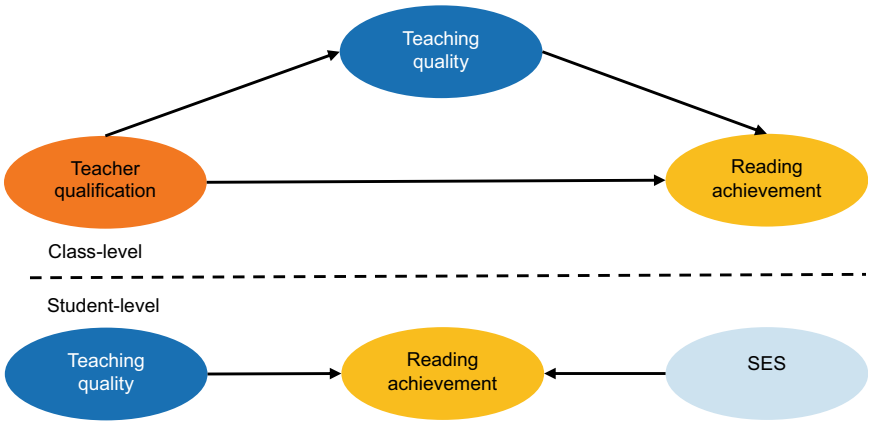

Fig. 4.1 Conceptual model

manner (Rutkowski et al., 2013); (2) it allows for simultaneous modeling at the student and class level; (3) it allows for creating latent variables and produces model fit and factor loadings that provide information on reliability and validity; (4) it allows for estimations of measurement invariance across countries, and (5) it allows for multi-group estimations to compare across countries. In general, SEM provides robust, reliable estimates (Hox et al., 2017).

We started by testing measurement invariance for all latent variables across the countries via multiple-group confirmatory factor analyses. Upon establishing measurement invariance (see results in Appendix A), we proceeded to investigate two key aspects: (1) the influence of teaching quality on reading achievement; (2) the mediating role of teaching quality in the relationship between teacher qualifications and PD and reading achievement. As depicted in Fig. 4.1, our conceptual hypothesized model, a series of two-level SEM models (with students nested within classrooms), was estimated using a multiple-group approach.

To avoid multicollinearity, we did not include all variables in one large model. Rather, the five teacher qualification variables (educational level, primary education, secondary education, PD, and PD needs) were each linked to teacher support and achievement and then to classroom management and achievement. This means that 10 different models were estimated. Each model produced five regression estimates (along with model fit, factor loadings, etc.), and so this amounts to 50 regression estimates per participating education system and 350 regression coefficients in total for the seven PIRLS 2021 regional participants. The results for these analyses will be presented in Appendix A, while summaries of the results and examples will be presented in the result Sect. (4.5.2).

4.5 Results

4.5.1 Research Question 1: Descriptive Statistics

In our first research question, we asked what characterizes teachers' qualifications, their PD, and teaching quality in the Dinaric region and to what extent this varies across the education systems. The measurement invariance analyses show that the means of the variables were comparable across education systems (scalar invariance; see Appendix B). In the following, we present descriptive statistics for teacher qualifications, PD, and teaching quality.

Figure 4.2 describes the level of education of the teachers who participated in PIRLS in the seven Dinaric education systems, as well as the international average according to the PIRLS context almanacs (see https://pirls2021.org/data/). The figure shows that, of all the Dinaric education systems, only Albania, Croatia, and Slovenia are above the international average in terms of the percentage of students taught by teachers who have master's or doctoral degrees. Of these, Albania has the largest proportion (almost 60%) but is also the education system with the largest proportion of teachers with the least education (upper secondary school or less). For most of the education systems, having a bachelor's is the most common, as is the case with the international average. However, for the international average, about 30% of students are taught by teachers with a master's degree. The percentages of students taught by teachers with a master's degree are much lower than the international average in Kosovo, Montenegro, North Macedonia, and Serbia.

Most teachers in the seven education systems had their main area of study in primary education, as shown in Fig. 4.3. This is also the case for the international

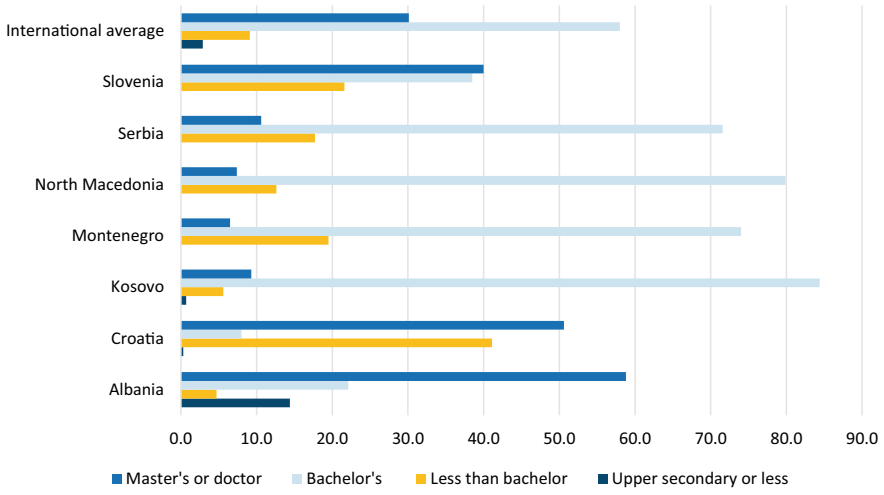

Fig. 4.2 Educational level of teachers who participated in PIRLS 2021 in the Dinaric region

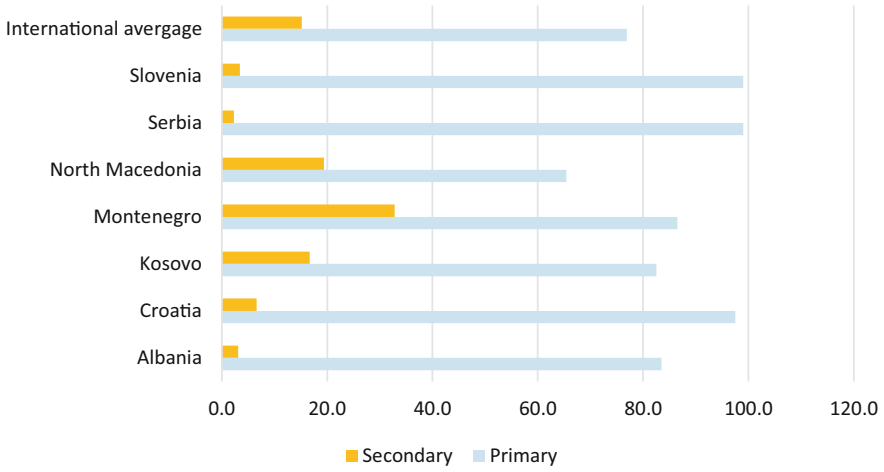

Fig. 4.3 Teachers' major area of study: primary or secondary education

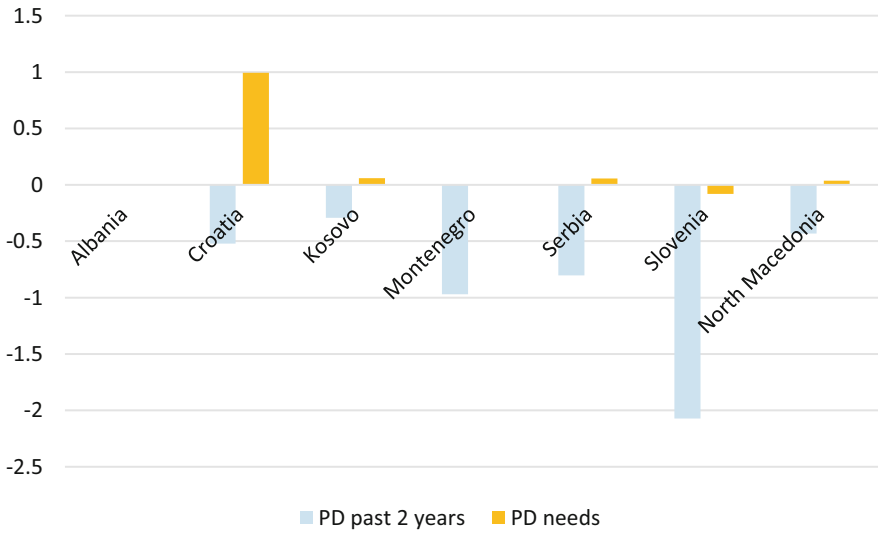

Fig. 4.4 The means of the two latent variables: teachers' participation in PD and teachers' needs for PD in the future

average. In Montenegro, though, over 30 percent of the teachers had their main area of study in secondary education.

With regard to teacher PD, there are seven different types, and this was measured as a latent variable. Figure 4.4 shows the means of the latent variables describing teachers' participation in different types of PDs in the last two years, as well as their needs for PD in the future. Albania is the reference education system and is set to zero in order to identify whether the differences between the education systems are

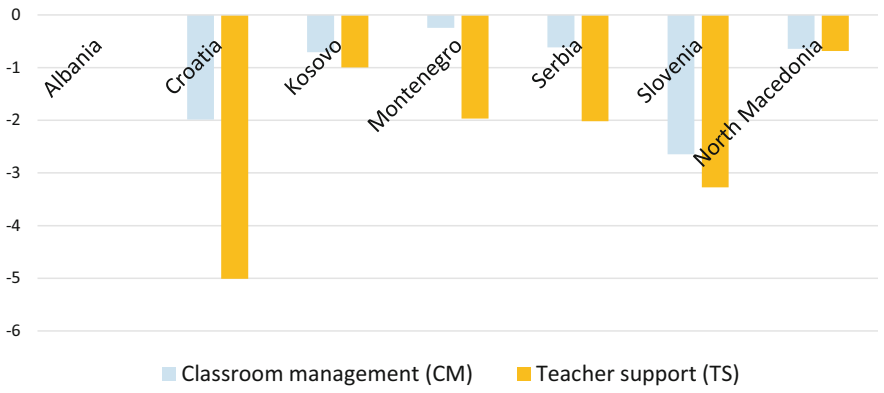

Fig. 4.5 The means of the two latent variables: classroom management and teacher support

significant. Of all the education systems, the Slovenian teachers participated less in PD activities than those in the other education systems over the last two years. All the differences were significant. For teachers' needs for PD in the future, on the other hand, the only significant finding was for Croatia, where the teachers reported having the largest need for PD as compared to the other education systems.

Figure 4.5 shows the latent means of the two latent variables, classroom management (CM) and teacher support (TS). Again, Albania is the reference education system. The results show that Croatia was the education system where teacher support had the lowest mean, followed by Slovenia. Slovenia was the education system with the lowest mean for classroom management, while Albania had the highest mean of all education systems for both aspects of teaching quality. Since the results show the aggregated students' responses about their teachers at the *class level*, this could indicate that teachers in Albania provide more support and better classroom management than the other education systems in the Dinaric region.

4.5.2 Research Question 2: Relation Between Teaching Quality and Student Achievement

For the second research question, we investigated the influence of teacher support and classroom management on achievement. The main focus is on the class level, and we controlled for students' individual perceptions at the student level and for SES.

The results for both levels are exhibited in Table 4.3. The relations between SES and achievement are not included in the table but were between 0.3 and 0.4 for all Dinaric education systems. The results at the class level answer research question two and are shown in Fig. 4.6.

Table 4.3 Relations between teaching quality and achievement in the education systems in the Dinaric region

	Level	Albania	Croatia	Kosovo	Monte-negro	Serbia	Slovenia	North Macedonia
TS on achievement	Student	0.13**	NS	0.20*	0.22*	NS	0.08**	NS
	Class	0.33*	−0.06*	0.47**	0.17*	NS	0.07**	0.09**
CM on achievement	Student	NS	NS	NS	0.24**	NS	0.18*	0.28**
	Class	0.19**	0.08**	0.26**	0.14*	0.09**	0.26**	0.45**

Notes: ** is $p < 0.05$, * is $p < 0.1$, NS means not significant. These are standardized results. *TS* Teacher support; *CM* Classroom management

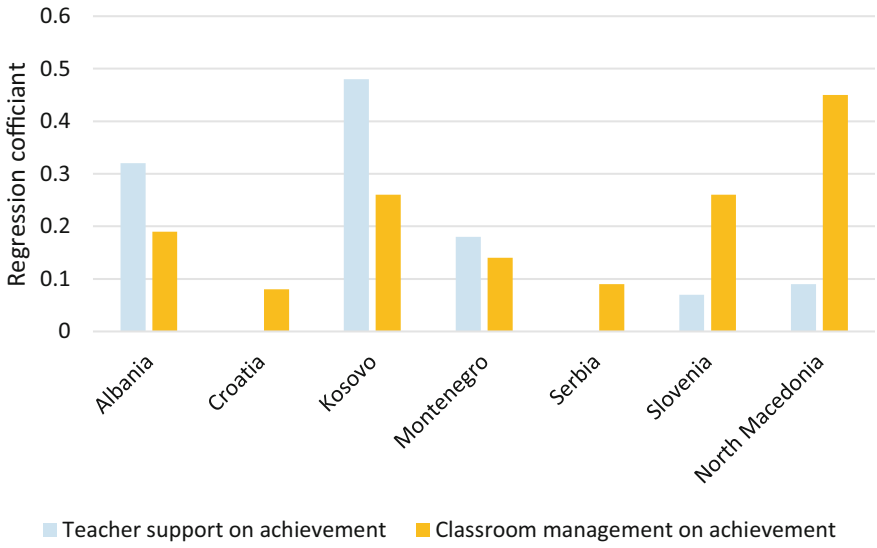

Fig. 4.6 Relations between teaching quality and student achievement at the classroom level

The results at the class level show that teacher support is associated with achievement in all education systems except for Serbia. The regression coefficients are positive in all education systems, except for Croatia, which had a weak, barely significant, and negative coefficient. The strongest relation is that of Kosovo (about 0.5). Classroom management has a positive, significant relation to achievement in all education systems. North Macedonia has the strongest relationship between classroom management and achievement.

4.5.3 Research Question 3: Relation Between Teacher Qualifications, Teaching Quality, and Student Achievement

For the third research question, we investigated relations between teacher qualifications, teaching quality, and student reading achievement, and specifically whether teaching quality may mediate the relation between teacher qualifications and students' achievement.

Due to the complexity and vast number of results (350 regression coefficients) from the mediation models, they are presented in Appendix B. Here, we present summaries of the results and examples.

Figure 4.7 is an example from Slovenia, which is one of the few education systems that exhibited full mediation. It shows that classroom management completely mediated the relation between primary education and reading

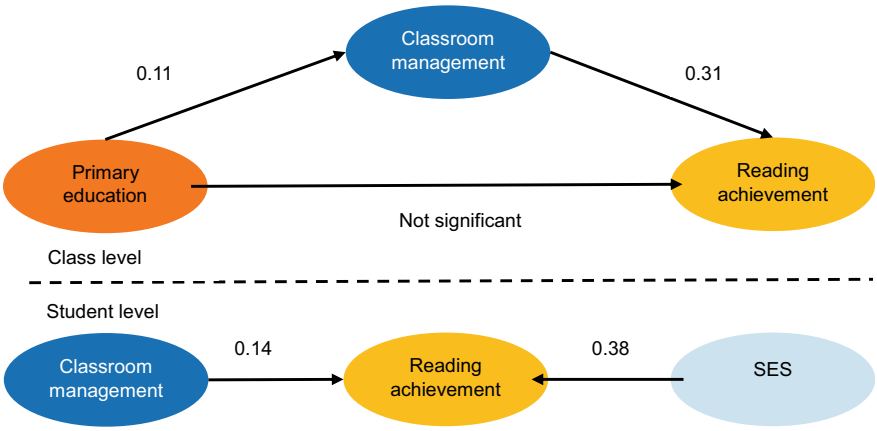

Fig. 4.7 Primary education, classroom management, and achievement in Slovenia

achievement. This means that having primary education as the major area of study in teacher education is *indirectly* related to student reading achievement via classroom management. The indirect effect was small but positive and significant. There was, in other words, no significant *direct* effect between primary education and achievement in Slovenia. The results at the class level, which are the main foci of the research question, show that primary education has a significant and positive relation to classroom management (B = 0.11) in Slovenia, which in turn has a positive and significant relation to reading achievement (B = 0.31). We have controlled for the variance in students' individual perceptions of classroom management at the within level and for SES. These results may indicate that teachers with primary education as their major area of study are good at managing their classes and that this is associated with higher student achievement in Slovenia.

For the other education systems, there were few significant findings for having primary education as the major area of study in teachers' education. Primary education did, however, have a positive, significant relation to teacher support in Kosovo and to classroom management in Albania and Slovenia. Primary education was related directly to achievement in Serbia (for both teacher support and classroom management).

Analyses of secondary education (i.e., having secondary education as the major area of study in teacher education) also revealed few significant findings. Secondary education had a positive, significant relation to teacher support in Serbia, a positive, significant relation to classroom management in Kosovo, and a negative, significant relation to classroom management in Albania. Secondary education was related directly to achievement in Slovenia (in both models). No indirect effects were found for any of the education systems in the Dinaric region.

Educational level had a direct positive and significant relation to achievement in Kosovo, Serbia, and North Macedonia for the teacher support model, but only in Serbia and North Macedonia for the classroom management model. Educational

level was not related to teaching quality in any education system, and therefore there were no indirect effects.

Professional development (PD) was related to teacher support in Croatia and to classroom management in Montenegro and in North Macedonia. PD had a negative, direct relation to achievement in Croatia (negative) in both models and a negative, direct relation to achievement in Kosovo for the teacher support model. In Montenegro, there was a full, positive mediation for the classroom management model.

Teachers reported that the need for PD in the future (PD needs) was not related to the teacher support model in any education system but to classroom management in North Macedonia. PD needs were related directly to achievement in Kosovo for the teacher support model (no significant findings for the classroom management model). A full mediation between PD needs and achievement via classroom management was found for North Macedonia.

4.6 Discussion

4.6.1 Summaries and Discussions of Findings

For research question one, we examined teachers' educational level and found that Albania had the largest proportion of teachers with a master's or doctoral degree. This is in line with findings for mathematics teachers in the Dinaric region (Đerić et al., 2022). However, for Kosovo, Montenegro, North Macedonia, and Serbia, the percentages of students taught by teachers with a master's degree were much lower than the international average. This indicates that teachers in most Dinaric education systems have lower educational levels than the mean of the 57 countries (and benchmarking entities) that participated in PIRLS 2021. We also found that most teachers in the Dinaric region had their main area of study in primary education. In a previous study—in mathematics at grade four in the Dinaric region—there were more education systems with teachers whose main area of study was secondary education in mathematics rather than in reading (Đerić et al., 2022).

For professional development, Albania was the education system where most teachers participated in PD, while the opposite was the case for Slovenia. Teachers in Croatia reported the highest need for PD in the future, and Croatia was also the education system with the highest PD needs in the Dinaric region in mathematics (Đerić et al., 2022). For teaching quality, the results showed that Albania had the highest mean of all education systems for both aspects of teaching quality. Croatia had the lowest mean for teacher support, and Slovenia had the lowest mean for classroom management. There is a lack of previous studies with which we can compare our findings. However, some previous research characterizes teaching in many of the Dinaric education systems as traditional and *teacher-centered* (Đerić et al., 2022; Duda et al., 2013). The measure for teacher support—to a large degree—rather reflects a *student-centered* pedagogy in many items, like "My teacher

lets me show what I have learned." This could explain why Croatia and Slovenia scored low on this variable.

Research question two examined relations between teaching quality and student achievement. Overall, the results showed that teaching quality did indeed have positive and significant relations to achievement in the Dinaric education systems. This is *not* in line with the previous study by Đerić et al. (2022) with regard to teaching quality in mathematics. Their overall results showed no significant relations between teaching quality and achievement in mathematics in the Dinaric region (with a few exceptions). However, their study used one single item to measure teaching quality in mathematics, and this was self-reported by the teachers (teacher questionnaire).

While there were positive, significant findings for all countries (education systems) for classroom management in our study, the exceptions to our findings on teaching quality were Serbia and Croatia for teacher support. Croatia was the education system with the lowest mean for teacher support, and this could mean that there are too few teachers that provide support to detect any significant relation between this and achievement. Moreover, as stated earlier, teacher support measures different types of support, including student-centered approaches, for instance, as reflected in the item "My teacher encourages me to say what I think about what I have read." At the same time, Croatia had the highest achievement of the participating Dinaric region education systems in PIRLS 2021. This could mean that other factors than teacher support contributed to the high achievement. In both Serbia and Croatia, the relation between SES and achievement was the highest of all education systems. This relationship could "steal" some of the predictive power away from teacher support. Moreover, Croatia has the highest GDP per capita and human development index of all the Dinaric education systems (except for Slovenia), and these measures are known to predict countries' achievement (e.g., Arikan et al., 2020).

With regard to research question three, overall, there were few significant findings from the mediation models. This is in line with findings in mathematics in the Dinaric region (Đerić et al., 2022). Only in three cases did teaching quality mediate the relation between teacher qualifications and achievement (classroom management was the mediator in Slovenia for primary education, in Montenegro for PD, and in North Macedonia for PD needs). For some countries' education systems, there were relations between some aspects of teacher qualifications and teaching quality and some direct relations between aspects of teacher qualifications and achievement. Educational level seemed to be the strongest predictor, as there were direct, significant relations to achievement in three of the seven countries (education systems).

There may be many reasons why there are few significant findings. One could be that teachers' understanding of the questions in the questionnaire is contingent on culture and differences in the teacher education systems across the countries. Another reason could be that the teacher education and PD in the Dinaric education systems are not optimal, as pointed out by previous studies (Đerić et al., 2022; Duda et al., 2013).

There were some negative relations, and especially for PD, which was negatively related to performance in Croatia for both classroom management and teacher support. One reason for this could be that schools might send teachers in great need of PD to attend PD courses. Hence, teachers with either insufficient qualifications or teaching quality might attend PD activities, and this could explain the low performance of their students. A longitudinal design would address this issue, as it would be possible to measure the difference in students' achievement before and after their teachers attended PD.

4.6.2 Implications, Significance, Impact, and Future Research

While it is promising that teaching quality is associated with higher learning outcomes in reading in the Dinaric region, the findings for teacher qualifications are disturbing. Seen in light of previous research, this finding implies that neither teacher education nor professional development promotes high-quality teaching or student learning outcomes. This finding may, to a small degree, be explained by the PIRLS' measures for teacher qualifications that may not fit the context of the education system. However, it still points to a need for improvements in teacher education and PD in many of the Dinaric region's education systems. Further research is needed to identify exactly what these needs are and whether more student-centered and modern pedagogies are needed. Longitudinal data would further help disentangle these issues. With regard to implications for the PIRLS study, it is important to create measures for teachers' qualifications and PD that are understood and that fit the context of the participating education systems.

Appendix A Results from Research Question Three at the Class Level

		Class level	Albania	Croatia	Kosovo	Montenegro	Serbia	Slovenia	North Macedonia
Education level	**TS**	Education level on TS	NS	**−0.17***	NS	NS	NS	NS	NS
		TS on achiev.	NS	NS	**0.47****	NS	NS	NS	NS
		Education level on achiev.	NS	NS	**0.17****	NS	**0.19***	NS	**0.24****
		Total indirect	NS	NS	NS	NS	NS	NS	NS
	CM	Education level on CM	NS	NS	NS	NS	NS	NS	NS
		CM on achiev.	**0.27****	NS	**0.32****	**0.34****	**0.25****	**0.31****	**0.41****
		Education level on achiev.	NS	NS	NS	NS	**0.20***	NS	**0.20****
		Total indirect	NS	NS	NS	NS	NS	NS	NS
Primary education	**TS**	Primary education on TS	NS	NS	**0.23***	NS	NS	NS	**0.35****
		TS on achiev.	NS	NS	**0.50****	NS	NS	NS	NS
		Primary education on achiev.	NS	NS	NS	NS	**0.11****	NS	NS
		Total indirect	NS	NS	NS	NS	NS	NS	NS
	CM	Primary education on CM	**0.14***	NS	NS	NS	NS	**0.11****	NS
		CM on achiev.	**0.37****	**0.09****	**0.39****	**0.34****	**0.26****	**0.31****	**0.42****
		Primary education on achiev.	NS	NS	NS	NS	**0.10****	NS	NS
		Total indirect	NS	NS	NS	NS	NS	**0.03****	NS
Secondary education	**TS**	Secondary education on TS	NS	NS	NS	NS	**0.19****	NS	NS
		TS on achiev.	NS	NS	**0.47****	NS	NS	NS	NS
		Secondary education on achiev.	NS	NS	NS	NS	NS	**0.14***	NS
		Total indirect	NS	NS	NS	NS	NS	NS	NS
	CM	Secondary education on CM.	**−0.11***	NS	**0.13***	NS	NS	NS	NS
		CM on achiev.	**0.36****	NS	**0.40****	**0.35****	**0.27****	**0.31****	**0.42***
		Secondary education on achiev.	NS	NS	NS	NS	NS	**0.16***	NS

		Class level	Albania	Croatia	Kosovo	Montenegro	Serbia	Slovenia	North Macedonia
		Total indirect	NS	NS	NS	NS	NS	NS	NS
Professional development (PD)	**TS**	PD on TS	NS	**0.19***	NS	NS	NS	NS	NS
		PD on achiev.	NS	**−0.25****	**−0.18***	NS	NS	NS	NS
		TS. On achiev.	NS	NS	**0.46****	NS	NS	NS	NS
		Total indirect	NS	NS	NS	NS	NS	NS	NS
	CM	PD on CM	NS	NS	NS	**0.17****	NS	NS	**0.17***
		PD on achiev.	NS	**−0.24****	NS	NS	NS	NS	NS
		CM on achiev.	**0.31****	NS	**0.33****	**0.34****	**0.26****	**0.31****	**0.46****
		Total indirect	NS	NS	NS	**0.06***	NS	NS	NS
PD needs	**TS**	PD needs on TS	NS	NS	NS	NS	NS	NS	NS
		PD needs on achiev.	NS	NS	**0.22****	NS	NS	NS	NS
		TS on achiev., achi	NS	NS	**0.50****	NS	NS	NS	NS
		Total indirect	NS	NS	NS	NS	NS	NS	NS
	CM	PD needs on CM	NS	NS	NS	NS	NS	NS	**0.24****
		PD needs on achiev.	NS	NS	NS	NS	NS	NS	NS
		CM on achiev.	**0.28****	NS	**0.34****	**0.34****	**0.27****	**0.3****	**0.49****
		Total indirect	NS	NS	NS	NS	NS	NS	**0.12****

Notes: *NS* Not significant, *TS* Teacher support, *CM* Classroom management, *PD* Professional development, PD needs =Teachers' need for professional development in the future, achiev = reading achievement, achieve = achievement in reading. One star (*) indicates $p < .1$, and two stars (**) indicated $p < .05$. **Bold** letters indicate that the regressions coefficient is significant

Appendix B Measurement Invariance Tests

Teacher support	Difftest P-value	RMSEA	CFI	SRMR	delta_RMSEA	delta_CFI
Configural		0.06	0.973	0.029		
Metric	0	0.055	0.97	0.029	0.005	0.003
Scalar	0	0.052	0.968	0.031	0.003	0.002

Classroom management	Difftest P-value	RMSEA	CFI	SRMR	delta_RMSEA	delta_CFI
Configural		0.049	0.997	0.014		
Metric	0	0.047	0.994	0.016	0.002	0.003
Scalar	0	0.045	0.993	0.018	0.002	0.001

PD	Difftest P-value	RMSEA	CFI	SRMR	delta_RMSEA	delta_CFI
Configural		0.102	0.956	0.034		
Metric	0	0.105	0.923	0.072	−0.003	0.033
Scalar	0	0.15	0.783	0.113	−0.045	0.14

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Chapter 5
Personal and Contextual Well-Being Factors Relating to Students' Reading Achievement in the Dinaric Region

Kajsa Yang Hansen and Gordana Čaprić

5.1 Introduction

Reading literacy achievement is a general term to describe the levels of reading comprehension of the school population, which is a key subject measured in several large-scale assessments such as the IEA's Progress in International Reading Literacy Study (PIRLS). Reading literacy is the basis and prerequisite for cognitive progress during schooling and is an outstanding predictor of academic performance. Low reading achievement is likely to contribute to poor academic achievement in other subjects, which may substantially reduce one's chances of completing secondary and tertiary studies and consequently impact future labor market integration and quality of life. Thus, one of the indicators of the quality of education and training in European Union (EU) member states is the monitoring of underachievement of students in basic skills. Underachievement at age 15 focuses on students who perform below the minimum level in reading, mathematics, or science, all of which are necessary to function successfully in society. Failing to meet this fundamental proficiency level lowers a student's future chances both on a personal and professional level (European Commission, 2021). In addition, gender equity is perceived as a universal goal and, therefore, one of the primary aims of the sustainable development goals set by the United Nations (2018).

Except for Slovenia, the education systems in the Dinaric region had not participated in the PIRLS survey on reading literacy before 2021 (Mullis et al., 2017). The only available data regarding young students' reading performance for the pre-2021 period was from the Program for International Student Assessment (PISA),

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conducted by the Organization for Economic Co-operation and Development (OECD). In 2020, the OECD developed a comparative overview of the PISA achievements for the fifteen-year-old students of the Western Balkan education systems, namely Albania, Bosnia and Herzegovina, Kosovo,[1] North Macedonia, and Serbia. This analysis showed that the average score in reading, being 402 points, in the Western Balkans is generally lower than that of the education systems across Central and Eastern Europe (476 points) and the European Union (481 points). On average, less than half (46%) of students across Western Balkan education systems scored above baseline proficiency in reading (PISA Level 2 and above) compared with three-quarters (77%) of the education systems across OECD countries and partner economies and a similar proportion (76%) of the education systems across EU countries. Moreover, students from socioeconomically disadvantaged backgrounds tend to perform worse than those from advantaged backgrounds (OECD, 2020a).

In addition to the socioeconomic gap in achievement among children of varying family backgrounds, the COVID-19 pandemic has evoked our attention to the well-being of children and young people (European Commission, 2022). Studies have shown significant mean increases in loneliness for school children and young adolescents and that higher levels of loneliness were significantly associated with poorer well-being, including higher depression symptoms, anxiety symptoms, gaming addiction, and sleep problems (Farrell et al., 2023). The newly adopted European Council's recommendation on Pathways to School Success is a policy framework developed for promoting better education outcomes for all young Europeans, irrespective of their socioeconomic background and personal characteristics. A comprehensive approach was proposed, focusing on, among other things, school achievement and well-being (Council of the European Union, 2022). Although the concept of well-being itself has been defined and measured in various ways, its dimensions and the relationships between the components have, however, not been clearly described. A network analysis based on PISA 2018 demonstrated that cognitive, psychological, and social well-being variables form a solid welfare construct in the educational context, where students' resilience, fear of failure, and sense of belonging play central roles. Although the influence of school factors on student well-being is generally low, teaching enthusiasm and support promote positive school climates, which, in turn, reduce bullying (see, e.g., Govorova et al., 2020).

The aim of this chapter is, therefore, twofold. Our *first research objective* seeks to map out the level of students' reading achievement in all Dinaric education systems and examine how the achievement differs between students' gender and socioeconomic status. Our *second objective* is to identify important well-being factors that may predict reading achievement both at the individual level and in a school setting

[1] This designation is without prejudice to positions on status and is in line with UNSCR 1244/1999 (United Nations, 1999) and the International Court of Justice (ICJ) Opinion on the Kosovo declaration of independence (ICJ, 2010).

in each of the Dinaric education systems. It could be interesting to recognize the common and unique well-being factors across the Dinaric education systems to better understand the variation of reading achievement. The study used PIRLS 2021 data, and the analyses were carried out in IDB analyzer and Mplus (Muthèn & Muthèn, 1998-2017).

5.2 Background and Research Questions

Meaningful impacts of home background, resources at school and the school climate, teaching methods, and students' attitudes towards learning on students' academic performance have been widely recognized (Hattie, 2008; see also McCoach & Siegle, 2001; Mikk, 2005; Ruus et al., 2007; Čaprić et al., 2008; Petrova & Alexandrov, 2015; Marôco, 2021; Japelj Pavešić et al., 2022a, 2022b).

Applying a comprehensive predictive model to PIRLS 2016 data from 61 participating education systems, Hu and her colleagues (2022) identified contextual factors at the student, family, and school levels that collectively impact students' reading achievement and differentiate high- and low-performing students. These factors include students' gender, motivation in reading, and reading self-concept; family socioeconomic status and earlier literacy activities; school limiting factors such as absenteeism and cheating; and teacher-student interaction and relationship, which intertwine with each other and together to affect students' reading performance. The differential influences of affective and contextual factors on high vs. low proficiency readers were investigated in a Hong Kong study (Tse & Xiao, 2014). The study revealed that being a high proficiency reader was found to be associated with reading attitude, reading motivation, reading self-concept, peer bullying, school bullying, and school socioeconomic status (SES), whereas the likelihood of being a low proficiency reader was associated with reading self-concept and peer bullying only. Other studies showed that both family SES and self-concept were significantly associated with the children's academic performance, and such association was mediated via students' academic self-concept (Li et al., 2020; see also Nunes et al., 2022).

To identify malleable factors related to students' personal characteristics and contextual well-being that can promote students' learning and academic achievement in the Dinaric region is essential for educational quality, equity, and school practices. This has been observed as the latest trend in research, extending the focus of school effectiveness to also examine well-being factors in the academic context (e.g., OECD, 2019). However, such research focusing on the Dinaric education systems is currently lacking and needs to be investigated.

The concept of well-being can be operationalized and analyzed in multiple ways (Cefai et al., 2021). Pollard and Lee (2003) systematically reviewed the English literature on the term "child well-being" and noted that well-being is a commonly used but a variously defined term, including five mostly used domains: physical, psychological, cognitive, social, and economic. The physical dimension refers to

health and physical habits; the psychological to emotional and mental health (often operationalized by the "absence" of negative indicators); the cognitive to intellectual and school-related elements; the social to relationships with others, support, and interpersonal or communicative skills; and the economic to the economic resources of the family (Pollard & Lee, 2003).

The school well-being model developed by Konu and Rimpela (2002) specifies well-being as an entity in a school setting. Indicators of school well-being are divided into four categories: environmental conditions (having), social relationships (loving), personal self-fulfillment (being), and health aspects. Each school well-being category contains several aspects of students' lives in school. The model also considers the impact of a student's home and surrounding community (Konu & Rimpelä, 2002). The OECD has developed a similar well-being framework where well-being is considered a multifaceted construct that incorporates subjective and objective well-being. It contains four dimensions: cognitive, psychological, social, and physical (OECD, 2017).

Given the importance of child and school well-being in academic achievement and the variation in the definition and the operationalization of the construct, the current study proposed a hypothetical model to integrate the interrelated, multidimensional well-being concept with students' academic achievement. Using PIRLS 2021 data, the following three key research questions were investigated across the participating Dinaric education systems:

1. What is the reading achievement difference according to gender, students' motivational factors, and socioeconomic status?
2. Which well-being components are related to students' reading achievement after controlling for students' sociodemographic (e.g., gender and SES) and motivational factors?
3. Are there any differences in these relationships across the Dinaric education systems?

5.3 Data and Methods

5.3.1 Sample Size and Gender Distribution

This analysis presented in this chapter involves seven participants from the Dinaric region that participated in PIRLS 2021, namely Albania, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, and Slovenia.

The sample size and gender distribution in the education systems are highlighted in Table 5.1. Altogether, 29,272 students in 1096 schools are included in the analysis, among which 49% are girls and 51% are boys.

Table 5.1 Sample sizes for participating education systems in the Dinaric Region

Education system	Gender		Total	Number of schools
	Girl	Boy		
Albania	2049	2164	4213	177
Croatia	1935	2002	3937	153
Kosovo	2310	2247	4557	150
Montenegro	2172	2317	4489	139
North Macedonia	1478	1451	2929	148
Serbia	1952	2085	4037	169
Slovenia	2493	2617	5110	160
Total	14,389	14,883	29,272	1096

5.3.2 Variables

In this chapter, we consider three types of variables, namely independent, dependent, and mediators. Detailed information on these variables can be found in Table 5.2.

The independent variables include the sociodemographic variables of student gender and family socioeconomic status. In the statistical model, the independent variables are not affected by any other variables; rather, they affect the dependent variables and the mediators. The dependent variable is students' reading achievements. PIRLS 2021 is a comprehensive assessment of fourth-grade students' reading literacy achievement. To contextualize the variability of students' reading achievement within and across education systems, PIRLS sets four benchmarking points to describe what students are able to do at that particular benchmark. More specifically, students with a score of 625 or above, 550 or above, 475 or above, and 400 or above were regarded as reaching the advanced, high, intermediate, and low international benchmarks, respectively (Wry et al., 2023). All five plausible values of reading achievement were used in our analysis. The dependent variable is assumed to be influenced by both the sociodemographic variables (independent variables) and the mediators (well-being variables).

The mediators are a set of affective and contextual factors that can be classified in the four categories in the school well-being model framework. The mediators are affected by the independent variables while affecting the dependent variable. For the well-being category, *school environmental conditions*, measures of general school resources, resources for reading instruction, and school discipline and safety are included. For the category *social relationship*, sense of school belonging, bullying, and teachers' job satisfaction are included. The *means for self-fulfillment* category includes parents' expectations of a child's education, classroom conditions, and teachers' guidance and encouragement. Finally, *health status* is indicated by fatigue and hunger. In this study, we used the estimated continuous scales of these constructs, except for health status, where a sum score was used.

The detailed information on these variables is listed in Table 5.2. All well-being constructs were estimated as continuous scales by Rasch partial credit models (Yin & Reynolds, 2023), except for the physical well-being dimension, where a sum score is used. The reliability of the measures of each construct across the Dinaric education systems can be found in Appendix A.

Table 5.2 Constructs and indicators used in this study

Construct	Variable name () mark as mentioned in the codebooks	Indicators	Scale
Sociodemographic	Gender	Dummy variable of students' sex	Girls = 1; Boys = 0
Material well-being	Home Socioeconomic status–SES (ASBHSES)	*ASBHSES scale is based on parent-reported variables:* • Number of books in the home • Number of children's books in the home • Highest level of education of either parent • Highest level of occupation of either parent	Five categories Five categories Five categories Six categories
Material well-being School resources for learning	Instruction affected by reading resource shortages scale (ACBGRRS)	*Based on school-reported variables:* How much is your school's capacity to provide instruction affected by a shortage or inadequacy of the following? *General school resources:* ▪ Shortage of instructional material (e.g., textbooks) ▪ Shortage of supplies (e.g., papers, pencils, materials) ▪ Shortage of school buildings and grounds ▪ Shortage of heating/cooling and lighting systems ▪ Shortage of instructional space (e.g., classroom) ▪ Shortage of technologically competent staff ▪ Shortage of technology and media resources to support teaching ▪ Shortage of technology and media resources to support student learning and expression ▪ Shortage of resources for students with learning disabilities ▪ Shortage of internet connection *Reading resources:* ▪ Shortage of teachers with a specialization in reading	Four-point scale: 1 = Not at all 2 = A little 3 = Some 4 = A lot

(continued)

Table 5.2 (continued)

Construct	Variable name () mark as mentioned in the codebooks	Indicators	Scale
		▪ Shortage computer software/ applications for reading instruction ▪ Shortage of library resources (books, eBooks, magazines, etc.) ▪ Shortage of instructional materials for reading (e.g., reading series, textbooks)	
Environmental well-being	School discipline (ACBGDAS)	To what degree is each of the following a problem among fourth-grade students in your school? ▪ Arriving late at school ▪ Absenteeism (i.e., unjustified absences) ▪ Classroom disturbance ▪ Cheating ▪ Profanity ▪ Vandalism ▪ Theft ▪ Intimidation or verbal abuse among students (including texting, emailing, etc.) ▪ Physical fights among students ▪ Intimidation or verbal abuse of teachers or staff (including texting, emailing, etc.)	Four-point scale: 1 = Not a problem 2 = Minor problem 3 = Moderate problem 4 = Severe problem.
Environmental well-being	Disorderly behavior during reading lessons Classroom management (ASBGDRL)	How often do these things happen in your reading lessons? ▪ Students don't listen to what the teacher says. ▪ There is too much noise for students to work well. ▪ My teacher has to wait a long time for students to be quiet. ▪ Students interrupt the teacher. ▪ My teacher has to keep telling us to follow the classroom rules.	Four-point scale: 1 = Every or almost every lesson 2 = About half of the lessons 3 = Some lessons 4 = Never

(continued)

Table 5.2 (continued)

Construct	Variable name () mark as mentioned in the codebooks	Indicators	Scale
Social well-being	Sense of school belonging (ASBGSSB)	What do you think about your school? Tell how much you agree with these statements. ▪ I like being in school. ▪ I feel safe when I am at school. ▪ I feel like I belong at this school. ▪ Teachers at my school are fair to me. ▪ I am proud to go to this school. ▪ I have friends at this school.	Four-point scale: 1 = Agree a lot 2 = Agree a little 3 = Disagree a little 4 = Disagree a lot
Social well-being	Student bullying (ASBGSB)	During this school year, how often have other students from your school done any of the following things to you, including through texting or the internet? ▪ Made fun of me or called me names ▪ Left me out of their games or activities ▪ Spreading lies about me ▪ Stole something from me ▪ Damaged something of mine on purpose ▪ Hit or hurt me (e.g., shoving, hitting, kicking) ▪ Made me do things I didn't want to do ▪ Sent me nasty or hurtful messages online ▪ Shared nasty or hurtful information about me online ▪ Threatened me	Four-point scale: 1 = At least once a week 2 = Once or twice a month 3 = A few times a year 4 = Never
Cognitive well-being	Students engaged in reading lessons (ASBGERL)	Think about the reading you do for school. How much do you agree with these statements about your reading lessons. ▪ I like what I read about in school. ▪ My teacher gives me	Four-point scale: 1 = Agree a lot 2 = Agree a little 3 = Disagree a little

(continued)

Table 5.2 (continued)

Construct	Variable name () mark as mentioned in the codebooks	Indicators	Scale
		interesting things to read. ▪ I know what my teacher expects me to do. ▪ My teacher is easy to understand. ▪ I am interested in what my teacher says. ▪ My teacher encourages me to say what I think about what I have read. ▪ My teacher lets me show what I have learned. ▪ My teacher does a variety of things to help us learn. ▪ My teacher tells me how to do better when I make a mistake	4 = Disagree a lot
Cognitive well-being,	Students like reading (ASBGSLR)	What do you think about reading? How much do you agree with each of these statements. ▪ I like talking about what I read with other people. ▪ I would be happy if someone gave me a book as a present. ▪ I think reading is boring. ▪ I would like to have more time for reading. ▪ I enjoy reading. ▪ I learn a lot from reading. ▪ I like to read things that make me think. ▪ I like it when a book helps me imagine other worlds.	Four-point scale: 1 = Agree a lot 2 = Agree a little 3 = Disagree a little 4 = Disagree a lot
Cognitive well-being	Students' confidence in reading (ASBGSCR)	How well do you read? How much do you agree with each of these statements. ▪ I usually do well in reading. ▪ Reading is easy for me. ▪ I have trouble reading stories with difficult words. ▪ Reading is harder for me than for many of my classmates. ▪ Reading is harder for me	Four-point scale: 1 = Agree a lot 2 = Agree a little 3 = Disagree a little 4 = Disagree a lot

(continued)

Table 5.2 (continued)

Construct	Variable name () mark as mentioned in the codebooks	Indicators	Scale
		than any other subject. ▪ I am just not good at reading.	
Physical well-being	(ASBG07A + ASBG07B)	How often do you feel this way? ▪ I feel tired. ▪ I feel hungry.	Four-point scale: 1 = Everyday 2 = Almost everyday 3 = Sometimes 4 = Never

5.3.3 Analytical Methods and Process

To answer the first research question, (What is the reading achievement difference according to gender, students' motivational factors, and socioeconomic status?) Bivariate analyses of the gender gap in reading achievement and the correlations between reading achievement and different aspects of well-being factors were done using the IEA International Database Analyzer (IDB Analyzer).

Furthermore, we proposed a hypothetical model based on the literature review concerning the interrelationship of well-being constructs. As depicted in Fig. 5.1, all well-being factors exhibit direct associations with reading achievement at the individual level. Students' physical well-being (hunger and tiredness) and social well-being (sense of belonging and experiences of bullying) impact their reading achievement, both directly and indirectly through the mediating influences of environmental well-being (disorderly behavior) and cognitive well-being (reading self-confidence, liking reading, and engagement in reading). These relationships, in turn, are influenced by students' gender and the family's material well-being (SES). At the school level, the material and environmental well-being (school discipline) exert an influence on school-level reading achievement while accounting for the school SES composition. We applied this model uniformly across all Dinaric education systems. We applied a multilevel path model to examine the relationship between reading achievement and various well-being factors at the student and school levels (e.g., Hox et al., 2017). Multilevel modeling was done in M*plus* software (Muthèn & Muthèn, 1998-2017). The two-level model is estimated with a robust maximum likelihood estimator (MLR) to adjust for bias by missing data and/or non-normality in the data (see, Appendix B for M*plus* model input). It is important to note that this

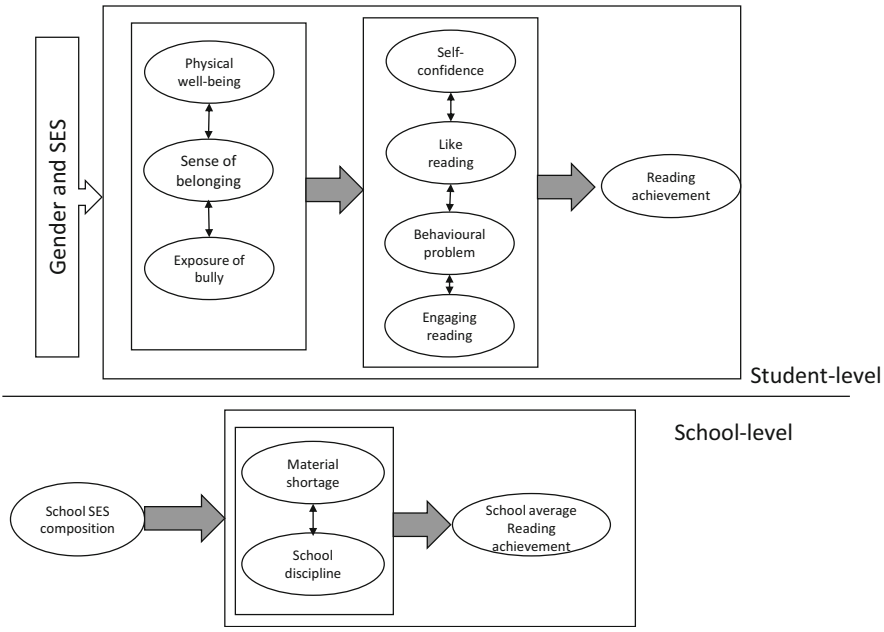

Fig. 5.1 Conceptual model of hypothesized relationships among well-being constructs and reading achievement

model represents a saturated model, indicating that all variables in the model are interconnected. Furthermore, it is a just-identified model that exhibits a perfect fit, and all five plausible values of reading achievement are used in modeling.

In the present analysis, we calculated estimates of intraclass correlation coefficients (ICC) for the constructs under consideration. The ICC provides a measure of the proportion of total variance in each construct that can be attributed to the fact that students belong to different schools. ICC is calculated as a ratio of the between-school variance of the construct of interest to its total variance, indicating the level of heterogeneity observed in the construct across schools; the higher the ICC of the construct is, the greater the disparity there is between different schools. As shown in Table 5.3, Apart from the relatively high ICCs for SES, most ICC values are relatively small, meaning that differences between schools are limited and that most of the differences observed are differences between students within schools.

However, when examining the design effects,[2] most of which were larger than two. It was essential to account for the cluster effect resulting from the PIRLS

[2]The design effect is calculated as the ratio of the variance of an estimate under a specific sampling plan to the variance of the same estimate from a simple random sample with the same number of observation units. When the design effect exceeds two, it indicates that a clustered sample needs to be twice as large as a simple random sample to obtain the same amount of information. A design effect of two is the threshold value that necessitates the use of multilevel modeling techniques to analyze the data.

sampling design.[3] Therefore, we opted for a two-level analysis correcting the standard error estimation of the model parameters to address the impact of clustering at the school level and ensuring accurate inferences (see Appendix C for the estimated design effects).

Table 5.3 Intraclass correlation coefficients of the constructs used in the study

Intraclass correlation coefficients	Education system						
	Albania	Croatia	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
Reading achievement	0.23	0.17	0.17	0.15	0.27	0.18	0.05
Socioeconomic status (SES)	0.40	0.23	0.24	0.27	0.36	0.32	0.05
Disorderly behavior	0.13	0.12	0.08	0.14	0.12	0.21	0.11
Sense of School belonging	0.06	0.09	0.03	0.05	0.07	0.13	0.05
Student bullying	0.08	0.04	0.05	0.08	0.07	0.07	0.04
Students engaged in reading	0.07	0.04	0.03	0.05	0.08	0.10	0.05
Students like reading	0.07	0.03	0.05	0.08	0.12	0.09	0.04
Students confident in reading	0.08	0.02	0.03	0.03	0.06	0.03	0.01
Physical well-being	0.07	0.05	0.04	0.06	0.06	0.06	0.04
Average school size	23.78	25.58	30.21	31.86	19.79	23.83	31.85

[3] In PIRLS 2021, students' observations are not independent since students are not randomly selected. Two-stage random sample design, with a sample of schools drawn as a first stage and one or more intact classes of students selected from each of the sampled schools as a second stage. This sampling design leads to the students from the same school being much more similar compared to those from other schools and violates the independent and identically distributed assumption.

5.4 Results

5.4.1 *The Reading Achievement Across the Dinaric Region*

The PIRLS 2021 international report (Mullis et al., 2023) exhibits varying levels of reading achievement for the Dinaric education systems (see Table 5.4). Croatia demonstrates the highest reading achievement level, with an average score of 557. Furthermore, 58% of Croatian students scored at or above 550 points. Slovenia follows, with an average score of 520. Within this group, 35% of students attained a high reading level, while 40% reached an intermediate achievement level. Serbia and Albania achieved the intermediate level, with average scores of 514 and 513, respectively. The distribution of students in these education systems across the intermediate and high levels of reading performance is relatively even, ranging between 36% and 40%. Montenegro attained an average achievement score of 487, slightly above the intermediate level. In contrast, Kosovo and North Macedonia's reading achievement fell below the low benchmark level, with an average score of 420 and 442, respectively. More than 70% of students in Kosovo scored below 475 points, and the percentage was 61% for North Macedonia.

Table 5.5 illustrates the distribution of Dinaric students across different PIRLS benchmark levels. A significant proportion of students achieving below 400 points can be attributed to Kosovo, accounting for nearly 40% of such students. At the same time, North Macedonia contributed almost a quarter of the students, Serbia almost one-fifth, and Albania also exhibits a relatively high percentage of low-achieving students (9.7%). On the contrary, Croatia displays the lowest percentage of students performing at this level (2.9%). Shifting to the most advanced reading level, Croatian students comprise 46.1% of all Dinaric students in this category, with Serbia also contributing a substantial proportion (24.1%), followed by Albania (16.6%). Kosovo only accounts for 0.6% of students in this advanced group. Albania, Serbia, and Slovenia have a relatively even distribution regarding the intermediate benchmarks.

Table 5.4 Mean reading achievement and percentage of students in different achievement categories in the Dinaric education systems

			Percentage (%) of students		
Education system	Mean	Standard error	< 475 Low	≥ 475 but <550 Intermediate	% ≥ 550 High
Albania	513	3.1	26	36	38
Croatia	557	2.5	11	31	58
Kosovo	421	3.1	72	23	05
Montenegro	487	1.6	43	37	20
North Macedonia	442	5.3	61	28	11
Serbia	514	2.8	23	40	37
Slovenia	520	1.9	25	40	35

Table 5.5 Distribution of students within each benchmark level of reading achievement relative to other Dinaric education systems

Education system	PIRLS benchmarks									
	Below 400		From 400 to Below 475		From 475 to Below 550		From 550 to Below 625		At or above 625	
	%	se %	%	se %	%	se %	%	se %	%	se %
Albania	9.7	1.1	15.8	0.9	16.2	0.5	15.5	0.8	16.6	1.5
Croatia	2.9	0.7	8.6	0.6	17.1	1.0	30.0	1.2	46.1	2.4
Kosovo	38.1	1.6	19.8	0.8	8.0	0.4	2.2	0.3	0.6	0.2
Montenegro	3.7	0.2	4.5	0.2	3.8	0.2	2.6	0.2	1.4	0.2
North Macedonia	23.0	1.7	13.7	0.7	7.6	0.5	3.5	0.4	1.9	0.5
Serbia	17.5	1.7	27.7	1.6	34.5	1.2	33.0	1.3	24.1	2.2
Slovenia	5.1	0.4	9.9	0.5	12.9	0.5	13.3	0.6	9.3	1.0

Note: *se* standard error

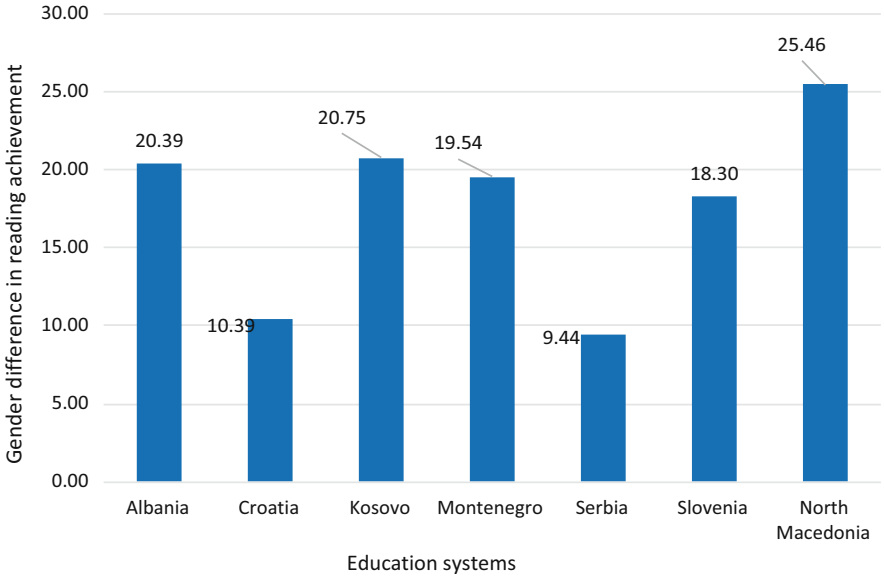

Fig. 5.2 Differences in reading achievement between boys and girls in the Dinaric region. Note: The reading achievement differences are in favor of girls and are significant at the $p < .05$ level

5.4.2 The Reading Achievement Differences Between Genders Across the Dinaric Region

Figure 5.2 shows the gender gap in reading achievement scores in the Dinaric region. The reading achievement differences between boys and girls, indicated by the values in Fig. 5.2, are significant at $p < .05$ level, with girls outperforming boys. The

highest difference is recorded in North Macedonia, where girls are more successful by 25 points on average. The differences range from 18 (Slovenia) to 21 (Kosovo). The slightest difference was recorded in Croatia (10) and in Serbia (9).

5.4.3 *The Reading Achievement and Different Dimensions of Well-being*

To explore the association between students' reading achievements and their well-being dimensions, zero-ordered bivariate correlations between plausible values of reading achievement and well-being factors were estimated and presented in Table 5.6.

Family socioeconomic status, reflecting the dimension of *material well-being,* is positively related to reading achievement in all Dinaric education systems, with the correlation coefficients ranging from 0.44 in Serbia to 0.34 in Kosovo and Montenegro. Croatia and North Macedonia also observed a high correlation (0.39).

Regarding the cognitive well-being dimensions, students' confidence in the reading factor displayed a positive correlation with reading achievement in all Dinaric education systems. The correlation coefficients varied from 0.45 in Slovenia to 0.30 in Albania. A weak correlation was also observed between reading achievement and students' engagement in reading lessons in all education systems except for Croatia. Among the Dinaric region, Montenegro demonstrated the highest coefficient (0.13). In terms of students liking reading, weak significant correlations with reading scores were observed in Albania, Kosovo, Montenegro, and Slovenia, ranging from 0.13 in Slovenia to 0.07 in Montenegro.

When examining the environmental and social well-being dimensions, the correlations observed were generally weak. Disorderly behavior during reading lessons significantly correlated with students' reading performance, ranging from 0.22 in North Macedonia and Montenegro to 0.08 in Albania and Croatia. Even lower correlations were observed between reading achievement and students' sense of school belonging. However, there appeared to be a substantial connection between student bullying and reading achievement, with coefficients ranging from 0.31 in North Macedonia to 0.09 in Albania.

Physical well-being is also positively correlated with reading achievement across all education systems. The highest correlation is recorded in Slovenia (0.24) and the lowest in Albania (0.12). A comparable correlation is observed in North Macedonia and Kosovo (0.20), and Serbia was close to it (0.18).

The bivariate analysis of the relationships between gender, SES, motivational factors, other well-being factors, and students' reading performance highlights the mutual importance of these factors. Notably, the magnitudes of the correlations varied significantly across the education systems and constructs. These findings suggest that the sociodemographic, motivational, and other well-being constructs may have direct and indirect associations with reading achievement. It provides

Table 5.6 Correlation coefficients between reading achievement and student's well-being factors

Well-being factors	Education system						
	Albania	Croatia	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
SES	0.36 (0.02)	0.39 (0.02)	0.34 (0.03)	0.34 (0.02)	0.39 (0.03)	0.44 (0.02)	0.36 (0.01)
Disorder	0.08 (0.03)	0.08 (0.02)	0.15 (0.02)	0.15 (0.02)	0.22 (0.04)	0.13 (0.03)	0.14 (0.02)
Belong	0.06 (0.02)	0.08 (0.03)	0.11 (0.03)	0.09 (0.02)	0.09 (0.03)	ns	0.11 (0.02)
Bully	0.09 (0.03)	0.18 (0.02)	0.27 (0.02)	0.26 (0.02)	0.31 (0.04)	0.13 (0.04)	0.18 (0.02)
Engagement	0.09 (0.03)	ns	0.10 (0.03)	0.13 (0.02)	0.12 (0.04)	0.06 (0.03)	0.06 (0.02)
Liker	0.08 (0.03)	ns	0.11 (0.02)	0.07 (0.02)	ns	ns	0.13 (0.02)
Sconf	0.30 (0.03)	0.38 (0.02)	0.32 (0.02)	0.36 (0.02)	0.32 (0.03)	0.38 (0.03)	0.45 (0.02)
PhsWB	0.12 (0.02)	0.15 (0.02)	0.20 (0.02)	0.17 (0.03)	0.20 (0.03)	0.18 (0.02)	0.24 (0.02)

Note: *ns* not statistically significant at $p < .05$ level. Standard errors appear in parentheses
SES family socio-economic status; *disorder* disorderly behavior during reading lessons; *belong* students' sense of school belonging; *bully* student bullying; *engage* students engaged in reading lessons; *liker* students like reading; *Sconf* students confident in reading; *PhsWB* physical well-being

evidence that the process of students' learning to read takes place within various integrated contexts such as, the family, classroom, and school, and is influenced by diverse mechanisms, including social, psychological, physical, and material factors. However, factors may interact, which is why a multivariate model to reflect the interrelation among the factors and contexts may be more suitable to predict students' reading achievement.

Table 5.7 Student- and school-level associations between well-being and reading achievement in Dinaric education systems

Standardized regression coefficients	Education system						
	Albania	Croatia	Kosovo	Montenegro	Serbia	Slovenia	North Macedonia
Within Level:							
Gender	.10	.05	.07	.08	.06	.07	.09
Socioeconomic status (SES)	.23	.25	.24	.26	.29	.25	.25
Physical well-being	.07	.09	.14	.08	.09	.12	.10
Sense of belong	ns	ns	ns	ns	ns	ns	ns
student bullying	ns	.11	.15	.15	.09	.08	.16
Engaging reading	ns	−.06	.04	.05	.07	−.05	.07
Behavior problems	.04	ns	ns	.04	.05	.05	.08
Like reading	ns	ns	ns	−.07	−.09	−.03	−.10
Reading self-confidence	.21	.34	.24	.29	.32	.39	.26
Explained within variance	15.6	25.6	25.5	26.4	28.0	32.4	29.8
Between Level:							
Shortage of material	ns	ns	ns	ns	ns	ns	.18
School discipline	ns	ns	ns	.29	.19	ns	ns
School SES	.62	.69	.48	.43	.65	.41	.49
Explained between variance	39.2	47.7	23.5	25.9	49.4	17.0	26.7

Notes: *ns* not statistically significant at $p < .05$ level

5.4.4 *Mechanism Among the Well-being Components Affecting Reading Achievement*

The results from the two-level analysis are presented in Table 5.7, highlighting a substantial diversity in the relationship between the well-being factors and students' reading achievement across different Dinaric education systems. However, common patterns are also observed.

5.4.4.1 Common Patterns in the Direct Effects

All Dinaric education systems showed a significant relationship between students' reading achievement and gender, SES, students' reading self-confidence, and physical well-being at the individual level. A positive gender difference favoring girls was observed across all education systems. These differences were relatively consistent, ranging from 0.10 in Albania to 0.05 in Croatia. The relationship between reading achievement and socioeconomic status (i.e., family material well-being) was approximately 0.25 across all education systems, with Serbia exhibiting the highest value (0.29) and Albania the lowest (0.23). Reading self-confidence displayed a positive relationship with reading achievement, with Slovenia having the highest estimate (0.39) and Albania having the lowest (0.21). Physical well-being, as the higher value indicates less hunger and tiredness, is also positively associated with reading achievement, ranging from 0.14 in Kosovo to 0.07 in Albania. However, students' sense of belonging did not demonstrate a significant relationship with their reading achievement after considering other well-being factors and accounting for gender differences.

At the school level, school SES composition explained a substantial amount of between-school reading achievement differences, ranging from 49.4% in Serbia to 17% in Slovenia.

5.4.4.2 Diverse Patterns in the Direct Effects

At the individual level, student bullying (higher value indicating less bullying) is significantly related to reading achievement in all Dinaric education systems except for Albania. The relationship ranged from 0.16 in North Macedonia and Montenegro to 0.08 in Slovenia. Students' engaging in reading lessons also observed a significant relationship with reading achievement. However, the relationship was negative in Croatia (−0.06) and Slovenia (−0.05) and positive in Kosovo, Montenegro, Serbia, and North Macedonia, being 0.04, 0.05, 0.09, and 0.07, respectively. Four education systems observed a significant relationship between students liking reading and reading achievement: Montenegro, Serbia, Slovenia, and North Macedonia. Interestingly, the relation was negative.

At the school level, school discipline (i.e., environmental well-being) is positively related to school reading achievement in only two education systems, Montenegro (0.29) and Serbia (0.19). Since school discipline was measured with higher values representing fewer disciplinary problems, the positive relationship indicated better school discipline with higher reading achievement. School material shortage affected instruction in all education systems except for North Macedonia, where it exerted no impact on reading achievement.

In summary, a significant amount of the variation in students' reading achievement can be accounted for by well-being factors, and the explained variance varied across Dinaric education systems. The interrelated individual-level well-being factors explain between 15.6% and 32.4% of students' reading achievement differences. Furthermore, a substantial proportion of the variation in reading achievement between schools is attributed to school well-being factors, particularly the socioeconomic composition of the schools, with the amount ranging from 49.4% in Serbia to 17% in Slovenia.

5.4.4.3 Indirect Effects on Reading Achievement

The results of the two-level model did not indicate any statistically significant indirect effect at the school level. While the total indirect effect at the individual level was found to be significant for all Dinaric education systems, the strength of each individual indirect effect was very often not significant or small, as shown in Table 5.8.

A notable indirect effect was found between SES and reading achievement, mediated by students' reading self-concept. This indirect effect was the major contribution to the significant total indirect effect, particularly in Albania.

Significant mediation effects were found in all such factors, for example, in Slovenia. Additionally, students' bullying and disorderly behavior appeared to be two important mediators. Students' bullying behavior significantly mediated SES impact on reading achievement in all education systems except Albania and Montenegro.

None of the Dinaric education systems demonstrated a significant indirect effect of SES on reading achievement through students who like reading. However, in a few instances, SES influenced reading achievement through students who like reading and an additional well-being factor. For example, in Montenegro, the SES effect on reading achievement was observed to be mediated through students who like of reading and their sense of belonging.

Table 5.8 Significant indirect effects between reading and achievement and well-being factors in the Dinaric education systems

Indirect effect of SES on reading achievement	Education system													
	Albania		Croatia		Kosovo		Montenegro		North Macedonia		Serbia		Slovenia	
	Est.	Z	Est.	Z	Est.	Z	Est.	Z	Est.	Z	Est.	Z	Est.	Z
Physical well-being	ns	ns			0.006	2.04	ns	ns			0.004	2.20	0.013	4.34
Bully	ns	ns	0.007	3.22	0.012	3.59	ns	ns	0.013	2.59	0.004	2.01	0.006	3.44
Engaged in reading	ns	ns	0.003	2.08	ns	ns	ns	ns	ns	ns	ns	ns	0.002	2.18
Disorderly Behavior	ns	ns	ns	ns	ns	ns	ns	ns	0.005	1.97	ns	ns	0.003	2.74
Self-confidence in Reading	0.040	6.82	0.055	9.09	0.035	8.11	0.043	7.88	0.037	5.97	0.061	10.21	0.074	11.50
Engaged in reading and sense of belong	ns	ns	ns	ns	ns	ns	0.001	−2.16	ns	ns	ns	ns	ns	ns
Like reading and sense of belong	ns	ns	ns	ns	ns	ns	0.001	2.40	ns	ns	ns	ns	ns	ns
Like reading and Bully	ns	ns	ns	ns	ns	ns	ns	ns	0.001	−2.14	ns	ns	ns	ns
Confidence in reading and physical wellbeing	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.003	3.00	0.005	4.88
Confidence in reading and sense of belong	ns	ns	ns	ns	ns	ns	0.002	−2.80	ns	ns	ns	ns	ns	ns
Confidence in reading and Bully	ns	ns	0.002	2.80	0.003	3.79	ns	ns	0.003	2.69	0.001	1.97	ns	ns
Confidence in reading and disor-deredly behavior and SES	ns	ns	ns	ns	ns	ns	ns	ns	0.002	2.00	ns	ns	0.001	2.71
Total indirect effect	0.039	5.43	0.069	9.53	0.059	7.27	0.050	6.49	0.060	4.96	0.072	9.63	0.103	12.84
Total	0.271	12.12	0.323	16.97	0.300	15.33	0.310	17.88	0.311	11.46	0.358	17.06	0.356	24.65

Notes: All estimates are significant at $p < .05$ level. *Est.* parameter estimate; *Z* z-value; *SES* family socio-economic status; *Disorder* Disorderly Behavior during reading lessons; *Belong* students' sense of school belonging; *Bully* student bullying; *Engage* students engaged in reading lessons; *Liker* students like reading; *Sconf* students confident in reading; *PHSWB* physical well-being; *ns* = not significant

5.5 Discussion

The PIRLS 2021 international results show that 38 out of 57 countries assessed fourth-grade students with scores above the scale center point of 500. Dinaric education systems showed, however, different success in the PIRLS 2021 survey. For the seven Dinaric education systems, only Croatia belongs to the higher achievement group, with students scoring an average of over 550 points. For students in Slovenia, Serbia, and Albania, scores ranged from 520 to 514, while the students in Montenegro, North Macedonia, and Kosovo had results below the scale center point of 500. These results raise concerns, as numerous studies highlight the importance of literacy for other subject learning, future careers, and life success (García-Madruga et al., 2014; Lerkkanen et al., 2005). This was also found to be true in the Dinaric region (Džumhur et al., 2022). These results align with findings from the TIMSS 2019 studies in the Dinaric region, which confirmed that early literacy competence is significantly correlated with achievements in all participating education systems. Therefore, if low achievers in the Dinaric education systems do not get the opportunity to reach minimum literacy competencies, it may impact their future education and life opportunities.

All seven Dinaric education systems showed a significant gender gap, with girls outperforming boys. Some researchers indicate that girls had better reading comprehension (Lietz, 2006), read more frequently, and had a more positive attitude toward reading and school (Logan & Johnston, 2009). Also, girls may have certain advantages when it comes to the form of items that assess literacy skills, and they also tend to be more intrinsically motivated to read (Schwabe et al., 2015). Recent research confirms that gender differences are secondary to other sources of heterogeneity, and it should be examined if self-selection of activities in early childhood education may contribute to early literacy differences (McTigue et al., 2021). It is also noteworthy that in many academic settings, girls tend to outperform boys at higher levels of education; however, the extent of underachievement can differ across societies and within them (Ullah & Ullah, 2019). The gender gap in the Dinaric education systems may also be a result of cultural attitudes towards education, where boys might be less likely to prioritize academic pursuits compared to girls. Efforts to close the gender gap in education require effective strategies that empower teachers to motivate boys and improve their academic performance. This can be accomplished through a variety of interventions, such as promoting the value of metacognitive strategies, providing mandatory training for teachers, integrating regular reading assignments into student materials, offering educational programs on effective reading techniques, and creating opportunities for students to apply their knowledge in real-world contexts (Milanović et al., 2011).

Furthermore, we analyzed the relationship between students' achievements and well-being constructs within four dimensions: material well-being, cognitive well-being, environmental and social well-being, and physical well-being. We also investigated how the factors of well-being interact with each other and also with gender.

The highest relationship was obtained regarding *material well-being*. Across all education systems in the Dinaric region, a moderately positive correlation was found between family socioeconomic status and reading achievement. Across all education systems, a moderately positive correlation was found between family socioeconomic status and reading achievement, with correlation coefficients ranging from 0.44 in Serbia to 0.34 in Kosovo and Montenegro.

Various educational studies consistently associate family socioeconomic status (SES) with students' academic performance (Chmielewski, 2019; Korous et al., 2022; Sandsør et al., 2023). Research suggests that this factor plays a significant role in students' education and interacts with cognitive, social, psychological, and physical well-being factors in this study. A 25-year longitudinal study by Rothman (2003) on Australian students' language and numeracy skills showed that the relationship between SES and academic success varies by grade and generation. Generally, students from lower SES backgrounds tend to perform less well and are less likely to enroll in higher education. The findings suggest that students with lower SES can succeed if they receive appropriate support from their schools and local communities. These successful students typically come from schools that pay attention to their potential and interests. Given this information, it may be worthwhile to examine the relationship between SES and student success further in the Dinaric region using new analyses. This could inform interventions, policy changes, or system reforms in education. However, it is important to avoid relying solely on social determinism when designing these interventions. Instead, research has shown that the quality of teachers and teaching, supported by strategic teacher professional development, is the most crucial factor in student success (e.g., Hattie, 2008; Rowe, 2003).

Regarding the cognitive well-being factors, the construct of students' confidence in reading displayed a positive correlation with reading achievement in all education systems. Students tend to have distinct views of their reading ability, and their self-appraisal is often based on their past experiences and how they see themselves compared to their peers. Students who are confident in their ability persevere in completing a school task because they believe they can be successful (Mullis et al., 2019). A connection could be expected between self-confidence and academic achievement. Across all the education systems that participated in TIMSS 2015, confidence in mathematics was found to be a moderately strong correlate (Japelj Pavišić et al., 2022aa, 2022bb). Another study of the relationship between achievement motivation, self-concept, and achievement in English and mathematics at the secondary level revealed that motivation and self-concept are significantly related to academic achievement, as well as significant gender differences discovered in favor of girls. (Awan et al., 2011). These findings suggest a consistent relationship between self-concept and achievement in the Dinaric region, pointing to areas for further research, and the potential usefulness of interventions targeting self-concept may effectively improve low achievers' academic achievement.

Furthermore, a weak correlation was observed between reading achievement and students' engagement in reading lessons in all education systems except for Croatia. In addition, a weak negative correlation with regard to the construct, students liking

reading, was observed in four education systems—Montenegro, North Macedonia, Serbia, and Slovenia—although PIRLS 2016-related research indicates that positive attitudes toward reading and high achievement are related and bidirectional. Because better readers enjoy reading more than poorer readers, they may read more often than poorer readers and develop more advanced comprehension skills and strategies (Mullis et al., 2017). PIRLS 2021 confirmed a modest relationship between liking reading and reading achievement. Students who internationally responded that they "do not like reading" had lower average reading achievement (491) than students who "very much like reading" (513) and students who "somewhat like reading" (501) (Mullis et al., 2023). Other studies also found that pleasure reading positively correlates with writing achievement and reading comprehension (Attiyat, 2019), and students who read for pleasure averaged higher scores than their non-reading counterparts in the subject areas measured (Whitten et al., 2019).

The current study observed that low-achieving students from Dinaric education systems reported that they love to read. There appears to be a tendency where a growing number of students who express a very positive attitude towards reading are associated with low levels of achievement and vice versa. The same tendency was observed, for example, in TIMSS 2019 of the Dinaric education systems (except for Albania, Japelj Pavešić et al., 2022a, 2022b). The phenomenon is known as the attitude-achievement paradox. Various explanations have been proposed to understand this paradox. In some of the highest-achieving education systems, this has been related to cultural differences reflected in students' responses to the questions. For instance, modesty bias or negativity toward the high expectations and academic pressures may be prevalent in high-achieving Asian education systems (Min et al., 2016). To better understand the underlying reasons for such attitudes in the Dinaric region, it is essential to investigate how fourth-grade students interpret the questions about whether they like reading and how they associate these questions with regular school homework referring to reading tasks.

The correlations observed were generally weak across all education systems when examining the environmental and social well-being dimensions. Disorderly behavior during reading lessons showed a significant relationship with students' reading performance. Considerable research has shown that discipline and time management in the classroom predict reading performance (Arik, 2022). This misbehavior negatively affects changes in grades and achievement test scores (Myers et al., 1987). Even lower correlations were observed between reading achievement and students' sense of school belonging. School belonging as a well-being construct refers to an affective experience by students that involves a sense of connectedness or affiliation towards the school (Allen et al., 2021). PISA 2018 provided evidence that students with a higher sense of belonging to their school had better literacy scores, reported higher levels of peer cooperation, and were more likely to expect to complete a university degree (OECD, 2020a). Other studies also confirm a significant relationship between the students' school belonging and academic achievement (Demiroz, 2020; Korpershoek et al., 2020), while some other studies challenged the links between a sense of school belonging and academic achievement (Liu & Lu, 2011).

In the case of the Dinaric region, students' sense of belonging did not demonstrate a significant relationship with their reading achievement after considering other well-being factors and accounting for gender differences. Regarding the obtained result, it should be kept in mind that the reliability of the construct, students' sense of school belonging, is low for all education systems except for Croatia and Slovenia. The operationalization and measurement properties of the construct need to be further investigated.

However, there appeared to be a substantial connection between student bullying and reading achievement. In the PIRLS 2021 frameworks, bullying is defined as repeated aggressive behavior that is intended to intimidate or harm the victim and takes a variety of forms, both mental and physical. In a meta-analysis of 66 systematic reviews (Zych et al., 2015), bullying causes distress to victims, leads to low self-esteem, general and social anxiety, and different psychological and other health issues, including lower academic achievement. Previous PIRLS reports have shown that bullied students tend to have lower reading achievement (Mullis et al., 2019). Results showed that across the Dinaric region, student bullying is significantly related to reading achievement. Also, students' bullying behavior and disorderly conduct appear to be two important mediators of SES. Students' bullying behavior significantly mediated SES impact on reading achievement in all education systems except Albania and Montenegro. Students' bullying behavior is an issue that should be addressed systematically, targeting both student groups—perpetrators and victims. In a systematic review of 40 studies on empathic competencies related to bullying, Van Noorden et al. (2016) found that bullying is associated with affective and cognitive empathy. These results highlight that interventions to improve student well-being in the Dinaric region should include universal interventions such as curriculum activities for the development of cognitive and affective components of empathy targeting perpetrators and victims, respectively.

The physical well-being dimension covering the lack of hunger and tiredness showed a (positive) association with reading achievement across all education systems. Volume 13 of *IEA Research for Education*, Dinaric Perspectives on TIMSS 2019 (Japelj Pavešić et al., 2022a, 2022b) also observed the association between tiredness and achievement. The results showed that a large proportion of students felt tired on arrival at school, and the reports of feeling tired tended to be more prevalent among students belonging to the low achievement group. As feeling tired affects a student's ability to listen attentively or work on specific tasks, the student's physical well-being affects their potential achievement (Vrapi et al., 2022). This well-being factor begets additional research involving relevant public services beyond schools.

At the school level, school SES composition explained a substantial amount of between-school reading achievement differences. Also, school discipline (i.e., environmental well-being) positively relates to school reading achievement in only two Dinaric education systems, indicating the positive relationship linking better school discipline with higher reading achievement. A multilevel analysis of PISA 2009 data also showed a significantly positive relationship between climate and student reading performance. School resources are a frequent topic discussed in the Dinaric

education systems. On average, principals from the Western Balkans are slightly more likely to report in PISA studies that indicate inadequate material resources hinder instruction at their schools (OECD, 2020b). Meta-analysis of the 60 primary research studies aggregated data by Greenwald et al. (1996) showed that a broad range of resources was positively related to student outcomes, with effect sizes large enough to suggest that moderate increases in spending may be associated with a significant increase in achievement. Internationally, PIRLS 2021 also obtained a positive association between the availability of resources and fourth-grade students' reading achievement (Mullis et al., 2023). On the other hand, this was not confirmed in Dinaric education systems since school material shortages affecting instruction did not impact reading achievement.

However, the current study is not without its limitations. While the term "effect" was used to present the estimates in the two-level structural equation models, it is important to note that the analyses were based on cross-sectional data. Consequently, causal inference is limited. Nevertheless, the findings of this study can be viewed in the context of extensive previous research, adding further evidence to the impact of different well-being dimensions on students' learning outcomes. All well-being constructs used in the analysis were Rasch partial credit model estimates as continuous scales, which are comparable over countries (Yin & Reynolds, 2023). However, the measurement invariance (MI) of the measurement property of these well-being constructs has not been tested across the Dinaric education systems. In the future studies, an MI test for each of the well-being constructs should be done prior to testing the structural relationships across the Dinaric education systems. Moreover, the current study adapted the student and school well-being model framework, where students' motivation, self-concept, and attitude in reading are seen as the intellectual/cognitive dimension of well-being that affect students' overall experience and success in school (e.g., Hossain et al., 2023; Konu et al., 2002). It should be noted that these constructs in other theoretical frameworks, such as the Expectancy Value Theory (e.g., Eccles & Wigfield, 2002), are classified as motivational traits of individuals. However, we see no conflicts in the definition or their functions, only the theoretical point of departure. Although the frameworks differ in their theoretical origins, they converge on the idea that motivation, self-concept, and attitude are critical determinants of students' academic engagement and performance.

5.6 Conclusion and Recommendations

Reading literacy is an essential factor required for the development of a civic society and is one of the most significant indicators of a society's economic and social welfare.

Our research reveals a high percentage of low-achieving students in reading literacy in Dinaric education systems. We have also discovered that student-related factors, such as gender, SES, physical well-being, and students' reading self-

concept, have a stronger association with reading literacy than the school-level factors. The study also reveals that each component of well-being is directly or indirectly linked to students' achievements in almost all Dinaric education systems. Our analysis shows that most of the influence of SES on reading achievement is mediated through at least one of the well-being factors. Additionally, bullying and disorderly behavior in the classroom are two crucial mediators.

According to the OECD's findings that show improvements in students' performance in reading, mathematics, and science are associated with potential positive effects on a country's economic growth (OECD, 2010; OECD, 2022), we suggest implementing measures that focus on enhancing students' reading abilities, drawing on practices that have been shown to be effective (Kennedy, 2013; Klemenčič et al., 2014; Marôco, 2021; Govorova et al., 2023). To start, we suggest involving education experts in devising a comprehensive plan that fosters literacy and ensures equal access for all learners. Raise awareness about the crucial role of reading in personal development, academic achievement, and social progress. In addition, enhancing the curriculum framework to better support the growth of reading literacy among learners is important. The new approach to literacy should be adaptable and tailored to meet the diverse learning needs of each individual. For effective implementation, educators should possess relevant subject expertise and competencies, and new evaluation tools for each distinct literacy skill should be utilized. Therefore, training educators to achieve these desired outcomes is necessary.

Moreover, we propose creating a comprehensive partnership comprising education stakeholders, teachers, students, and other parties to collaborate on students' literacy competencies. It is critical to establish a plan for attracting and selecting high-quality teachers and leaders, improving teaching practices to improve reading proficiency, and promoting parental involvement to enhance student reading achievements and family participation in reading activities. Programs that boost student self-confidence in reading, encourage reading for both entertainment and educational purposes, and work with students to prevent bullying and disruptive behavior should also be launched.

Finally, it is essential to allocate significant financial resources to support students from disadvantaged families. This includes providing meals at school and ensuring their participation in early education during the preschool years. Also, ensuring all measures taken are coordinated and systematic and that interventions are closely monitored to assess progress and guide a transformational agenda over a period of four to five years is crucial.

Recognizing the multitude of factors associated with reading achievement is paramount. Policymakers can employ advanced research models to better comprehend the complex interplay between these factors and how they affect students' literacy skills. This understanding can then inform the development of effective educational policies. However, identifying the most impactful factors and comprehending their interrelationships can present challenges. Therefore, it is crucial for each education system to take into account their unique educational and cultural backgrounds when analyzing large-scale international data in order to offer

insightful recommendations and valid empirical support for both practitioners and policymakers.

Appendix A Reliability of the Instrument Measuring Each Construct in the Study Across the Dinaric Education Systems

All the Cronbach's alpha were from Yin and Reynolds (2023). As shown in Table 5.9, in general, Cronbach's alpha is at or above 0.75, the criteria of being a reliable measurement of the construct, for example, in Croatia, Serbia, and Slovenia. The reliability of construct *ASBGSSB (student sense of school belonging)* is low for all education systems except for Croatia and Slovenia. And Albania has the most unreliable measurement of the constructs used in the analyses. This should be kept in mind when interpreting the results.

Table 5.9 Reliability of the instrument measuring each construct in the study across the Dinaric education systems

Variables	Education system						
	Albania	Croatia	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
Home socio-economic status	0.82	0.78	0.77	0.78	0.83	0.82	*0.73*
Resource shortages scale	0.94	0.91	0.90	0.86	0.84	0.86	0.79
School discipline	0.97	0.89	0.95	0.94	0.91	0.88	0.90
Classroom management	*0.72*	0.86	0.79	0.81	0.79	0.81	0.84
Sense of school belonging	*0.69*	0.82	*0.67*	*0.70*	*0.66*	*0.74*	0.83
Student bullying	0.85	0.88	0.90	0.87	0.92	0.86	0.89
Students engaged in reading lessons	*0.71*	0.85	0.77	0.81	0.83	0.79	0.85
Students like reading	*0.73*	0.89	*0.72*	0.83	0.81	0.87	0.88
Students' confidence in reading	0.77	0.81	*0.73*	*0.74*	0.77	0.75	0.82

Note: Italic values indicate a caution for unreliable measure of the construct

Appendix B M*plus* Model Input for the Two-Level Path Analysis of the Dinaric Education Systems

```
TITLE: IEA Dinaric seven groups two-level path model

DATA:
  TYPE IS IMPUTATION; ! all plausible values are used
  FILE = mplus_7Dinaric.csv;
VARIABLE:
  NAMES ARE  IDCNTRY IDSCHL IDSTD SEX SES
  PHSWB BELONG BULLY ENGAGE DISOR DER LIKER
  SCONF SHRTRES DISCIP SCHLSES HOUWGT TOTWGT
  SENWGT READ;

USEVARIABLES ARE SEX SES PHSWB BELONG
 BULLY ENGAGE DISORDER LIKER SCONF
 SHRTRES DISCIP READ SESB;

GROUPING IS IDCNTRY(8 =ALB 191 = CRO 411 = KOS
499 = MONT 688 = SERB 705=SLOV 807 = NMac);

WITHIN IS SEX SES PHSWB BELONG BULLY
 ENGAGE DISORDER LIKER SCONF;
BETWEEN IS SHRTRES DISCIP SESB;

MISSING ARE ALL (-99);

CLUSTER IS IDSCHL;

DEFINE:
SESB = CLUSTER_MEAN(SES);

ANALYSIS:
 TYPE IS TWOLEVEL ;
 ESTIMATOR=MLR;

 MODEL:

%WITHIN% !all direct effects at the student level
 READ ON SEX SES PHSWB BELONG BULLY ENGAGE
     DISORDER LIKER SCONF;
```

```
   ENGAGE LIKER SCONF ON SEX SES BELONG
       BULLY DISORDER PHSWB;
  DISORDER PHSWB BELONG BULLY ON SEX SES ;

DISORDER PHSWB BELONG BULLY WITH
  DISORDER PHSWB BELONG BULLY;
  ENGAGE LIKER SCONF WITH ENGAGE LIKER SCONF;

 %BETWEEN% !all direct effects at school level
  READ ON SHRTRES DISCIP SESB;
  DISCIP SHRTRES ON SESB;
  DISCIP WITH SHRTRES;

OUTPUT:
  STDYX MODINDICES (ALL);

MODEL INDIRECT: ! estimate indrect effects
 READ IND SES;
READ IND DISORDER PHSWB BELONG BULLY;READ IND SESB;
```

Appendix C Design Effects of the Variables in This Study

Design effect	Education system						
	Albania	Croatia	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
Reading achievement	6.15	5.23	6.05	5.47	6.09	5.00	2.48
Socioeconomic status (SES)	10.20	6.73	8.07	9.30	7.75	8.37	2.54
Disorderly behavior	3.94	3.88	3.31	5.26	3.25	5.68	4.46
Sense of school belonging	2.32	3.16	1.76	2.42	2.26	3.97	2.67
Student bullying	2.91	2.08	2.34	3.41	2.32	2.58	2.08
Students engaged in reading	2.69	2.08	1.73	2.67	2.50	3.17	2.57
Students like reading	2.59	1.79	2.46	3.47	3.25	3.10	2.23
Students confident in reading	2.75	1.54	1.96	1.99	2.18	1.73	1.22
Physical well-being	2.57	2.16	2.05	2.82	2.03	2.28	2.26

Note: Design effect = 1 + (average cluster size - 1) *intraclass correlation

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Chapter 6
Impact of Home Environmental Support on Reading Achievement

Christian Christrup Kjeldsen and Ines (Elezović) Perović

6.1 Introduction

The significance of students' home situations and resources influencing students' reading achievements and attitudes has consistently been highlighted across IEA's Progress in International Reading Literacy Study (PIRLS) reading assessments. The 2021 inclusion of Dinaric region education systems[1] presents an unprecedented opportunity to examine the impact of these factors across the region, extending insights from the Dinaric Trends in International Mathematics and Science Study (TIMSS) 2019 analysis, which underscored the positive relationship between home resources and mathematical achievements. This chapter focuses on regional analysis of critical home background factors affecting student achievement. It aligns with earlier findings from TIMSS regarding the Dinaric education systems, suggesting that home resources and parental engagement significantly influence students' attitudes and confidence across subjects, potentially delineating high and low performers (Vrapi et al., 2022, pp. 191–92).

[1] The seven education systems in the Dinaric Region had different modes and timings of PIRLS 2021 administration. Croatia and Slovenia administered the study in digital format, i.e., on computers and tablets, while others administered it on paper. Also, Croatia implemented the study in the autumn of 2021, assessing the fourth-grade cohort at the beginning of the fifth grade, while other education systems were on the original schedule in the spring of 2021. For more details on PIRLS administration, see Chap. 1.

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In international cross-sectional analyses, researchers typically describe the relationships between context and attainment as mean differences of the dependent outcome within a linear regression framework, which relies on assumptions of homoscedasticity for the (multiple) independent variables. An example of this approach is the use of figures that represent the variance explained, denoted as R^2 in OLS regression, in order to provide information on the association between outcome and context. To put it simply, heteroscedasticity occurs when the error terms vary across independent variables, thereby violating the assumption of homoscedasticity. Addressing this issue is often considered crucial for obtaining optimal estimates of regression coefficients, as noted by Downs and Rocke (1979, p. 816). But in our view, there is more at play than biased estimates. Looking only at the average differences may overlook important information about how covariates relate to performance along the proficiency distribution (Costanzo & Desimoni, 2017). Information that may be of great policy relevance.

This chapter takes a different approach and uses quantile regressions to explore how categories of selected background variables relate to student achievement, as proposed by Koenker and Bassett Jr. (1978) and further developed by Koenker et al. (2017). The strength in relation to ordinary regression is that quantile regression is robust to heteroscedasticity. The chapter will delve deep into the associations between students' background factors, such as socioeconomic status, parental early literacy activities, and parental attitudes toward reading, all in relation to students' reading achievement along the ability scale. Additionally, it will compare the variations in these findings across the region.

There are good reasons for going beyond focusing on correlations between reading scores and background characteristics alone; as Reimer et al. (2018) argue, this association may differ for students who perform poorly, averagely, or well in the assessment. In another study conducted by D'Agostino et al. (2022), they argue that in the analysis of international large-scale assessments (ILSAs) of learning outcomes and test anxiety, "on assessing the effect of anxiety on math performance using standard regression approaches or simple hypothesis testing, with the findings valid mainly around the center of the distribution of math scores. As a consequence, these findings do not allow us to distinguish the different degrees of association that test anxiety may have among high-performing and low-performing students." (D'Agostino et al., 2022, p. 2). The method of quantile regression was furthermore applied in a paper by Perry et al. (2022) in their analysis, trying to give an answer to the question, "Does school SES matter less for high-performing students than for their lower-performing peers?" with the case of Australia's OECD's Programme for International Student Assessment (PISA) 2018 data. In this study, they mainly focused on the 20th, 40th, 60th, and 80th percentiles (quintiles). To our knowledge, the approach of using quantile regression has so far not been applied to the association between reading ability, parents' attitudes towards reading, their literacy activities before schooling, and students' backgrounds. This chapter seeks to fill this gap for the Dinaric region.

The findings from such analyses unveil that the impact of contextual factors is not consistent across high or low achievers in all school systems; instead, it varies

significantly. This variation highlights specific areas that require targeted interventions or further exploration in some countries. It's important to note that when assessing the relationship between reading achievement and the home environment, it should not be viewed in isolation. Insights from PIRLS studies have shown that numerous factors within the school, classroom, and students' personal characteristics collectively contribute to individual outcomes.

This approach facilitates a nuanced understanding of how home resources for learning influence the reading achievements of high versus low achievers, guiding the investigation of specific research questions related to these relationships.

1. *To what extent is home socioeconomic status related to student reading achievement across Dinaric education systems and the ability distribution?*
2. *How are parental reading for enjoyment and early literacy activities at home before primary education related to student achievement across Dinaric education systems and the ability distribution?*

6.2 Home Environmental Support for Reading Acquisition

The PIRLS 2021 context questionnaires introduced scales for assessing reading-related constructs within the *home environmental support* framework, covering home socioeconomic status, pre-primary literacy activities', and parental attitudes towards reading', utilizing the Rasch partial credit model for item scaling. Utilizing this form of scaling, student responses were placed with a "centerpoint" of 10, representing the mean score on the scale across all PIRLS 2021 participating education systems, and with the scale's units designed so that a two-point difference equates to the standard deviation of the overall distribution, facilitating a nuanced analysis of student performance relative to the international benchmark. To enhance the understanding of these context scale outcomes, they were categorized into three groups reflecting high, middle, and low levels on the evaluated construct. The segmentation of these groups was achieved through specific cut points on the scale, defined by various combinations of respondents' answers. In the following, the percentages and grouping of students utilize the three categories, whereas the plots of the quantile regression and the percentage of variance explained apply the continuous scale.

We begin by exploring the background characteristics of students, highlighting the substantial correlation between students' outcomes and their home socioeconomic status, which stands out among the three factors as having the largest impact on student outcomes.

6.2.1 Home Socioeconomic Status

The home socioeconomic status (SES) scale, formerly covered by the "home resources for learning," experienced significant revisions from previous iterations of the study, now exclusively drawing on data from parents via the PIRLS 2021 home questionnaire. This modification aims to more accurately measure the influence of home socioeconomic factors on reading achievement by relying solely on parental reports. The updated scale categorizes students into "higher," "middle," and "lower" SES groups and reveals substantial disparities in reading achievement across these categories: an 86-point achievement gap between the highest and lowest SES groups internationally (Mullis et al., 2023).

Discussing home environment support involves *exogenous* factors such as the student's age, gender, socioeconomic status, and the school's resource base (Fraillon et al., 2014). These external factors, from a school's viewpoint, affect learning outcomes to varying degrees across different school systems. They are beyond the direct control of individual learners. PIRLS 2021 findings underscore the significant impact of these factors on learning, with the home socioeconomic status scale showing a stronger correlation with students' reading achievements compared to, for instance, teacher-focused scales like teachers' job satisfaction (Yin & Reynolds, 2023).

The interconnection between students' reading proficiency and their socioeconomic status raises critical considerations about educational equity and social justice. This relationship underscores the need to consider education as a fundamental public good, enriching both individuals and the broader society. Equal opportunity in education is essential not only for individual development but also for creating a more inclusive, equitable society. Moreover, enhancing educational equity can potentially boost economic growth and social cohesion, echoing the OECD's stance on the matter:

> The evidence shows that equity can go hand-in-hand with quality; and that reducing school failure strengthens individuals' and societies' capacities to respond to recession and contribute to economic growth and social wellbeing. This means that investing in high quality schooling and equal opportunities for all from the early years to at least the end of upper secondary is the most profitable educational policy. (Organization for Economic Cooperation and Development (OECD), 2012, p. 3).

The OECD further argues that efficient academic institutions necessitate a proper blend of skilled staff, sufficient educational assets, and motivated learners, with resources allocated accordingly. It finds that underprivileged students often attend schools with limited resources, impacting various aspects of education. Thus, equitable resource distribution must be considered in school systems (OECD, 2012). Or, as Esping-Andersen formulates, "From an equity perspective, children's life chances should depend less on the lottery of birth than on their own latent abilities." (Esping-Andersen, 2008, p. 23). Across 53 participating education systems (including eight benchmarking participants) in PIRLS 2021 that administered the home questionnaire for parents, there are seven education systems where the scale for home socioeconomic status (SES) explains more than 20% of the variance in students reading scores (R^2 in an ordinary least square regression [OLS]). This is Brazil, 20.3%

(SE = 2.6); France, 21.0% (SE = 1.6); Slovak Republic, 21.4% (SE = 3.3); Türkiye, 24.2% (SE = 2.0); Austria, 25.4% (SE = 1.7); Hungary, 27.4% (SE = 2.4); and in the top. Bulgaria, 28.5% (SE = 2.2). This is the percentage of variance in reading achievement attributable to the student's home socioeconomic status and may be seen as an indicator for educational systems with lower equity (Alcott et al., 2018). Across the aforementioned PIRLS 2021 international education systems, the median explained variance is 13.0%, and the cross-education system average is 13.4%.

The results in four education systems in the Dinaric region are comparable to the international median. Socioeconomic status (SES) of students accounts for 12–13% of the explained variance in reading scores in Montenegro, Kosovo, Slovenia, and Albania (12.0%, SE = 1.1), (12.6%, SE = 1.7), (13.0%, SE = 1.0), and (13.3%, SE = 1.6), respectively. Three education systems exhibit higher percentages of variance explained by SES, above the international median: Croatia (15.2%, SE = 1.6), North Macedonia (16.5%, SE = 2.4), and Serbia, with Serbia showing nearly a fifth (19.3%, SE = 2.0) of the variation in student outcomes attributed to socioeconomic background. It is also worth mentioning that there are large differences in the overall economic situation in these places, ranging from approximately $5000 in Kosovo and $6000 in Albania to approximately $28,000 in Slovenia (World Bank, 2022).

Moving instead to the proportions of students within each SES category, Fig. 6.1 presents the percentage across these education systems, sorted by the proportion of students in the lower SES category. Despite Serbia having the highest explained variance by SES, it is positioned mid-range in terms of students from lower socioeconomic backgrounds, whereas Kosovo, with a significant proportion of lower SES students, shows a lesser impact of SES on student outcomes among the Dinaric education systems. Many factors can contribute to this situation, especially from the realm of social cohesion, family structure, location of living (urban/rural), cultural habitus of the home environment, etc., but which are mainly out of the scope of the PIRLS study and administered instruments.

Table 6.1 displays the average reading scale score for each of the three socioeconomic status groups. The gap in reading scores between the higher SES group and the lower SES group is high for all education systems, ranging from a gap of 91.6 (SE = 6.60) score points for North Macedonia to significantly narrower gaps of 73.1 (SE = 3.69) and 75.1 (SE = 5.00) points, respectively, in Montenegro and Croatia. Addressing social inequalities does not adversely affect the average scale scores, as evidenced by Croatia's high reading proficiency among fourth graders.

The initial analysis underscores significant disparities in learning associated with factors that students cannot control, namely their socioeconomic status at home, spotlighting the issue of equality in learning outcomes. The relevance of home environments for educational support, already crucial pre-COVID-19, likely grew during the pandemic as education systems struggled to address or mitigate these deepening inequalities. In essence, a student's home socioeconomic situation plays a pivotal role in their learning opportunities both at home and also within schools, with impacts varying across education systems.

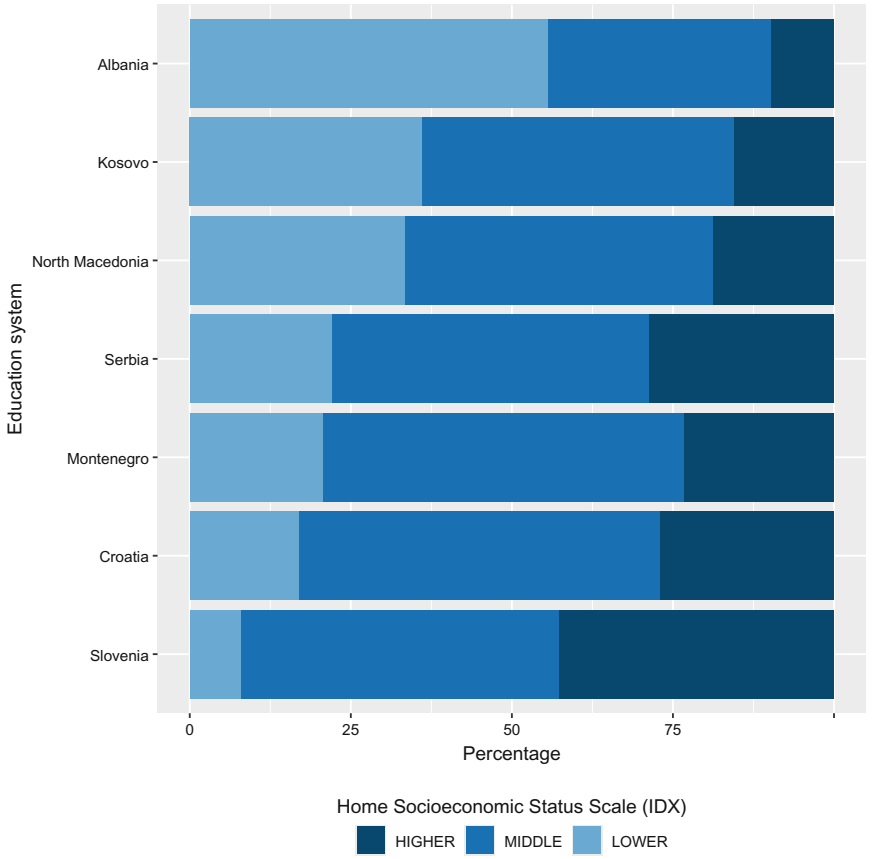

Fig. 6.1 Percentage of students from higher, middle and lower-SES families, by education system

Table 6.1 Average reading scale score, average reading scale scores by socioeconomic status, and score gap between higher and lower SES categories

Education system	Overall mean	Lower SES	Middle SES	Higher SES	Difference higher and lower SES
Albania	512.7 (3.2)	491.7 (3.8)	531.5 (3.5)	574.4 (4.2)	83
Croatia	556.6 (2.4)	514.8 (4.7)	555.2 (2.6)	589.9 (2.5)	75
North Macedonia	442.1 (5.3)	399.2 (6.4)	456.3 (4.4)	490.8 (5.0)	92
Montenegro	487.2 (1.6)	448.4 (2.9)	488.7 (2.0)	521.5 (2.5)	73
Serbia	513.6 (2.7)	468.7 (5.2)	512.3 (3.3)	552.9 (2.5)	84
Slovenia	519.7 (1.9)	469.7 (4.4)	510.0 (2.1)	548.4 (2.1)	79
Kosovo	420.5 (3.2)	392.3 (3.5)	426.9 (3.1)	472.3 (5.9)	80

Notes: Standard errors in parentheses, *SES* Socioeconomic status

Figure 6.2 presents both the average coefficients from the linear regression of reading score and the scale for socioeconomic status, as well as the results for each percentile. Blue-colored dots are statistically insignificant results for the percentile estimate, and dots in red color are significant. In order to interpret it, the coefficient provides descriptively the number of reading score points difference according to one point difference on the SES scale. Having in mind that one scale score point on the home environmental scales corresponds to a half standard deviation. Differences of 0.5 standard deviations are quite substantial differences in educational research.

Quantile regression figures illustrate how variables influence different points (quantiles) of a distribution, offering a nuanced view beyond average effects. To understand these figures, focus on how the relationship between independent variables (e.g., socioeconomic status) and dependent variables (e.g., reading scores) varies across the distribution. Look for trends indicating whether the effect is stronger or weaker at different quantiles, for instance, among the high or low achievers, revealing insights into disparities or heterogeneities within the data. These figures help identify which factors have more significant impacts at the extremes (low or high ends) of the outcome variable and may provide some guidance on where to intervene and place focus.

Descriptive statistics indicate a consistent relevance of home socioeconomic status to reading scores across the Dinaric region, with Serbia and North Macedonia showing notable gaps between students from high and low socioeconomic backgrounds. Quantile analysis suggests socioeconomic factors significantly affect lower-performing students, who are below the median due to various other factors impacting reading outcomes. In North Macedonia, the negative impact of socioeconomic status is particularly pronounced for these students. Albania having a lower overall association stands out in comparison to having a more uniform association across the distribution. In other words, SES impacts all students' outcomes to the same degree. Conversely, in the other education systems, the socioeconomic influence diminishes for students above the median proficiency, highlighting the need for focused interventions for lower-performing students from disadvantaged socioeconomic backgrounds.

6.2.2 Pre-primary Literacy Activities

From the perspective of schools and teachers, early literacy activities prior to formal schooling are considered exogenous factors, while from the standpoint of preschool policy or parenting, they may be directly influenced within the home environment or interventions supporting the home. The home early literacy activities scale, based on parental reports, measures engagement in literacy activities before primary school in three categories: "often," "sometimes," and "never or almost never." This

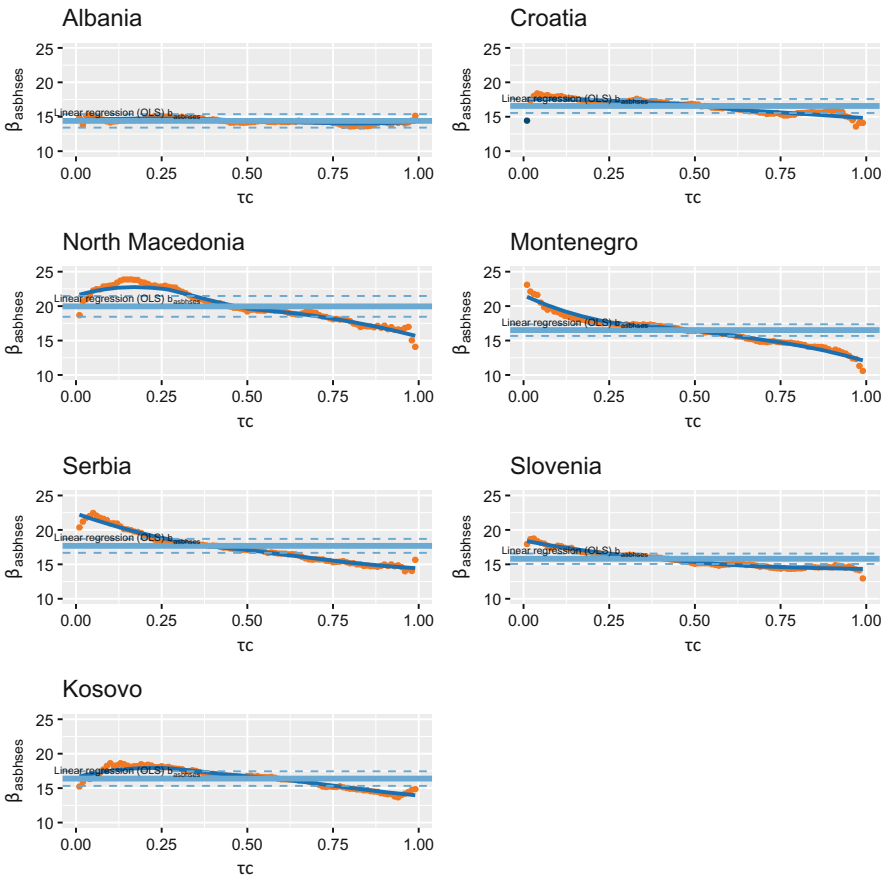

Fig. 6.2 Quantile regression: Reading score and students home socioeconomic status

engagement crucially influences reading achievement by the fourth grade, with higher involvement linked to higher reading scores (Mullis et al. 2007; 2023). Highlighting the importance of early literacy experiences, the international data shows students whose parents often engaged in literacy activities had an average reading scale score of 517 (SE = 0.5), representing 42% (SE = 0.1) of the students. Conversely, only 3% (SE = 0.1) of students had parents who seldom engaged in these activities, with these children averaging a score of 418 (SE = 3.4) as reported in the PIRLS 2021 exhibits (Mullis et al., 2023).

Similar to the SES scale, the analysis of early literacy activities sheds light on their contribution to the explained variance in students' reading scores across PIRLS 2021 education systems. Bulgaria and Türkiye exhibit the highest explained variance due to these activities, at 13.8% (SE = 1.8) and 14.7% (SE = 2.1), respectively, marking them as outliers when considering the rest of the education systems. Among

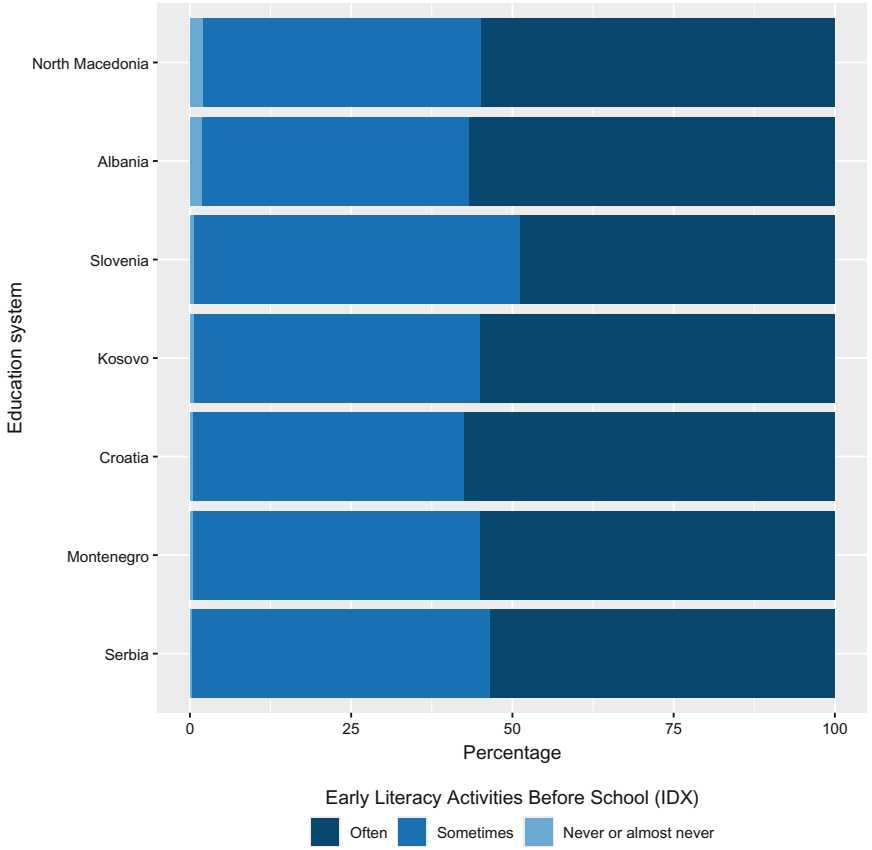

Fig. 6.3 Percentage of students with whom parents practiced early literacy activities

the PIRLS 2021 participating education systems administering the home questionnaire, with substantial parental data including benchmark regions, the median explained variance is 2.8%, with an overall mean of 3.3%. Within the Dinaric region, the explained variance by early literacy activities shows variation: Slovenia at 1.7% (SE = 0.6), North Macedonia at 2.5% (SE = 0.9), Serbia at 2.6% (SE = 0.9), Montenegro at 3.1% (SE = 0.5), Albania at 4.6% (SE = 1.3), and Croatia with the highest point estimate at 5.1% (SE = 0.9), highlighting the differential explained variance of early literacy activities on reading proficiency. Still, it is clear that across the Dinaric region, early literacy activities before schooling play a relatively important role for reading achievements in all education systems.

In Fig. 6.3, the proportions of students within each category of early literacy activities before primary education for each Dinaric education system are presented.

Similar to international findings, the Dinaric education systems report a minimal percentage of students indicating "never or almost never" in their response pattern to

parents' engagement in early literacy activities. However, focusing on examining the differences between students whose parents "often" or "sometimes" engage in early literacy activities before schooling reveals notable comparative variations across these education systems. In Slovenia, the distribution of students among these groups is quite similar, with a negligible gap of −1.8 percentage points (SE = 2.00). Notably, Slovenia exhibits statistically significantly lower gaps in percentage points between the two groups compared to all other Dinaric education systems. In contrast, Croatia, with the highest average reading score among the Dinaric education systems, displays a substantial gap of 15.6 percentage points (SE = 2.27) in favor of students whose parents often engaged in early literacy activities. This gap is statistically similar to Albania, which has a gap of 15.4 percentage points (SE = 2.91). Meanwhile, North Macedonia shows a gap of 11.7 percentage points (SE = 2.23), Kosovo with 10.7 percentage points (SE = 2.54), and Montenegro with 10.5 percentage points (SE = 1.82), all exhibiting similar gaps. Serbia, on the other hand, presents gaps that are statistically significantly lower than those of Croatia and Albania but significantly higher than Slovenia, with a gap of 7.4 percentage points (SE = 2.32).

Shifting our focus from the gap in *proportions* of students, we now examine the *gap in reading achievement* among students who often or sometimes engaged in these activities at home before primary schooling. Despite variations in proportions and the overall average reading scores for the education systems, the differences we observe between education systems are not statistically significant. Albania, Croatia, Montenegro, Kosovo, and Serbia exhibit gaps in reading scores of 30.1 (SE = 3.93), 25.5 (SE = 3.23), 25.3 (SE = 2.43), 23.9 (SE = 3.08), and 22.3 (SE = 3.84), respectively, with no significant differences among them.

Slovenia, however, stands out in this comparison, with a smaller gap in reading score of 15.9 (SE = 2.75), which is statistically smaller than the gaps in Albania, Croatia, and Montenegro. One plausible interpretation is that schools in Slovenia compensate to a greater extent for the exogenous factors related to home activities before schooling, contributing to greater equity among students from diverse backgrounds (Fig. 6.4).

In the descriptives of the explained variance, both the differences in proportions of students with parents who often or sometimes report they did early literacy activities before students entered primary schooling and the gap in average reading score, we found those categories are important for students reading acquisition in schools. The descriptive relationship pointed out Slovenia as a place where this has less importance. It is interesting to see that this counts across the proficiency distribution. One interpretation is that there is a fair influence not disadvantaging students with high or low reading ability. In Kosovo, the importance becomes way less when focusing on the upper quarter of the proficiency distribution, whereas it is of more importance for the lower quarter of students in North Macedonia. One policy-relevant implication from this is that informing parents and supporting the knowledge on the importance of activities such as telling stories, singing songs, or playing with alphabetic toys prior to schooling may give a head start in reading for, in particular, the lower quartile of achievers.

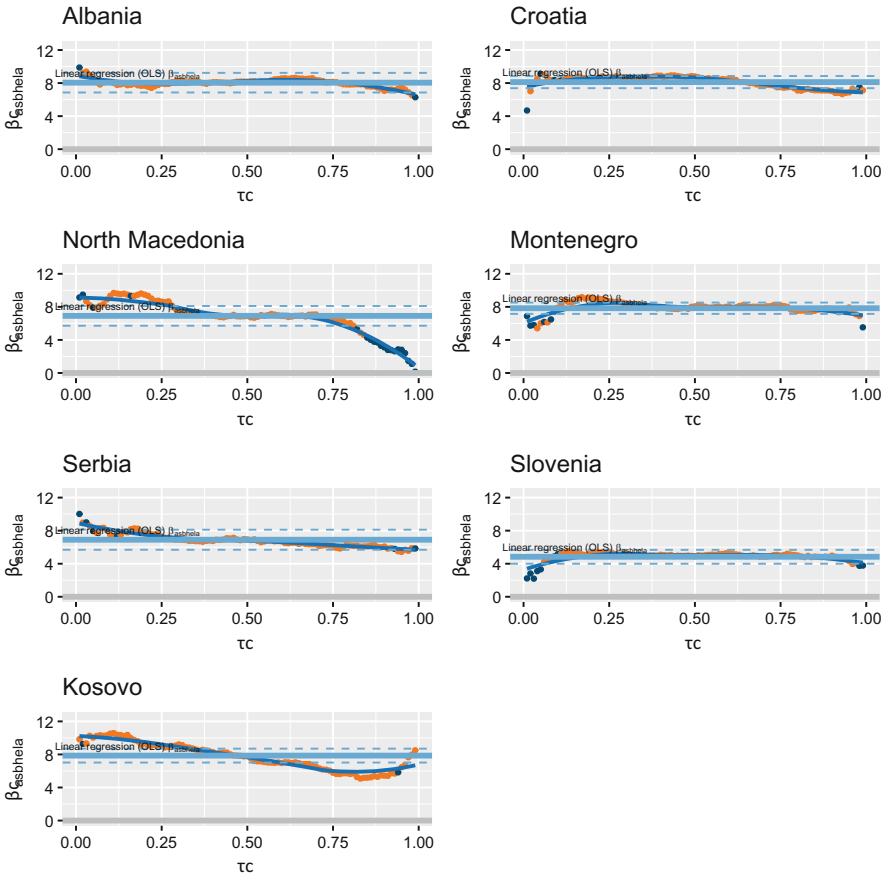

Fig. 6.4 Quantile regression: Reading score and early literacy activities scale

In a project on early literacy skills conducted by Jordan et al. (2000), they explored the impact of a year-long intervention aimed at enhancing early literacy through family engagement and sought to enrich literacy through parent education sessions, at-school parent/child activities, and at-home book-mediated activities. The findings revealed that children whose families participated in the intervention showed significantly greater gains in different literacy domains, such as storytelling, than those in the control group. This was especially true for low-achieving students who began with lower language skills. This highlights the opportunity for policies to make a difference in preschool settings.

Engaging in early literacy activities can be interpreted as concrete and more direct pedagogical exercises in the parent-child relationship. Drawing from theories of socialization, we understand that parents' practices, values, and beliefs also influence children's behavior and attitudes. Therefore, let us now shift our focus to a more indirect parental influence on students' reading proficiency.

6.2.3 Parental Reading Behavior and Enjoyment

Children observing adults and their older peers engaged in reading are more likely to emulate these reading behaviors as part of the primary socialization within the home. According to Bourdieu and Wacquant (2002), the main socialization that forms the individual's habitus is the influence from the parent's dispositions in cultural practice. The degree to which parents themselves like reading and their reading practice is of importance. In PIRLS 2021, it was found that students with parents who have a positive attitude and behavior towards reading tend to achieve higher scale scores in reading. The parents who like reading scale, assessing parental behaviors, and enjoyment of reading through their agreement with statements such as "reading is one of my favorite hobbies" or "reading is an important activity in my home," gather reading and frequency of reading for pleasure by the parents. The scale has furthermore been categorized into parental attitudes of "very much like," "somewhat like," or "do not like" reading. This scale reveals a clear correlation between parental reading behavior and enjoyment and higher reading achievements among their own children, emphasizing the influence of a positive reading environment and socialization of practices at home on children's reading.

Across the PIRLS 2021 education systems, the international report and results showed 30% (SE = 0.1) of students had parents who "very much like" reading, achieving higher scores on average compared to the 52% (SE = 0.01) for those parents who "somewhat like" reading. The average reading scores for these groups were 524 (SE = 0.5) and 497 (SE = 0.5), respectively—a large gap. Meanwhile, 17% (SE = 0.1) of students with parents who "do not like" reading scored the lowest, with an average of 478 (SE = 0.8), underscoring the significant impact of parental reading attitudes on children's reading achievements (Mullis et al., 2023).

Internationally, parents' attitudes towards reading explain a very high share of the variance in students reading scores in Austria (10.7%, SE = 1.2), Türkiye (11.0%, SE = 1.6), and Bulgaria (14.1, SE = 1.9). The cross-education system international median with benchmarking participants leaving out countries that did not administer the home questionnaire or had less than 40% parent responses for the students is 4.0%, and the mean is 4.4%. We find that the Dinaric education systems have similar figures with no significant differences. Distributed with Serbia in the high end with 6.3% (SE = 1.4) explained variance and Croatia at the other end with 3.8% (SE = 1.0) variance explained. In other words, parents enjoyment and reading for pleasure have socialization implications across the Dinaric region as well.

Figure 6.5 presents the percentages of students having parents that like reading. The importance of students' socialization for positive reading practices is also very similar across the Dinaric education systems, but still the proportions of students who have parents that do not like reading differ. Even though Croatia and Slovenia have high reading scale scores in comparison with the other Dinaric education systems, they also have a high number of students with parents who do not like reading. The gap in achievement between students with parents who like reading very much and those who do not like reading is not found to be statistically

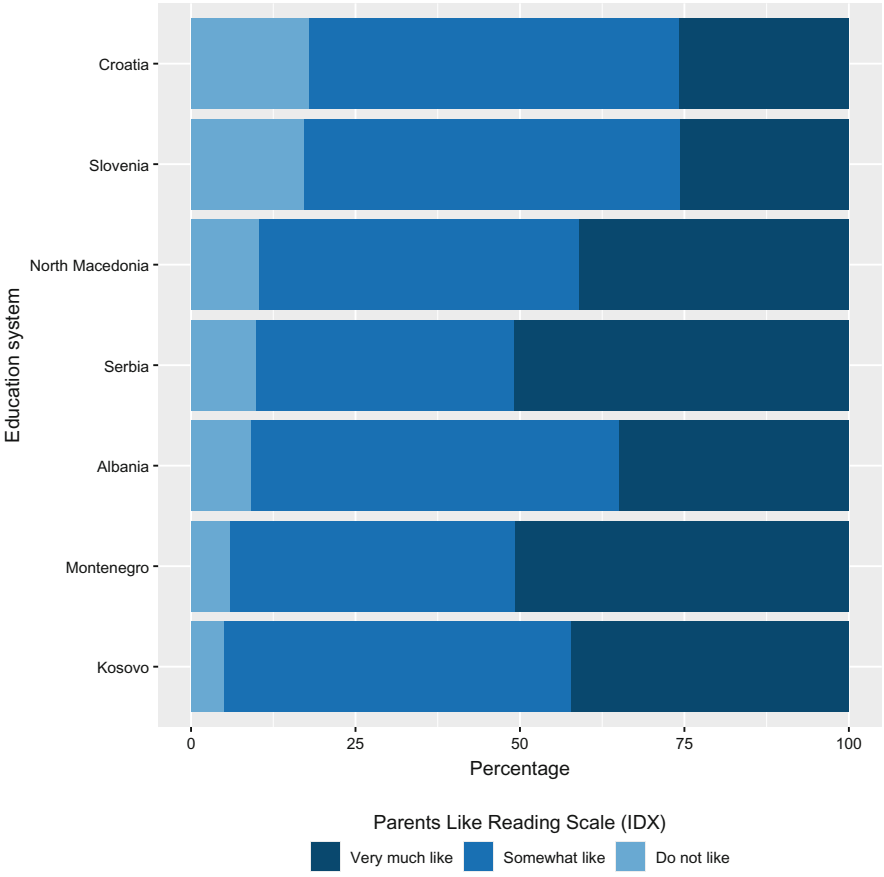

Fig. 6.5 Percentage of students whose parents like reading very much, somewhat, and do not like reading at all, by education system

significant between the Dinaric education systems. In North Macedonia, the gap is 61.1 (SE = 9.4), and in Serbia, it is 39.1 (SE = 7.0). But the proportions of students in each group differ across the Dinaric education systems and are split into three tiers. If we focus on the proportion of students with parents who do not like reading, we find the smallest share in Kosovo at 5.0% (SE = 0.6), no statistically significant difference from Montenegro (5.9%, SE = 0.4), but significantly smaller than the other Dinaric education systems. Croatia (17.9%, SE = 1.2) and Slovenia (17.1%, SE = 0.7), on the other hand, have statistically significant larger shares than the rest of the Dinaric education systems and are in the same size as the international percentage. In between we find North Macedonia (10.3%, SE = 1.0), Serbia (9.8%, SE = 1.0), and Albania (9.1%, SE = 1.2). These are significantly higher than Kosovo and Montenegro, but at the same time also significantly lower than Croatia and Slovenia. When interpreting these patterns, it is important to keep in mind that there is a positive correlation between parents who enjoy reading and students' achievement. Even though Kosovo has the smallest number of parents

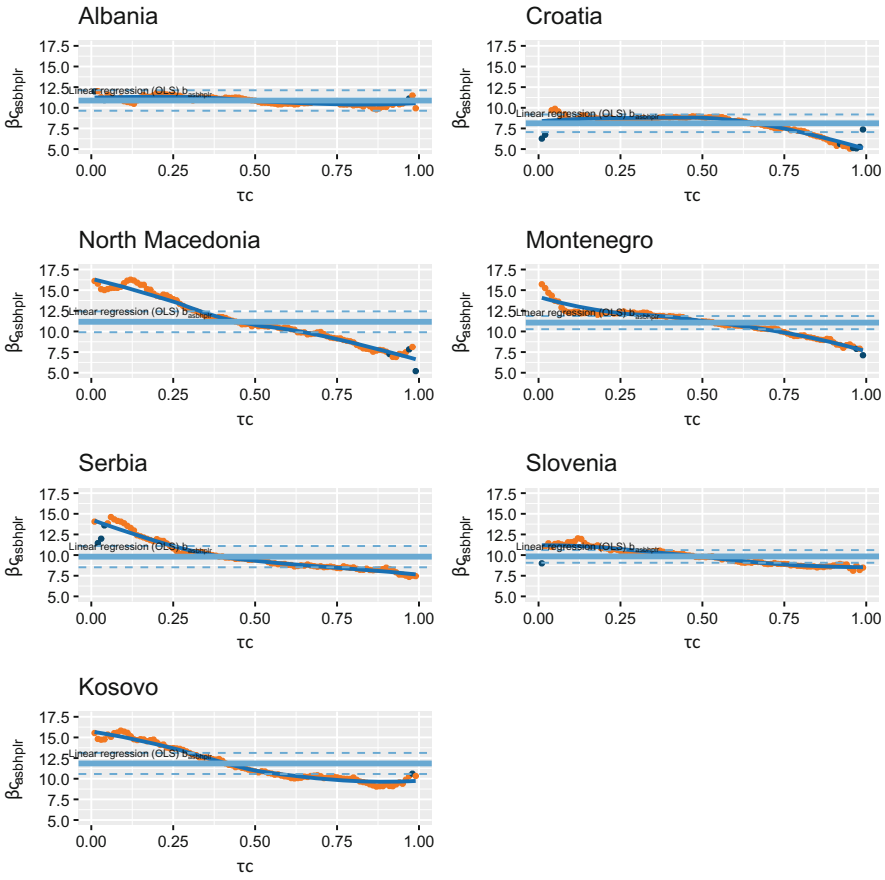

Fig. 6.6 Quantile regression: Reading score and parents like reading scale

reporting this influence, and in comparison to other Dinaric education systems, it also ranks lower in terms of average reading scores. The key takeaway is that education systems with a high percentage of parents influencing students' reading attitudes still have room for improvement in that regard.

In Fig. 6.6, we find it particularly noteworthy to observe the results in North Macedonia, Serbia, and Kosovo, where the low-performing quartile of students to a much higher degree benefit from having parents that like reading rather than the high-performing pupils. In other words, even though all students across the education systems seem to have some benefit of having parents who like reading, for low-performing students in these education systems, it might be of special importance to address their parents' attitudes towards reading. There exists some evidence that this may actually be accomplished through pedagogical interventions.

A study by Çalışkan and Ulaş (2022) investigates the impact of parent-involved reading activities on fourth graders' reading comprehension, motivation, and attitudes towards reading. Utilizing a pre- and post-test quasi-experimental design with

a control group, data were gathered from 100 fourth-grade students across two schools. The results indicated significant improvements in the experimental group's reading comprehension, motivation, and attitudes compared to the control group, highlighting the positive effects of parent involvement in reading activities. In this study, the intervention was of a limited size, whereas "children read together with their parents for eight weeks, answered questions about the texts, and completed various activities within parent-involved reading activities." (Çalışkan & Ulaş, 2022). One of the suggestions from the study was that "teachers can plan activities to enable parent-involved reading at home and school and organize home visits, and parents can be encouraged to take part in committees such as school-parent unions."

6.3 Limitations of the Analysis and Results

One of the limitations of the presented analysis and respective results in this chapter is the relatively low and varied reliability (Cronbach's alpha) of the scales used for the factors explaining reading achievement. As shown in Chapter 15 in the PIRLS 2021 Technical Report (Yin & Reynolds, 2023), the reliability of the home resources for learning scale for the Dinaric education systems was relatively low, from 0.67 in Kosovo and Montenegro to 0.72 in Albania. The reliability of early literacy activities varied more from 0.66 in Kosovo to 0.80 in Albania. Reliability for the parents who like reading, the early literacy activities scale was more satisfactory than the abovementioned scales, but also with some variation, from 0.74 in Kosovo to 0.9 in Croatia. The second limitation of large-scale assessments worth mentioning for the comparative approach is missing data. Although it is presumed that the data that is missing is random—and in most of the cases this is true—when comparing different education systems on different scales, the possibility that missing data could be distributed unevenly could potentially have an impact on (some) conclusions. In this specific case, the home resources for learning scale has 87–95% valid cases across Dinaric education systems; for the other two scales, missing data are also present in the range from 5 to 10%. This, as usual, points in the direction of making careful inferences on the subject matter while comparing different educational systems based on the ILSA data.

6.4 Conclusion and Discussion of the Results Across Education Systems

Among the education systems analyzed in the Dinaric region, only Slovenia has constant trend monitoring of PIRLS results in reading achievement (every cycle since 2001 to 2021); North Macedonia conducted three cycles (2001, 2006, and 2021), and Croatia two (in 2011 and 2021). In Croatia and North Macedonia,

captured results in these measuring points were almost the same, i.e., the trend is a flat line, while in Slovenia, trend results in reading achievement were rising until this last cycle (2021), where the result dropped significantly (going back to the level of the cycle 2006).[2] All other Dinaric participants in the analysis in this chapter joined only in the most recent cycle of PIRLS. Until now, across the region, general conclusions were made that the "usual suspects" had an effect on reading achievement—these being background variables such as students' home socioeconomic status and activities in early education, but also students' positive attitudes towards reading and confidence in reading. A little less impact came from school environment variables, although emphasis on success and school discipline are not to be ignored (Mullis et al., 2003, 2007, 2012, 2023).

This chapter has revealed some of the similarities and differences across the Dinaric education systems concerning home environmental support for reading acquisition in greater detail. We have identified both significant differences and found similarities across the region. For instance, there is a substantial variation in the percentage of students in the lower socioeconomic category, with the largest share of students falling into the low socioeconomic category in Albania and the lowest proportion in Slovenia. Although the home environment, in terms of socioeconomic situation, strongly influences student outcomes, the overall differences between the education systems do not necessarily align with this pattern.

- *Socioeconomic status (SES) impact*: The analysis underscores a significant disparity in reading achievement among SES categories. Lower SES students notably lag behind their higher SES counterparts, with education systems like North Macedonia demonstrating a substantial achievement gap. This highlights the necessity for targeted interventions to support lower SES students who are across the proficiency distribution most affected by socioeconomic disadvantages.
- *Early literacy activities before primary education*: Engagement in early literacy activities before primary education has a notably positive impact on reading achievement. Quantile regression analysis indicates that these activities are particularly advantageous for lower achievers, suggesting that early literacy support can help mitigate reading outcomes. Education systems with higher reported engagement in early literacy activities, such as Croatia, showcase the potential for such initiatives to enhance reading achievement.
- *Parental reading behavior and enjoyment*: The influence of parental attitudes towards reading on students' reading achievement varies across the achievement distribution. Lower achievers derive greater benefits from positive parental reading behaviors than higher achievers. This implies that cultivating a reading-positive environment at home can be a crucial support mechanism, especially for students facing challenges in reading.

[2]Drop in trend results in 2021 are to be taken "with a grain of salt" due to many extraordinary influences in the measuring period, the most important being the COVID-19 pandemic and school closures. Please see Chap. 1 for more details on possible restraints for PIRLS 2021 results.

These findings emphasize the pivotal role of home environment factors in shaping students' reading achievement. Taking into consideration that school resources are not as relevant in the overall contribution of external factors in the Dinaric region in the TIMSS analysis as presumed (Elezović et al., 2022), it is clear that home resources need to be addressed while aiming to achieve better reading skills in this age group. Socioeconomic status, early literacy activities, and parental reading behaviors all play critical roles across the Dinaric region. Possible policy implications from this analysis suggest tailored interventions that address the specific needs of both lower and higher achievers. Focusing on enhancing home support for reading, especially in lower SES contexts, is of paramount importance.

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Chapter 7
Digital Skills and Tools Supporting Distance Learning: A Comprehensive Response of Dinaric Education Systems in Times of Educational Disruption

Marina Radović, Dijana Vučković, and Jelena Radišić

7.1 Introduction

The COVID-19 pandemic triggered severe global challenges for education systems and schooling (UNESCO, 2021), and the Dinaric region was no exception (OECD, 2020). While the demand for digital competence among teachers and the use of digital tools in teaching and learning has been present in the area for over a decade, the existing practices could not entirely meet the demands of the COVID-19 pandemic disruption. Yet, despite systemic unpreparedness, education systems showed great flexibility and adaptability. The latter was evident from the numerous ways teaching was (re)organized (Ristić Dedić & Jokić, 2021) as well as the abundant instructions continuously forwarded to schools through national educational information systems (Radović, 2022). This chapter attempts to shed light on the level of interruption recorded during the COVID-19 pandemic, the existing conditions for successful distance learning, and the measures education systems took to respond to the educational disruption in light of the Progress in International Reading Literacy Study (PIRLS) 2021 data collected in the Dinaric region.

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7.2 Background Information

We start with a short overview of the different aspects relevant to quality distance learning and teaching in the Dinaric education systems, the challenges posed by the COVID-19 pandemic, and the recognized needs as a result of the disruption.

7.2.1 Digital Demand and Digital Divide in Pre-Covid Times

Over the last decade, the demand for teacher digital competence and learning within the digital environment has gained momentum (Carrillo & Assuncao Flores, 2020). However, despite this requirement being openly communicated at the policy level, there is an apparent absence of legislation regulating teaching and distance learning across all Dinaric education systems (Eurydice, 2022). Nevertheless, more systemic attempts do exist, for instance, in Croatia with the 2014 curricular reform (Elezović & Bosnić, 2022). The reform in Croatia focused on improving the digital infrastructure in schools and on capacity building for teachers and students (Elezović & Bosnić, 2022). As part of the reform, schools, teachers, and students were given digital equipment. At the same time, educational software was developed for primary and secondary schools.

Indeed, legislation is an essential step in a systemic attempt to implement distance learning and teaching. Schools must also be equipped for such an endeavor, and teachers must have appropriate training. A considerable obstacle across almost all Dinaric education systems was a lack of availability of digital devices and the prevalence of outdated equipment (OECD, 2020). This difficulty was significantly less pronounced in Slovenia, where internet connections and smartphones were available to most students, even pre-COVID. At the same time, schools in Slovenia provided most teachers with the necessary technical conditions, including virtual learning environments or learning management systems (Meinck et al., 2022). Thus, one can fairly say that Slovenian schools were digitally equipped before the pandemic (OECD, 2020). While data in Croatia is somewhat mixed, despite the e-Schools project back in 2015—this pilot project, started in 2015, established a system for developing digitally mature schools, and after the pilot phase, was implemented in all schools in Croatia (CARNET). This project was an important preparation for the transition to distance learning (Ristić Dedić & Jokić, 2021)—it seems that the digital requirement (i.e., access to the internet and availability of computers) is at least met at home, following the OECD average (Ristić Dedić & Jokić, 2021). In Serbia, Kovács Cerović et al. (2021) reported that technical obstacles were not a particularly noticeable problem because 97% of teachers reported having an internet connection, 85% having devices for online teaching, and 99% of students having the necessary digital devices and internet access. It is unclear whether these numbers refer to personal devices or those provided by the schools. Systemic data for other Dinaric education systems are scarce. At the same time, in

many education systems of the region, E-Systems for grading students are in place. In Montenegro, this system includes information about students' behavior and possible misconduct (Radović, 2022).

As to the level of teachers who perceive themselves as competent for teaching within the digital environment, in Croatia, 36% of teachers felt that they were well-prepared for teaching in a digital learning environment, while 47% (slightly below the OECD average) reported the "use of ICT for teaching" was part of their formal education. Additionally, in Croatia, 73% of teachers had continuous professional development related to the use of ICT, 26% believed that they had a strong need for training, and 46% encouraged students to use ICT. At the same time, 25% of principals indicate the shortcomings and inadequacy of digital technology for instruction (Reimers, 2022). In Slovenia, 53% of teachers received formal training on the use of ICT, 67% believed they were well-prepared for this task, and 59% attended professional development courses on the subject. In comparison, only 8% highlighted a severe need for such training, 37% reported often or always including ICT for students' projects or classwork, and only 4% of principals pointed out shortcomings regarding digital technology for instruction (Reimers, 2022). In the other Dinaric education systems, professional development courses for using ICT in teaching are available (Eurydice, 2022), but like in the examples above, data is usually given for subject teachers, whose education and later training are different compared to class teachers (Eurydice, 2022; Kowalczuk-Walędziak et al., 2023). Notably, the report on *The COVID-19 Crisis in the Western Balkans* (OECD, 2020, p. 10) stresses that "schools' insufficient or inadequate equipment for digital learning and teachers' digital skills pose additional challenges for effective student learning." Such conclusions are grounded on data where about two-thirds of fifteen-year-olds go to schools that do not have an online learning support platform, the same number attend schools that do not have digital devices for instruction, and one-quarter of students of the same age have teachers who do not have the necessary technical and pedagogical competencies for the integration of digital devices in instruction (OECD, 2020).

7.2.2 Impact of the COVID-19 Pandemic

The World Health Organization (WHO) declared the COVID-19 pandemic on March 14, 2020. This decision had a completely unexpected and unpredictable effect on education worldwide, affecting more than 1.5 billion children and young people (UNESCO, 2021). As a direct effect of the pandemic, almost all education systems experienced closure within a short period and switched to some form of distance learning (Kennedy & Strietholt, 2023; Reimers & Schleicher, 2020), with many schools unprepared for the sudden switch.

In a world with distinct differences between national economies and regions within countries, schools in lower-income areas faced unique challenges. They encountered more severe obstacles in responding to the overwhelming demand to make distance learning the principal form of instruction (OECD, 2020). At the same

time, students from underprivileged families met new challenges to keep up with such instruction (Schleicher, 2020), which in turn affected their achievement-related self-confidence during their independent work (Meinck et al., 2022). As noted by Stepanović (2020), "this [pandemic] crisis illuminates deep inequalities, not only in who owns digital devices and has access to the Internet […] but also in who is capable of learning on his own and whose parents have time to help them" (p. 184).

In March 2020, all Dinaric education systems stopped direct teaching. However, the demand to reopen schools was strong, given the fact that the youngest students are still acquiring basic literacy skills in reading and writing, mastering basic arithmetic and elementary concepts of science, and are just starting to develop their learning skills. In Croatia, for example, some schools were reopened in May of the same school year for in-person instruction for the youngest attendees. Despite that, some forms of distance learning for the youngest students continued after reopening (Ristić Dedić & Jokić, 2021).

It is evident that the processes implemented across the region had their challenges. However, all education systems in the Dinaric region reacted promptly and organized some form of distance learning using the resources available. These included different learning modes by means of learning management platforms, applications, and other digital tools combined with TV lessons and independent learning. In the research carried out with class teachers and subject teachers, it was noticed that they were mostly satisfied with TV lessons and that TV teaching, especially for younger grade students, was positively perceived (Đorđić et al., 2021). Students in higher grades of elementary school, high schoolers, and university students continued with online instruction for most of the pandemic (Ristić Dedić & Jokić, 2021).

Notably, the education systems in the Dinaric region (see Sect. 7.4.1) are mostly centralized.[1] Yet, during the pandemic, the degree of autonomy of local authorities in schools increased due to the different contexts in which schools were open and the unequal number of students/teachers infected with the virus as time passed. The ministries of education entrusted schools to decide which teaching model they should apply under the context each school was in (Elezović & Bosnić, 2022; Mihajlovska, 2022; OECD, 2020; Radović, 2022; Ranđelović et al., 2022).

Finally, it should be noted that during the pandemic, parents also had additional tasks related to studying with their children, which, in addition to often complicated personal and professional engagements, brought further stressful situations to some families (Cluver et al., 2020). Generally, for younger students, parents play a more significant role in learning at home (Drvodelić et al., 2021; Radović, 2022). During COVID-19, parents communicated more intensively with class teachers (Radović, 2022) and were even more involved in younger children's work than in the older

[1] In connection to the countries observed in this book, it should be noted that in the educational system of North Macedonia, municipalities have the autonomy to establish and finance schools at the local level, elect principals, hire staff, and thus decide on issues related to teaching (Mihajlovska, 2022).

ones (Reimers, 2022). Parents of older elementary school students expressed a positive attitude towards the work of teachers, but they also pointed out that the children were overburdened (Drvodelić et al., 2021). In Serbia, generally, parents took on a more supervisory role rather than direct support in learning. However, greater satisfaction with distance learning was identified for students whose parents provided more direct support in learning (Slijepčević et al., 2022).

As with every change, both negative and positive reactions among students, teachers, and parents were observed. In Croatia, for example, older students indicated their preference for classroom teaching; i.e., they pointed out that direct teaching has advantages over distance teaching in terms of quality, task load, and effort (Ristić Dedić & Jokić, 2021). Similarly, several other studies noted the absence of direct contact between students and teachers was a disadvantage (Cvijetić et al., 2022; Stojković & Jelić, 2021). In addition, the lack of peer interaction, lack of intrinsic motivation, increase in boredom (Radović, 2022), and difficulties with self-regulation of learning (Stojković & Jelić, 2021) were also reported. In contrast, improved digital communication with teachers, better presentation of learning topics using digital sources, and the constant availability of materials on online platforms were seen as positive outcomes of distance teaching (Stojković & Jelić, 2021).

For the teachers, the COVID-19 pandemic was marked by a significant increase in their workload (Meinck et al., 2022), and more time was needed to prepare lessons, especially learning materials (Radović, 2022). Teachers pointed to various aspects of increased workload and reported that some also continuously distributed printed learning materials to students (Đorđić et al., 2021). Evaluating what students have learned was seen as a major obstacle, coupled with organizational and technical support (Jovanović & Dimitrijević, 2021). Yet despite the definite obstacles students and teachers met, the COVID-19 disruption also exemplified that learning in digital environments, regardless of the circumstances, represents an important aspect of education in the future. In addition, as Ranđelović et al. (2022) pointed out, education systems profited in terms of equipment and internet connection to a certain extent during distance learning. In general, schools ended up having better internet coverage and being better digitally equipped. As a result of the pandemic, teachers are now generally more ready and accepting of the use of digital devices for learning and teaching.

7.3 Present Study

In light of the presented background, this chapter aims to shed light on how the Dinaric education systems reacted to the COVID-19 pandemic by examining the following research questions:

1. *Are there differences across Dinaric education systems regarding the duration of school closures due to the COVID-19 pandemic disruption?*

2. *When normal primary school operations were affected by the COVID-19 pandemic, how did schools across the Dinaric education systems support remote learning?*

Next, we investigate critical preconditions linked to successful remote instruction and (or) distance learning through the following additional research questions:

1. *How many teachers report availability and prior use of digital devices (desktop computers, laptops, or tablets) during reading instruction and assessment across the Dinaric education systems?*
2. *How often have teachers participated in formal and informal training opportunities concerning their competence in using digital devices for reading instruction and assessment across the Dinaric education systems?*
3. *How often have students used digital devices (desktop computers, laptops, or tablets) for schoolwork across the Dinaric education systems?*
4. *How do students view the use of digital devices (desktop computers, laptops, or tablets) for schoolwork across the Dinaric education systems?*

7.4 Method

The current investigation uses the dataset gathered during the PIRLS 2021 cycle.[2]

7.4.1 Participants

Detailed information about the participants is provided in Chap. 1 of this volume. This chapter focuses on the situation in Albania, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, and Slovenia during the COVID-19 disruption. Data collection was performed as planned (i.e., February to July 2021) in all examined education systems except for Croatia, where it was delayed to September to November 2021.

7.4.2 Variables

Examined variables connect constructs from the student, teacher, home, and school context questionnaires applied during the PIRLS 2021 cycle. Table 7.1 provides a complete overview of the variables examined.

[2] Available at https://pirls2021.org/data/

Table 7.1 Variables used in the study

Questionnaire	Variable name	Variable ID and description	Variable options
Student questionnaire	ASBG05	Do you have any of these things at your home? ASBG05A - A shared computer or tablet that you can use ASBG05D - Access to the internet ASBG05F - Your own computer or tablet ASBG05G - Your own smartphone	Dichotomous variable
	ASBG08A-B	How much time do you spend using a computer, tablet, or smartphone to do these activities for your schoolwork on a normal school day? ASBG08A - Finding and reading information ASBG08B - Preparing reports and presentations	Categorical variable (range: from "no time" to "more than 30 min")
	ASBG09A	How much do you agree with these statements about using computers, tablets, or smartphones? ASBG09A - I am good at using a computer or tablet	Categorical variable (range: from "agree a lot" to "disagree a lot")
Teacher questionnaire	ATBG07A	In the past two years, have you participated in formal professional development in reading (e.g., workshops, seminars, lesson studies)? ATBG07AD - Integrating technology into reading instruction ATBG07AE - Instruction related to digital literacies	Dichotomous variable
	ATBR08H	When you have reading instruction and/or do reading activities with the students, how often do you do the following? ATBR08H - Teach digital literacy skills (e.g., read, write, and communicate using digital tools and media)	Categorical variable (range: from "never/almost never" to "every day/almost every day")
	ATBR12A	ATBR12A - Do the students in this class ever have digital devices (desktop computers, laptops, or tablets) available to use during reading instruction?	Dichotomous variable

(continued)

Table 7.1 (continued)

Questionnaire	Variable name	Variable ID and description	Variable options
	ATBR12B	What access do the students have to digital devices? ATBR12BA - The school provides each student with a digital device ATBR12BB - Class has digital devices that students can share	Dichotomous variable
	ATBR12C	When doing reading activities with the whole class, how often do you have students use digital devices?	Categorical variable (range: "At least once a week" to "Never or almost never")
	ATBR12EA	During reading instruction, how often do you have students use digital devices to do the following? Read digital texts ATBR12EA - Read digital texts	Categorical variable (range: "At least once a week" to "Never or almost never")
School questionnaire	ACBG19	Please estimate the number of weeks during the current academic year where normal primary school operations have been affected by the COVID-19 pandemic	Categorical variable
	ACBG20	Does your school provide remote instruction or distance learning resources for primary grades when normal school operations are affected by the COVID-19 pandemic?	Dichotomous variable
	ACBG21	When normal primary school operations are affected by the COVID-19 pandemic, does your school support remote learning through the following? ACBG21A - Delivery of printed learning materials to students ACBG21B - Internet-based resources for students ACBG21C - Access to digital devices for students ACBG21D - Recommendations for teachers about how to provide online instruction ACBG21E - Technical support for teachers ACBG21F - Access to digital devices for teachers	Dichotomous variable

(continued)

Table 7.1 (continued)

Questionnaire	Variable name	Variable ID and description	Variable options
Home questionnaire	ASBH19	Did your child stay at home any time because of the COVID-19 pandemic?	Dichotomous variable
	ASBH20	When your child was not in school, how did your child's school engage with your child's home-based learning? ASBH20A - Reading assignments ASBH20B - Online activities ASBH20C - Printed learning materials	Dichotomous variable
	ASBH21	Did you provide additional educational resources for your child during the pandemic? ASBH21A – Books ASBH21B – Digital devices ASBH21C – Digitally-based learning activities ASBH21D - Online instruction or tutoring	Dichotomous variable
	ASBH22	Do you think your child's learning progress has been adversely affected?	Categorical (range "not at all" to "a lot")

7.4.3 Analytical Approach

All data were inspected in SPSS, while the IEA IDB Analyzer was used for the statistical analysis. The state of each education system was analyzed based on the comprehensive overview provided in the PIRLS 2021 encyclopedia (Reynolds et al., 2022). The PIRLS 2021 encyclopedia includes two main types of data: exhibits presenting results obtained from the PIRLS 2021 curriculum questionnaire as well as detailed chapters of countries' education systems and language/reading curricula provided by national experts, as well as information on addressing the challenges and innovations that occurred during the COVID-19 pandemic. The latter informs the current analyses in this chapter with a focus on the Dinaric education systems (e.g., Elezović & Bosnić, 2022; Klemenčić Klemenčić Mirazchiyski, 2022; Mihajlovska, 2022; Radović, 2022; Ranđelović et al., 2022).[3]

[3] Information on school closures and support to students during COVID-19 in Kosovo was obtained from the local PIRLS team, from the guidelines on support of the learning process, and the guidelines for the evaluation of students for the school year 2020/2021 under COVID-19 (Republic of Kosovo Ministry of Education and Science, 2020).

7.5 Results

The results section has been organized to cover the primary goals of this chapter. Firstly, examined is the extent to which the Dinaric educational systems were disrupted (Sect. 7.5.1) and how they reacted to the COVID-19 pandemic (Sect. 7.5.2). Next the availability and frequency of practices linked to successful remote instruction and/or distance learning (Sect. 7.5.3) are explored.

7.5.1 Duration of School Closures Due to the COVID-19 Pandemic

Results presented in Tables 7.2 and 7.3 indicate that all the Dinaric education systems were affected by some form of disruption. The start of the disruption to face-to-face teaching happened around the same time (March of 2020) for the education systems; however, differences in the timing of the end of the disruption were observed. Similarly, the start date of the school year in September/October 2020 and the further disruptions in connection to the epidemiological situation in each of the examined education systems were also noted. In addition, different types of disruptions occurred depending on school location (e.g., Albania) or the grades, for example, primary vs. lower secondary grades (e.g., Croatia and Slovenia).

Concerning the school principals' reports (Table 7.3), it becomes even more evident that there was a significant variation in the duration of these disruptions between education systems during the school year 2020/2021. School principals in Slovenia reported the highest interference with normal school operations; 83% of schools reported that their students experienced disruption for over eight weeks. School principals in Montenegro, Croatia, and Serbia reported similar numbers for about one-third of schools, and in North Macedonia for one-quarter of schools. The least school disruption was reported for Kosovo and Albania. According to principals' reports, students in one-third of schools were not affected by disruption in North Macedonia; in Serbia and Albania, the same is reported for students in one-quarter of schools.

In connection with the disruption caused by COVID-19, all parents in Croatia and Slovenia reported that their children stayed home at some point because of the COVID-19 pandemic. The lowest reported indices are for Montenegro (83.1%) and Serbia (83.5%). With higher percentages reported by parents in North Macedonia (85.4%), Albania (90.3%), and Kosovo (96.0%). These answers reflect not only parents' perceptions of the epidemiological situation in each participating education system and the levels of school closures but also the particular policy decisions that provided parents with a choice whether to send their child to school. An example of such an agency given to parents may be found in Serbia, where parents could opt out of direct instruction at the beginning of the school year in September and October 2020, and the school would provide a digital solution.

Table 7.2 Direct instruction disruption period during spring 2020 and school year 2020/2021

Education system	School closure date in 2020	End of the disruption in 2020	Start date for the 2020/2021 school year	Disruption(s) during the 2020/2021 school year
Albania	March 8	End of the school year in June.	September 2020	During February 2021 for some lower and upper secondary schools in major cities.
Croatia	March 16 (3 days earlier in the Istria region)	May 8, 2020 (only grades 1 to 4 continued with a face-to-face model; a combined approach was used for others).	September 2020	– For most of the school year, grades 1 to 4 continued to use face-to-face instruction. – Due to the omicron variant outbreak in the winter of 2021, distance learning was dominant in all grades of primary and secondary schools.
Kosovo	March 13	End of the school year in June.	September 2020	Not applicable
Montenegro	March 12	End of the school year in June.	October 1, 2020	A hybrid model was dominant.
North Macedonia	March 11	End of the school year in June.	October 1, 2020	A hybrid model was implemented in grades 4 and beyond.
Serbia	March 16	Partial shutdown from May	September 2020 At this point, parents could decide whether to send their children to school or keep them home	November 1, 2020, until January 2021. For the remainder of the school year, a hybrid model of instruction was implemented throughout the country.
Slovenia	March 16	Reopening May 18 for grades 1–3 Reopening May 2 for grades 4–9	September 2020	November 1, 2020, until January 2021. For the remainder of the school year, a hybrid model of instruction was implemented throughout the country.

Source: PIRLS 2021 encyclopedia (Reynolds et al., 2022)

Table 7.3 Percentage of students in schools affected by the disruption of normal primary school operations due to the COVID-19 pandemic in the academic year 2020/2021 as reported by school principals

		Education system						
		Albania % (S.E.)	Croatia[a] % (S.E.)	Kosovo % (S.E.)	Montenegro % (S.E.)	North Macedonia % (S.E.)	Serbia % (S.E.)	Slovenia % (S.E.)
Time that school operations were affected by COVID-19 pandemic	Not affected by the COVID-19 pandemic	25.0 (3.8)	1.5 (0.9)	8.8 (2.3)	1.9 (0.0)	34.0 (3.5)	28.6 (3.9)	2.9 (2.0)
	Less than two weeks of instruction	52.2 (4.3)	5.1 (2.9)	39.2 (4.0)	6.4 (0.9)	8.9 (2.4)	4.3 (1.6)	3.8 (1.5)
	Two weeks to four weeks of instruction	8.6 (2.8)	25.8 (3.9)	37.8 (4.1)	13.9 (0.3)	27.9 (4.6)	19.2 (3.0)	2.2 (1.3)
	Five weeks to eight weeks of instruction	1.1 (0.9)	32.7 (4.4)	4.1 (1.8)	40.3 (0.7)	2.9 (1.7)	14.6 (2.8)	8.1 (2.5)
	More than eight weeks of instruction	13.1 (2.9)	34.9 (4.4)	10.2 (2.7)	37.5 (0.5)	26.3 (4.1)	33.2 (4.2)	83.0 (3.4)

Note: [a]Croatia had a 6-month delay for the data collection period

7.5.2 System Reaction and Methods of Distant Learning

In all education systems, between 86.7% (Albania) and 100% (Montenegro, North Macedonia, and Slovenia) of schools provided remote instruction or distance learning resources for primary grades when normal school operations were affected by the COVID-19 pandemic (Table 7.4).

In relation to the distance learning resources provided by schools, it was observed that generally, printed learning materials were used less than internet-based resources. While the former did dominate in Serbia (nearly 90%), printed materials were used to a lesser extent in Croatia (44%) and Slovenia (57.7%). On the other hand, internet-based resources were widely available in all Dinaric education systems, with around 98% of schools providing these in Slovenia and Croatia. Internet-based resources were used the least in Serbia but were still highly present (74.1%).

Despite visible variability, digital devices for students and teachers were available to a large extent across all Dinaric education systems. While this coverage was nearly complete for all students and teachers in Slovenia, in Serbia, only two-thirds of students were offered this support, compared to just over 96% of teachers who had access to digital devices. Overall, the availability of digital devices as a resource for teachers was more manageable across almost all the examined education systems. Only in Albania was this ratio in favor of the students. Technical support was most substantial in Slovenia and Croatia, followed by Serbia and Montenegro. As a resource, technical support was the least present in Albanian schools (68.3%).

Technical and overall resource support in many education systems was coordinated by national ministries of education (acronyms MoE, MoSE, MoESY, or MoESTD in Table 7.5). In Croatia, for example, the "School for Life" website, created for the experimental phase of the comprehensive curricular reform in academic years 2018–2019 and 2019–2020 (Divjak & Pažur Aničić, 2019), expanded its purpose during the COVID-19, pandemic and became both a communication platform for the ministry with other stakeholders, a source for digital teaching materials, and also provided short video lessons to support remote instruction, all coordinated by the ministry. Technical support was provided by the Croatian Academic Network (CARNET). In Serbia, in addition to the coordination of the provision of digital lessons, the ministry enabled the first-ever online assessment using the Moodle platform at the end of April 2020. The primary goal of the online assessment was to prepare approximately 68,000 eighth-grade students for their upcoming final examinations. In Slovenia, a number of resources to aid remote teaching and learning were already in place before the COVID-19 pandemic. These included systems for reporting student grades, virtual learning environments, or learning management systems. Upon the COVID-19 disruption, additional digital lessons or learning materials were developed by different stakeholders, while some publishing houses shared electronic and interactive textbooks and other materials. A physical distribution of paper-based materials was provided for households with no computer and/or internet connection. A joint education support centre was established to assist and guide teachers in successfully implementing distance

Table 7.4 Percentage of students offered remote instruction and distant learning resources during the COVID-19 pandemic, as reported by school principals

		Education system						
		Albania % (S.E.)	Croatia[a] % (S.E.)	Kosovo % (S.E.)	Montenegro % (S.E.)	North Macedonia % (S.E.)	Serbia % (S.E.)	Slovenia % (S.E.)
Percentage of students	Receiving remote instruction or distance learning resources	86.7 (3.1)	94.8 (2.0)	91.2 (2.4)	100.0 (0.0)	100.0 (0.0)	97.1 (1.4)	100.0 (0.0)
	Receiving printed learning materials	60.2 (4.6)	44.0 (4.4)	66.2 (4.9)	86.7 (0.2)	83.0 (3.9)	89.8 (2.6)	57.7 (4.3)
	Receiving internet-based resources	89.9 (2.9)	97.1 (1.5)	87.4 (3.6)	95.1 (0.1)	81.6 (3.2)	74.1 (3.7)	98.4 (1.1)
	Receiving recommendations	96.1 (1.6)	98.5 (1.0)	94.5 (1.4)	100.0 (0.0)	93.5 (2.5)	99.2 (0.8)	100.0 (0.0)
	Receiving technical support	68.3 (4.2)	98.5 (1.0)	75.5 (4.6)	94.9 (0.1)	88.6 (3.1)	95.1 (1.7)	100.0 (0.0)
	Receiving digital devices – students	77.5 (3.7)	92.7 (2.2)	71.4 (5.0)	72.6 (0.7)	74.0 (4.0)	66.2 (3.9)	99.1 (0.9)
	Receiving digital devices – teachers	71.3 (3.8)	98.5 (1.0)	76.2 (4.3)	87.4 (0.7)	83.1 (2.7)	96.4 (1.5)	100.0 (0.0)

Notes: all cells denote the "yes" category

[a]Croatia had a 6-month delay for the data collection period

Table 7.5 Support mechanisms during the COVID-19 disruption

Education system	Support to students, teachers and schools	Production of learning materials	Key challenges
Albania	MoESY, with the Agency for Quality Assurance of Pre-University Education, supported schools.	Not applicable	Conducting training for teachers to develop digital skills.
Croatia	MoSE provided aid for children of lower SES. The "School for Life "website, created before the pandemic, became a pillar in providing resources and facilitated communication between MoSE and other stakeholders.	During the school year 2020/2021, 2125 TV scripts, 734 hours of educational programmes, and 1500 digital resources for classroom teachers.	/not applicable
Kosovo	Partners German GIZ, UNICEF, Save the Children, and OSCE provided more than 2000 tablets and laptops to schools. The same partners provided training for teachers.	/not applicable	Lack of equipment, poor internet coverage.
Montenegro	MoE, in cooperation with other CSOs and developing partners such as UNICEF, distributed technological tools (tablets, laptops) to students/families in need. MoE provided access and teacher training via Microsoft Teams platform.	The Learn-at-Home platform contains more than 3500 online lectures on 20 subjects (available on their YouTube channel).	Poor digital skills, network issues, accessibility, lack of training, as well as resistance to change among students, teachers, and parents.
North Macedonia	Many families received free internet access and equipment.	An online platform called EDUINO was developed, offering over 4.000 video lessons and games. The platform fully supports distance learning.	Lack of equipment and internet coverage.
Serbia	The pilot project "Bridging the digital divide for the most vulnerable children" (EU delegation in Belgrade and UNICEF) supported children from vulnerable groups in 144 schools around the country by providing		Most teachers had no prior experience with distance teaching. Availability of distance learning to vulnerable groups (Roma students, students of low socio-economic standings, and students with special

(continued)

Table 7.5 (continued)

Education system	Support to students, teachers and schools	Production of learning materials	Key challenges
	equipment and training for teacher assistants. Government, NGOs, and private companies equipped schools with learning management systems and free internet access. MoESTD enabled the first-ever online assessment in the country at the end of April 2020 via the Moodle platform.		needs). Many teachers lacked equipment. Some teachers did not have access to the internet. Increased workload of teachers.
Slovenia	Some publishing houses provided free electronic and interactive materials (e.g., textbooks, workbooks, independent workbooks and tutorials) to all teachers, parents and pupils. MoE provided around 9000 computers to the students. Professional development for teachers aimed at supporting the use of ICT was facilitated in synergy with academic institutions.		Recorded difficulties for students in vulnerable groups (low socioeconomic standings, students with migrant backgrounds, students with special educational needs, etc.)

Source: PIRLS 2021 encyclopedia (Reynolds et al., 2022)
Notes: MoE, MoSE, MoESY, or MoESTD

education coordinated by the University of Maribor. Reports also indicate that during COVID-19 in some of the education systems, lack of equipment (i.e., North Macedonia, Kosovo) and poor internet connection (i.e., Kosovo, Montenegro), coupled with low levels in teachers' digital skills (i.e., Albania, Montenegro) or prior use of digital services (i.e., Serbia), were a key challenge. In addition, a substantial increase in teachers' workload was recorded during the COVID-19 disruption (e.g., in Serbia).

Analyses of national reports also show resourcefulness and variability in platforms and the means used to provide digital lessons or foster teacher-student communication. Thus, both existing learning management systems, such as Moodle and Google Classrooms, were in use, and newly developed platforms were implemented (e.g., North Macedonia EDUINO). YouTube channels were also

widely used (e.g., in Albania, the Ministry had a dedicated channel on YouTube for students to follow and repeat the topics learned at any time).

National television broadcasts supported learning with content linked to national curricula in all examined education systems (see Table 7.6). By all means, this

Table 7.6 Distance teaching implementation models covering spring 2020 and the 2020/2021 school year

Education system	Models of distance teaching
Albania	Albanian radio television created a television channel dedicated to teaching. Ministry of Education dedicated a YouTube channel for students to foster learning.
Croatia	Three modes: 1) TV lessons "School on the Third Channel" – broadcasted on channel 3 of the Croatian radio and television network (national abbreviation HRT3) class teaching. 2) A combination of TV lessons and tasks given by the class teacher. 3) The mode of teaching created/chosen by the class teacher, appropriate to the context.
Kosovo	Broadcasting in local media and on a YouTube channel Three modes: 1) Face-to-face instruction 2) Blended learning 3) Online instruction
Montenegro	Three modes: 1) Online programme for all education levels #UciDoma (Learn from Home) broadcasted on three national channels in Montenigrian and Albanian languages 2) Face-to-face instruction 3) A combined approach
North Macedonia	Three modes: 1) TV lessons called "*TV classroom"* on national TV service (i.e., Macedonian Radio and Television MRTV 2) Face-to-face 3) Combined instruction
Serbia	TV lessons in Serbian and several minority languages were broadcast on national TV services. This was combined with teacher instruction via different learning management systems. Modes of instruction included a) face-to-face and b) combined instruction (face-to-face and distance learning) depending on school capacities. Schools were given the autonomy to choose the most appropriate mode.
Slovenia	National television broadcasts were used to support learning with content linked to the syllabuses. Three modes: 1) face-to-face 2) All students follow the instruction in school but with recommendations to prevent infection applied 3) Combined – some students follow the instruction in school, others do distance learning 4) All students do distance learning. *Model 2 was mainly applied throughout schools, but the situation varied during the year depending on the pandemic*.

Source: PIRLS 2021 encyclopedia (Reynolds et al., 2022)

endeavor represented a principal source in providing remote teaching to students. It demanded coordinated work between the national ministries, educational agencies and institutes, schools, and teachers. Different modes across all education systems were used to deliver such material depending on the resources and target groups. The teachers had to monitor how the students understood the material and to what degree they had mastered it, so they often organized supplementary instructions for the students with real-time interaction using learning management platforms like Moodle.

In regard to parents' perception of school engagement with their child's home-based learning, a dominant format of learning resources across all education systems except Serbia favored online activities provided by the school; this aligns with earlier reports by school principals. At the same time, there is an overall lower perception of the availability of printed learning materials compared to the reports displayed in Table 7.4. Interestingly, parents largely reported being provided additional educational resources during the pandemic, which also included digital devices or digitally based learning activities. The home questionnaire does not provide information on the source of these digitally based learning activities. Yet, there was a noticeable variation in parents' reporting concerns on their role in online instruction or tutoring. Less than 10% of parents report this concern in Slovenia, compared to three-quarters of parents in Montenegro (Table 7.7).

At the same time, while most parents believe their child's progress was somewhat adversely affected during the COVID-19 pandemic, more variation is visible in the answers of parents who believe their child's progress has been affected a lot, as reported by nearly half of the parents in Montenegro (Table 7.8).

7.5.3 Using Digital Devices, Availability, and Training

Digital technologies may serve their purpose for teaching when educational systems are sufficiently ready for using them, which implies not only having access to the internet and being equipped with digital devices but also having teachers with sufficient digital skills and regular access to the available resources. The situation is similar for the students.

During the disruption and the introduction of distance learning and teaching on a large scale, some support was continuously provided for teachers and students (see Tables 7.4 and 7.5). However, greater ease of use is assumed when prior similar practices were already in place, and national reports indicated a lower level of teachers' digital skills in some of the examined education systems.

From teachers' reports, one can conclude that the professional development they had previously experienced was focused more on instruction related to digital literacies than integrating technologies into reading instruction (Table 7.9). The opposite trend is noticeable only in Albania. Inquiry into professional development covers the two years before PIRLS data collection.

Table 7.7 Percentage of schools engaging with students' home-based learning and providing additional educational resources during the COVID-19 pandemic

	Type of assignment	Education system						
		Albania % (S.E.)	Croatia[a] % (S.E.)	Kosovo % (S.E.)	Montenegro % (S.E.)	North Macedonia % (S.E.)	Serbia % (S.E.)	Slovenia % (S.E.)
School engagement with students' home-based learning	Reading assignments	59.4 (1.5)	62.2 (1.1)	58.6 (1.1)	35.9 (0.8)	39.7 (1.5)	59.7 (1.3)	83.7 (0.8)
	Online activities	85.0 (1.1)	92.1 (0.8)	86.9 (0.6)	95.9 (0.3)	94.0 (0.8)	59.7 (0.6)	92.5 (0.5)
	Printed learning materials	29.3 (1.5)	32.7 (1.0)	21.0 (0.9)	34.9 (0.8)	23.5 (1.2)	29.2 (1.5)	62.5 (1.2)
Schools providing additional educational resources during the pandemic reported by parents	Books	75.4 (1.7)	47.6 (1.2)	77.3 (1.0)	47.4 (1.0)	69.9 (1.4)	54.7 (1.3)	67.6 (0.9)
	Digital devices	57.7 (1.7)	80.8 (0.9)	50.1 (1.2)	57.3 (0.9)	67.8 (1.5)	68.2 (1.1)	79.8 (0.7)
	Digitally based learning activities	42.1 (1.7)	62.5 (1.2)	39.7 (1.1)	51.0 (0.9)	51.0 (1.4)	57.4 (1.2)	67.5 (0.9)
	Online instruction or tutoring	63.5 (1.5)	18.6 (0.8)	68.7 (1.1)	74.6 (0.7)	19.0 (1.3)	62.3 (1.8)	9.6 (0.5)

Note: All cells denote the "yes" category

[a]Croatia had a 6-month delay for the data collection period

Table 7.8 Percentage of students whose parents reported whether their child's learning progress has been adversely affected

Variable	Education system						
	Albania	Croatia[a]	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
	%	%	%	%	%	%	%
	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)
A lot	11.2 (1.3)	33.3 (1.2)	16.9 (0.9)	45.4 (1.0)	20.0 (1.3)	26.5 (1.2)	25.4 (0.9)
Somewhat	47.6 (1.8)	51.9 (1.3)	54.8 (1.1)	48.4 (1.1)	57.4 (1.4)	58.8 (1.1)	58.2 (0.9)
Not at all	41.2 (1.8)	14.8 (0.8)	28.3 (1.2)	6.2 (0.4)	22.5 (1.2)	14.8 (0.9)	16.4 (0.7)

Note: [a]Croatia had a 6-month delay for the data collection period

As to the practices concerning teaching digital literacy skills—reading activities with the whole class using digital devices or reading digital texts during reading instruction—both practices exist within the Dinaric education systems. However, it seems there is no particular pattern in the frequency of such practices. Reading digital texts during reading instruction across most education systems occurs from several times a month to several times a week, except in North Macedonia, where one-third of teachers reported this as almost a daily practice. The use of digital devices for reading activities with the whole class has a similar pattern of occurrence (i.e., between a few times a year and once or twice a month). At the same time, around one-third of teachers in Serbia and Croatia reported this practice on a weekly basis, and in North Macedonia, almost 57% confirmed this. Finally, teaching digital literacy skills happens across the Dinaric education systems from once a month to once a week, and 55% of teachers in North Macedonia reported this as a daily practice. Appendix A shows a significant correlation between the above-mentioned practices. The correlation between using digital devices during reading activities and reading digital text during reading instruction is the highest, especially in Croatia and Montenegro. Overall correlations between the three practices are the lowest in Kosovo.

Teachers reported having devices available, and sharing between students within the class is the most common practice (Table 7.10). Bringing your own device is a practice dominating only in Albania. In North Macedonia, there seems to be a clear focus on having the digital device available during reading instruction. In Albania, two-thirds of students reported having access to shared devices; in other education systems, this is between 70 and 80% of students. Internet coverage is above 80% in Albania and Kosovo and well above 90% for the other education systems. The dominant device is a smartphone, which is especially visible in Serbia when comparing owning a smartphone to computers/tablets (Table 7.11).

Between the Dinaric education systems, students in Serbia view themselves as the most competent (75.6%), compared to 57.6% in Albania. Very few students feel incompetent; in Croatia, there are almost none. Interestingly, students report more

Table 7.9 Professional development and teaching practices

Type			Education system				
	Albania	Croatia[a]	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
	%	%	%	%	%	%	%
	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)
Professional development: *Percentage of students with teachers who participated in the respective training*							
Integrating technology into reading instruction	59.0 (3.6)	49.6 (3.9)	39.2 (3.5)	41.7 (2.6)	52.0 (4.6)	42.0 (3.7)	28.5 (3.1)
Instruction related to digital literacies	48.4 (4.2)	78.4 (3.1)	38.1 (3.5)	64.5 (2.3)	55.2 (4.2)	77.7 (3.3)	49.4 (3.9)
Teaching digital literacy skills (e.g., read, write, and communicate using digital tools/media): *Percentage of students with teachers who reported a respective frequency for the teaching approach*							
Every day or almost every day	18.0 (3.3)	14.4 (2.5)	35.7 (3.5)	13.1 (1.8)	55.5 (4.3)	13.0 (2.8)	8.6 (1.8)
Once or twice a week	39.8 (4.03	28.1 (3.2)	34.6 (4.7)	23.0 (2.2)	31.4 (3.8)	30.3 (3.7)	26.4 (3.0)
Once or twice a month	37.1 (3.9)	38.2 (3.5)	20.9 (3.1)	37.0 (2.9)	12.5 (3.0)	30.3 (3.6)	42.7 (3.2)
Never or almost never	5.1 (2.2)	19.3 (3.6)	8.7 (2.2)	26.9 (2.3)	0.6 (0.5)	26.4 (3.7)	22.3 (2.5)
Reading activities with the whole class (use of digital devices): *Percentage of students with teachers who reported a respective frequency for the teaching approach*							
At least once a week	11.3 (3.6)	38.1 (7.2)	18.2 (4.5)	16.3 (2.8)	56.7 (5.4)	36.2 (7.1)	12.6 (5.1)
Once or twice a month	38.6 (4.6)	26.3 (6.0)	47.4 (5.7)	29.2 (4.1)	18.5 (4.3)	29.3 (6.0)	43.3 (8.3)
A few times a year	46.3 (4.6)	31.3 (5.5)	24.6 (4.3)	44.8 (3.6)	25.7 (4.5)	25.4 (6.1)	36.0 (8.0)
Never or almost never	3.8 (1.9)	4.3 (2.4)	9.8 (3.0)	9.7 (2.0)	9.1 (2.9)	9.1 (3.9)	8.0 (4.1)
During reading instruction, reading digital text: *Percentage of students with teachers who reported a respective frequency for the teaching approach*							
Every day or almost every day	2.3 (1.1)	3.2 (2.2)	3.8 (2.1)	1.8 (0.2)	30.7 (4.5)	3.7 (2.6)	9.4 (4.9)
Once or twice a week	26.2 (5.0)	29.1 (7.3)	38.4 (6.4)	32.3 (4.1)	37.7 (4.2)	36.6 (7.1)	14.8 (5.3)
Once or twice a month	50.9 (5.6)	58.0 (7.3)	37.1 (5.6)	44.4 (3.6)	24.1 (4.1)	40.8 (6.3)	52.7 (8.4)
Never or almost never	20.7 (5.0)	9.7 (3.3)	20.7 (4.0)	21.6 (2.1)	7.5 (2.5)	19.0 (5.0)	23.0 (7.6)

Note: [a]Croatia had a six-month delay for the data collection period

Table 7.10 Digital device availability at school

Device availability for students	Education system						
	Albania	Croatia[a]	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
	%	%	%	%	%	%	%
	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)
Reported by teachers							
Digital device available to use during reading instruction	53.0 (4.2)	26.4 (3.0)	52.8 (4.6)	24.3 (2.3)	91.0 (2.2)	31.7 (3.8)	18.8 (2.8)
One-to-one device	7.3 (2.3)	43.2 (6.3)	8.9 (3.0)	4.2 (2.0)	16.5 (3.5)	34.7 (8.1)	16.5 (3.5)
Shared within class	18.4 (3.6)	60.4 (6.2)	38.6 (5.2)	30.4 (4.1)	30.4 (4.1)	67.6 (6.4)	46.6 (10.2)
BYOD	53.8 (5.5)	10.7 (3.5)	23.1 (6.0)	19.8 (2.7)	36.8 (5.2)	8.3 (3.4)	5.6 (3.0)
Reported by students							
Own shared computer/ tablet	66.1 (1.1)	79.2 (1.0)	75.3 (1.1)	71.3 (0.9)	74.5 (1.0)	75.5 (0.9)	71.8 (0.8)
Own computer/ tablet	53.4 (1.4)	73.5 (1.0)	63.2 (1.2)	51.5 (0.7)	61.8 (1.0)	49.1 (0.9)	61.6 (0.8)
Own smartphone	43.5 (1.2)	91.6 (0.5)	65.0 (1.1)	76.1 (0.8)	73.5 (1.2)	86.4 (0.9)	72.9 (0.9)
Internet connection	83.5 (0.9)	93.5 (0.8)	84.7 (0.8)	92.1 (0.5)	90.7 (0.6)	95.2 (0.5)	91.8 (0.6)

Notes: All cells denote the "yes" category
[a]Croatia had a 6-month delay for the data collection period; *BYOD* bring your own device

frequently using digital devices for schoolwork on a normal school day than their teachers when asked about finding and reading information.

7.6 Discussion

The focus of this chapter was twofold. First, we examined how the Dinaric education systems reacted to the COVID-19 pandemic and how they coped with the global disruption of regular schooling. All systems were disrupted, but the level of disruption varied as time passed, given the epidemiological situation in each country concerning COVID-19. A typical pattern in all the systems was that the response was immediate and comprehensive since all systems switched to some form of distance learning (Reimers & Schleicher, 2020). Ministries of education took over

Table 7.11 Percentage of students reporting on their competence in using a computer and its use at school

Variable	Education system						
	Albania	Croatia[a]	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
	%	%	%	%	%	%	%
	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)
Being good at using a computer or tablet							
Agree a lot	57.6 (1.3)	66.6 (0.9)	58.5 (1.1)	66.2 (1.0)	64.4 (1.4)	75.6 (1.0)	63.3 (1.0)
Agree a little	26.4 (0.9)	30.3 (0.9)	27.4 (0.9)	23.3 (0.8)	25.2 (1.2)	18.1 (0.8)	31.5 (0.9)
Disagree a little	9.5 (0.8)	2.7 (0.4)	8.9 (0.5)	5.1 (0.4)	6.5 (0.6)	4.1 (0.5)	4.2 (0.4)
Disagree a lot	6.4 (0.9)	0.4 (0.1)	5.1 (0.5)	5.5 (0.4)	3.8 (0.5)	2.2 (0.3)	1.1 (0.2)
Using digital devices–Finding and reading information							
No time	13.8 (1.0)	11.6 (1.0)	13.4 (0.7)	22.2 (0.8)	14.2 (1.6)	17.2 (0.9)	25.0 (0.7)
30 minutes or less	56.7 (1.2)	63.6 (1.4)	46.6 (1.1)	51.1 (0.9)	53.1 (1.7)	49.4 (1.1)	52.9 (0.8)
More than 30 minutes	29.5 (1.4)	24.7 (0.9)	40.0 (1.0)	26.7 (0.9)	32.7 (1.3)	33.5 (1.2)	22.1 (0.7)

Note: [a]Croatia had a delayed data collection

the organizing role, communicating and fostering the teaching and learning process, engaging with learning management platforms, and broadcasting services to ensure learning resources reached all students. The schools' role in that process was also valuable. Country reports demonstrated the variety of practices in place, challenges met, and how technical and resource support was delivered. While some of these pillars were already established in countries like Croatia and Slovenia (Elezović & Bosnić, 2022; Meinck et al., 2022), others faced more challenges (e.g., Albania and Montenegro) due to the poor availability of digital devices and outdated equipment (OECD, 2020; Reimers, 2022). Despite existing resources, others also needed to create new ones (e.g., an online assessment system in Serbia) or optimize current resources (e.g., CARNET use in Croatia or collaboration with the University of Maribor in Slovenia).

Earlier studies showed a mixed picture concerning the digital skills of teachers and their practices using digital tools in teaching or even access to these (Kovács Cerović et al., 2021; OECD, 2020; Reimers, 2022; Ristić Dedić & Jokić, 2021). Current data show that while all teachers had access to professional development, these focused more on instruction on digital literacy than the integration of technology in (reading) instruction. Such experiences may also explain why certain practices concerning the use of digital resources are not as frequent, except in North Macedonia. However, this does not speak of the quality of the implemented practices per se. Still, the results on varied correlations between different types of practices

(i.e., teaching digital literacy skills, reading activities with the whole class using digital devices, or reading digital texts during reading instruction) and country differences warrant further investigation on the quality of such practices and how they are applied in the context of interest.

Finally, while we do see some mixed results in equipment availability, it seems at least smartphones are primarily available among the fourth graders. However, owning a laptop or tablet is not far behind in some of the education systems, confirming earlier findings (Ristić Dedić & Jokić, 2021). Overall, fourth graders perceive that they use digital tools daily at school and maintain positive views of their competence. While teachers reported on such use less frequently, this can also be due to differences in what both groups have been asked, such as "schoolwork" compared to "reading instruction." Nevertheless, digital tools are here to stay, and their need and use have been demonstrated on a large scale during the COVID-19 pandemic. Valuable lessons can be and should be drawn on how their use can be further optimized to answer the demands of the schools in the future and even more so of the prospective digital competencies students need to acquire. At the same time, while the COVID-19 pandemic was a unique challenge, it can be expected that schools may again face similar challenges, such as school closures due to extreme weather conditions. In that regard, integrating technology in (reading) instruction becomes very relevant to teachers' everyday practices and is an element all teachers seem to need more support with on *how* and *when* to implement technology.

7.7 Limitations and Future Research

This chapter focused on creating a snapshot of disruption and response measures in connection to the challenges posed by COVID-19 across the Dinaric education systems. With that in mind, this is a dominantly descriptive exploration. In addition, we use cross-sectional data, and while we combine both quantitative and qualitative data sources, we can draw conclusions about the frequency of some of these practices rather than their quality. Nonetheless, based on the results, comparing data from TIMSS 2023 at a country level would be interesting in relation to COVID-19 (e.g., access to digital devices, instruction supported by digital devices) and would allow for a certain follow-up at the system level. In addition, current results prompt in-depth additional analyses at the county level concerning the teacher practices we examined and their varied correlation (e.g., the example of Kosovo). We are especially interested in seeing if the quality of such practices and how they are implemented in reading instruction, in particular, can contribute to explaining varied correlations. In connection to practices, additional inquiry with school principals may shed light on the most demanding aspects of school operation during the COVID-19 disruption, thus providing valuable lessons for future similar events and the use of digital tools and devices.

7.8 Conclusions

The COVID-19 pandemic triggered severe global challenges for education systems worldwide, and the Dinaric region was no exception. The response was immediate and versatile, with Dinaric education systems facing many challenges with equipment, access, communication, and the facilitation of digital skills. Important lessons were learned, yet systems still require support in embedding digital tools in daily instruction and optimizing existing services and equipment. At the same time, given the diversity of systems within the Dinaric region, coupled with numerous regional initiatives on different aspects related to teaching and learning, experiences derived during the COVID-19 disruption can also be used as a valuable tool for regional cooperation by sharing and adopting successful practices, as well as finding solutions for those pain points that all Dinaric systems are struggling with.

Appendix A Correlation Between Reported Teacher Practices

Education system	Teacher practice	Correlation 1	Correlation 2
		(1)	(2)
Albania	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	0.38	
	Teaching digital literacy skills (3)	0.34	0.44
Croatia	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	**0.67**	
	Teaching digital literacy skills (3)	0.36	0.44
Kosovo	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	0.28	
	Teaching digital literacy skills (3)	0.11	0.19
Montenegro	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	**0.59**	
	Teaching digital literacy skills (3)	0.14	0.37
North Macedonia	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	**0.45**	
	Teaching digital literacy skills (3)	0.09	0.28

(continued)

Education system	Teacher practice	Correlation 1	Correlation 2
		(1)	(2)
Serbia	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	0.28	
	Teaching digital literacy skills (3)	0.32	0.35
Slovenia	Reading activities with the whole class (use of digital devices) (1)		
	During reading instruction, reading digital text (2)	**0.46**	
	Teaching digital literacy skills (3)	0.44	0.39

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Chapter 8
Data Collection During a Pandemic. How Did COVID-19 Impact the Sample Composition in PIRLS 2021?

John Jerrim and Duygu Savaşcı-Smith

8.1 Introduction

A primary aim of many social surveys is to provide estimates of "population parameters"—a number that describes a quantity of interest amongst a broader population (e.g., an entire country, state, or city). To achieve this goal, obtaining sample data that are genuinely representative of this broader population is key. This is not an easy task. The population has to first be tightly defined, a sampling frame developed, the sample then drawn, and then the data collection takes place. Those conducting the study must then convince as many of those selected in the sample to participate as possible. Unfortunately, at each stage of this process, some potential participants are lost, incrementally increasing the risk that bias starts to creep into the sample. This, in turn, may bring into question whether one key goal of the study—to obtain unbiased estimates of selected population parameters—has truly been met.

It is because of such issues that data representativeness is taken so seriously in large-scale international assessments (ILSAs) such as IEA's Progress in International Reading Literacy Study (PIRLS). As one of their primary aims is to compare population parameters across countries and over time, obtaining nationally representative samples—which truly reflect the characteristics of the country as a whole—is key. Challenging criteria are hence set by those coordinating such studies—including the IEA (International Association for the Evaluation of Educational Achievement). It is because of such issues that data representativeness is taken so seriously in large-scale international assessments (ILSAs) such as PIRLS. As one

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of their primary aims is to compare population parameters across countries and over time, obtaining nationally representative samples—which truly reflect the characteristics of the country as a whole—is key. Challenging criteria are hence set by those coordinating such studies—including the IEA—for countries to minimize exclusion rates and maximize school and pupil participation rates. If they fail to do so, then countries run the risk of being excluded from international reporting (or having their data flagged as being problematic) if the risk of bias is deemed too high.

While most countries manage to achieve impressively high participation rates and low exclusion rates in most ILSAs, in some this has proven to be a consistent struggle. A relatively small but growing academic literature has provided some national case studies into this issue. For instance, Anders et al. (2021) investigate Canada's Programme for International Student Assessment (PISA) 2015 data, establishing how a combination of high exclusion and low response rates leads to serious questions about whether it is truly representative. Building on this work, Jerrim (2021) demonstrates how PISA 2018 sample members in England and Wales achieved higher national examination grades than among the population as a whole. Freitas et al. (2016) and Pereira (2011) investigated related issues with respect to PISA in the case of Portugal. They found that issues surrounding sampling and response had an impact on the PISA scores in this country, including changes over time. Jerrim (2013), building on Micklewright et al. (2012), similarly notes issues with changes in PISA scores for England over time due to low response rates in the 2000 and 2003 waves, illustrating how rather different results emerge if one considers IEA's Trends in International Mathematics and Science Study (TIMSS) data instead. In Türkiye, Spaull (2019) discusses the issue of changing eligibility criteria for the PISA study, demonstrating how this may have impacted comparisons of scores in this country over time. Providing evidence on how exclusion rates vary across ILSAs conducted by the IEA, Atasever et al. (2024) show that, prior to the pandemic, there had been a relatively small increase in exclusion rates over time. However, they also find only a weak negative association between ILSA exclusion rates and test performance at the country level.

Returning to the focus of this volume, similar issues surrounding the national representativeness of the data could pose a challenge for inferences drawn from PIRLS 2021. Non-response to surveys will lead to bias in population parameter estimates if it is relatively high and is systematic (correlated with the survey results). The pandemic may have impacted both of the above. For instance, response rates may have declined due to higher levels of student absence now than previously (a higher level of non-response), with this disproportionately occurring amongst certain groups, such as lower achievers and those from disadvantaged socio-economic backgrounds (greater selectivity in the non-response). Indeed, these may be greater challenges now than ever. At the time these data were collected, many countries were still in the midst of the COVID-19 pandemic. With school closures and staff absences, obtaining high school response rates may have been more difficult than previously. Likewise, with the virus spreading amongst children, pupil absence rates were higher than usual (Tomaszewski et al., 2023), leading to

a greater risk of non-participation amongst pupils. Moreover, with pupils in some countries spending weeks out of school and learning from home (Engzell et al., 2021), behavioral issues may have also increased. This could lead to higher student exclusion rates from the testing if, for instance, they are more likely to be disruptive when the test is taking place. As the pandemic hit countries at different times and with different intensity, such factors may have had more impact on the PIRLS 2021 data collection in some than others. This then potentially has implications for the cross-national comparability of these data and the extent to which they provide a reliable basis to consider changes over time.

This chapter explores such issues in detail, focusing on the PIRLS 2021 data for the Dinaric education systems discussed in this volume. In particular, it explores how exclusion and response rates compare in PIRLS 2021 to the most recent pre-pandemic ILSA that most of these education systems participated in (TIMSS 2019). This reveals whether there is any evidence that exclusion and non-participation rates were higher than usual in PIRLS 2021 and whether the Dinaric education systems were atypical in this respect. We also investigate the background characteristics of the TIMSS 2019 (pre-pandemic) and PIRLS 2021 (during pandemic) samples to explore whether certain groups, such as pupils from lower socio-economic backgrounds, may be underrepresented in PIRLS 2021 due to the pandemic. In doing so, the chapter seeks to help readers of the volume to understand some of the necessary caveats with the PIRLS 2021 data stemming from the collection taking place during the COVID-19 pandemic and what this in turn implies for the results.

The chapter now proceeds as follows: Section 8.2 describes the TIMSS 2019 and PIRLS 2021 datasets and our empirical methodology. Findings are then presented in Sect. 8.3 before conclusions are drawn in Sect. 8.4.

8.2 Data and Methodology

The data source of interest throughout this volume is PIRLS 2021 (von Davier et al., 2023). Across the Dinaric education systems, data collection took place in most between March and June 2021. The exception is Croatia, where the data collection took place slightly later (October/November 2021). Within each education system, a nationally representative sample was drawn. A minimum of 150 schools were first selected with probability proportional to size, with all pupils from a randomly selected class (or classes) then asked to participate. The participating pupils were enrolled in the grade that represents four years of schooling, beginning with the first year of ISCED Level 1, provided that their mean age at the time of testing was at least 9.5 years. The later data collection in Croatia meant these pupils were tested soon after they had entered the subsequent school grade.

As noted in the introduction to this chapter, the COVID-19 pandemic is likely to have led to additional challenges for countries in obtaining nationally representative samples. To investigate this issue further, in an ideal world, one would have access

to administrative/register data in each country that has been linked to the PIRLS 2021 sample, including information that would likely be strongly associated with performance on the PIRLS test (e.g., scores on a national examination). One would then be able to consider how the PIRLS 2021 sample obtained compares to the broader population of interest that it is meant to represent (see Jerrim, 2021 for an example of this method in practice). Such an approach is unfortunately not feasible for PIRLS 2021 in most countries due to the lack of accessible administrative data containing external information on student achievement, including the Dinaric education systems that are the focus of this volume.

We hence take a different approach. Rather than compare PIRLS with administrative records, we compare it to other sample data that were designed to represent a similar population, were collected in a similar manner, yet whose data collection was not impacted by the COVID-19 pandemic. By comparing the PIRLS 2021 data to such an alternative resource, we will be able to better understand the impact that the pandemic had on the survey data collection (such as response rates), as well as whether it has led to any substantial change in the demographic composition of the sample. This will, in turn, help readers to better appreciate the representativeness of the PIRLS 2021 data for the Dinaric education systems and how it compares in this respect to previous ILSAs.

Although the most recent pre-pandemic PIRLS sweep may be the most obvious choice of comparator, we do not focus on this resource for two reasons. First, as the data were collected in 2016, the distribution of population characteristics could have conceivably changed over the intervening five years through to 2021. Second, most of the Dinaric education systems did not participate in the 2016 edition of PIRLS. Hence, one must find a credible alternative resource.

We consequently turn to the TIMSS 2019 data instead. These data were collected between March and May 2019 and included most of the Dinaric education systems that are the focus of this volume (Slovenia is a notable exception). The data were collected less than a year before the COVID-19 pandemic arrived in Europe and hence did not encounter the same challenges with the data collection (in terms of school closures and elevated rates of school absence). In TIMSS, like PIRLS, the population of interest is fourth-grade pupils, with the data collected using a near-identical sample design. It also asks pupils and their parents many of the same background questions—using identical wording—leading to high levels of inter-study comparability. Together, this makes TIMSS 2019 the best available resource to compare the PIRLS 2021 data against (at least for the Dinaric education systems).

Our analysis comparing the PIRLS 2021 to the TIMSS 2019 data proceeds as follows. To begin, we compare overall exclusion rates, school response rates (before replacement), and pupil response rates across the two resources. This will reveal the extent that the pandemic led to greater challenges in obtaining high response rates (e.g., due to school closures or higher pupil absence rates) than previously. This is important as, ceteris paribus, lower response rates and higher exclusion rates increase the risk of bias creeping into the sample, meaning it may no longer be representative of the broader population. We perform this analysis for all jurisdictions that participated in both PIRLS 2021 and TIMSS 2019, allowing us to establish

whether any change in response or exclusion rates were greater or smaller in the Dinaric education systems than elsewhere.

We then turn to our comparison of demographic characteristics across the two samples. If the pandemic has had only a minor impact on the representativeness of the PIRLS 2021 data, then the distribution of key background variables should be very similar. The ideal set of variables to compare are those that are (a) likely to be strongly associated with PIRLS test scores and (b) would be unlikely to have been impacted by the pandemic. Given this, we shall compare the PIRLS 2021 and TIMSS 2019 samples in terms of the following characteristics:

- Age when taking test. *Student questionnaire*.
- Parental education (whether either parent holds a degree). *Home questionnaire*.
- Parental occupation (whether either parent holds a professional job). *Home questionnaire*.
- Absence from school (percent rarely absent). *Student questionnaire*.
- Preschool attendance (percent never attended preschool). *Home questionnaire*.
- Gender. *Student questionnaire*.
- Activities the parent did with the child before they started school. *Home questionnaire*.

These specific variables have been chosen as, out of all the information available, they are likely to be amongst the strongest predictors of the underlying variable of interest (PIRLS test scores). For instance, socioeconomic background, school absence, gender, and preschool attendance are all known correlates of student reading test scores. For continuous measures, the mean average will be presented. For categorical variables (parental occupation, parental education, absence from school, preschool attendance), we will dichotomize the measure (using the thresholds indicated in the bullet-point list above), with the frequency then compared.

8.3 Results

8.3.1 Exclusions

In IEA studies, certain exclusions may occur within the target population for practical reasons. There are two types of exclusions: school-level exclusions and student-level (or within-school) exclusions. School-level exclusion refers to the exclusion of schools from the target grade school list prior to the sample selection process. On the other hand, student-level exclusions involve the exclusion of individual students or intact classes within participating schools during the testing phase.

School-level exclusions may include very small schools (e.g., three or fewer students in the target grade). It may also include schools that are geographically inaccessible, making it difficult to conduct the assessment. For all participating education systems, the student-level exclusions include the same categories: students

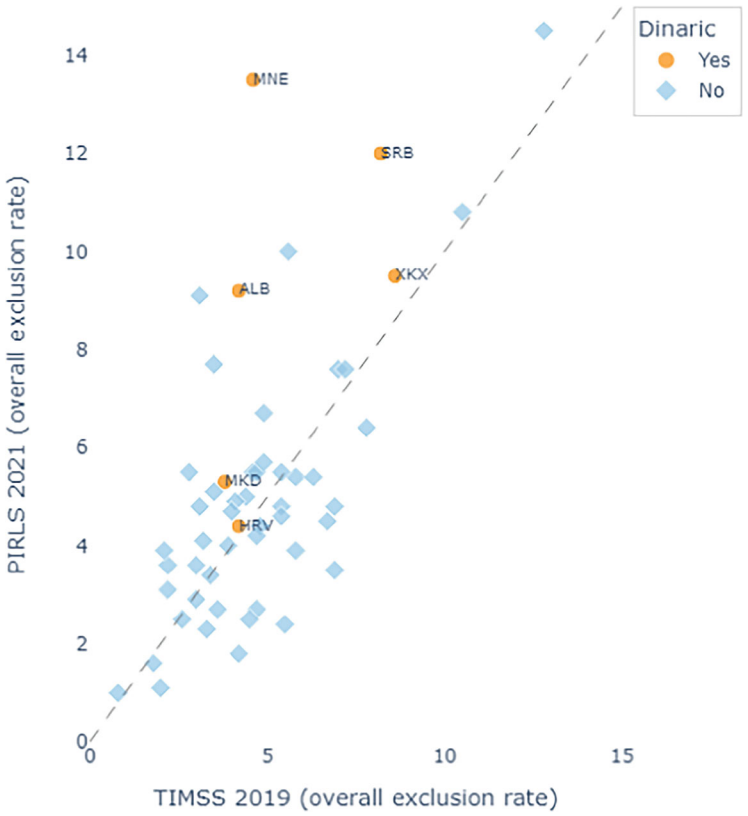

Fig. 8.1 Overall exclusions rates from TIMSS 2019 and PIRLS 2021 across countries
Notes: The *dashed 45-degree line* indicates where the overall exclusion rate from TIMSS 2019 and PIRLS 2021 are equal. *MNE* Montenegro, *SRB* Serbia; *XKX* Kosovo, *ALB* Albania; *MKD* North Macedonia; *HRV* Croatia. *Orange circles* refer to the Dinaric education systems, blue diamonds are all other jurisdictions that participated in both PIRLS 2021 and TIMSS 2019

with functional disabilities, students with intellectual disabilities, and students who are not native speakers of the test language. It is possible that there might be classrooms entirely composed of students who belonged to one of the student-level exclusion categories. These classrooms may also be excluded prior to the class sampling phase, which happens before the assessment of students.

These exclusions, both at the school- and student-levels, add up to total exclusions. If the percentage of the total student exclusions exceeds 5% of the target population, it is noted in the exhibits of the international reports. Fig. 8.1 compares the overall exclusion rate from PIRLS 2021 (vertical axis) to TIMSS 2019 (horizontal axis). This includes all jurisdictions that participated in both studies, with the Dinaric education systems denoted by orange circular markers. The dashed 45-degree line illustrates where the exclusion rate across the two studies is equal.

The first point to note about Fig. 8.1 is that the PIRLS 2021 overall exclusion rate for four out of the six Dinaric education systems clearly exceeds the 5% maximum stipulated by IEA, while North Macedonia (5.3%) sits on the boundary.[1] Usually, countries that exceed this level of exclusions have their results flagged within the reports as covering less than 95% of the national target population. The data points for North Macedonia, Croatia, and Kosovo sit very close to the dashed 45-degree line. This illustrates how the overall exclusion rate for these education systems was very similar in PIRLS 2021 to TIMSS 2019. It hence seems unlikely that, in these two education systems, the COVID-19 pandemic has led to the overall level of exclusions to increase. Indeed, in the case of Kosovo, the high exclusion rate is largely being driven in both TIMSS 2019 and PIRLS 2021 by the sample not including schools where teaching is in Bosnian and Serbian language. Fig. 8.2 presents analogous evidence focusing on within-school exclusions only (i.e., where individual pupils or entire classrooms are exempted from taking the test) and illustrates the data point for Kosovo moves much closer to the other education systems.

The situation for Serbia, Albania, and particularly Montenegro is rather different. The data points for these three education systems sit well above the 45-degree line; overall exclusion rates were much higher in these education systems in PIRLS 2021 than in TIMSS 2019. In Serbia, the exclusion rate increased by around 50% (from 8.2% in TIMSS 2019 to 12% in PIRLS 2021), more than doubled in Albania (from 4.2% to 9.2%), and nearly tripled in Montenegro (from 4.6% to 13.5%). While the school-level exclusions for these education systems remained similar to the rates in TIMSS 2019, the student-level exclusions increased drastically. Moreover, these education systems stand out from most others in this respect; in most education systems, the overall exclusion rate from TIMSS 2019 and PIRLS 2021 was very similar. Figure 8.2 further emphasizes that, particularly in the case of Montenegro, within-school exclusions from PIRLS 2021 were unusually high, nearly a 9% increase compared to TIMSS 2019.

This increase in the overall exclusion rate resulted in Albania and Kosovo being annotated in the PIRLS 2021 technical report with a "2," indicating an exclusion rate of between 5 and 10%, and Montenegro and Serbia being annotated with a "3," indicating exclusions exceeding 10%. The only notable difference, other than the fact that, during the PIRLS 2021 assessment in the middle of the COVID-19 pandemic, none of the Dinaric education systems except for Serbia were able to administer the compulsory field trial[2] administration for PIRLS 2021 due to school closures caused by the COVID-19 pandemic, is that the absence of practicing the administrative aspects of such large studies might have had an impact on the increase in within-school exclusions.

[1] Although 5% is officially the maximum exclusion rate set by the IEA, 5.5% is the threshold used in practice due to figures being rounded to the nearest whole number (Atasever et al., 2024).

[2] Field testing offers participating education systems an opportunity to practice in the sampling, test administration, and scoring procedures. It also serves as a means to test the new assessment items.

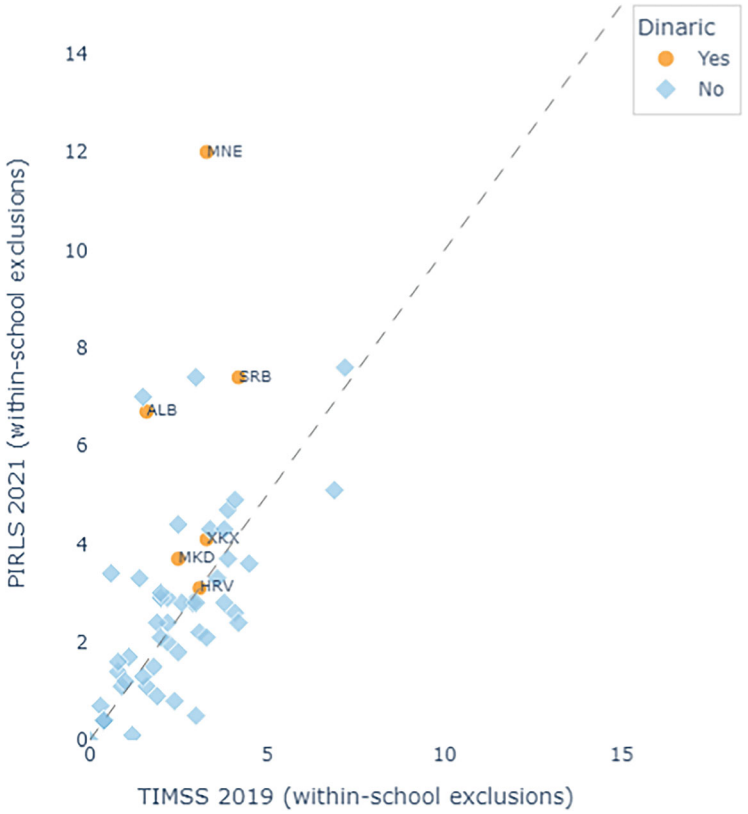

Fig. 8.2 Within-school exclusion rates from TIMSS 2019 and PIRLS 2021 across countries
Notes: *Dashed 45-degree line* indicates where the within-school exclusion rate from TIMSS 2019 and PIRLS 2021 are equal. *MNE* Montenegro, *SRB* Serbia; *XKX* Kosovo, *ALB* Albania; *MKD* North Macedonia; *HRV* Croatia. *Orange circles* refer to the Dinaric education systems, blue diamonds are all other jurisdictions that participated in both PIRLS 2021 and TIMSS 2019

8.3.2 Response Rates

IEA sets high standards for participation rates. It is expected that all sampled schools will participate in the study. However, recognizing that 100% participation might not be feasible, there are strict guidelines to follow. One of them is the 50% within-class participation rate, i.e., at least half of all students within a given class needs to complete the assessment in order for that class to be counted as "participating." If this 50% threshold is not met, the class is deemed to be nonparticipating. If there was only one class selected in the sampled school, this class classified as nonparticipating means the sampled school is considered to be non-participating as well. For PIRLS 2021, this threshold was lowered to 40% (Almaskut et al., 2023). The reason for this rare change was to accommodate the challenges associated with the data collection

Table 8.1 PIRLS 2021 school and class response rates across Dinaric education systems

	School response rate		Class response rate
Education system	Before Replacement	After Replacement	Response rate
Albania	99%	99%	100%
Croatia	92%	95%	97%
Kosovo	100%	100%	100%
Montenegro	100%	100%	99%
North Macedonia	98%	99%	96%
Serbia	100%	100%	99%
Slovenia	95%	97%	100%

coinciding with the COVID-19 pandemic, with some jurisdictions implementing hybrid models of schooling and remote learning. This meant that only about half of the eligible students were physically present in school to attend the test daily. Therefore, a 40% student participation rate, under these conditions, approximated an 80% student participation rate among the available students.

Table 8.1 begins by presenting the school and class response rates for PIRLS 2021 across the Dinaric education systems. In each of the education systems, most of the educational establishments that were randomly selected to take part in the study completed the PIRLS test. Response rates before replacements were approached were at least 95%, exceeding by some distance the minimum threshold that IEA stipulates countries must meet (in PIRLS, when a randomly selected school chooses not to participate, the two adjacent schools on the sampling frame are then approached to take its place). Similar results also hold for most other countries that participated in both TIMSS 2019 and PIRLS 2021 as well (data not shown). This suggests that, in the vast majority of education systems, the COVID-19 pandemic is unlikely to have severely impacted school and class response rates in PIRLS 2021.

Next, we turn to the issue of pupil non-response, with the results presented in Fig. 8.3. The first point to note is that most data points sit below the 45-degree line. This illustrates that, in most countries, pupil response rates were lower in PIRLS 2021 than in TIMSS 2019. This includes the Dinaric education systems that are the focus of this volume. North Macedonia, Croatia, and (particularly) Serbia stand out, however, as having a particularly large difference in pupil response rates across the two studies. Indeed, the difference between the TIMSS 2019 and PIRLS 2021 response rates is bigger in Serbia than in any other education system, falling by 10 percentage points (from 97% to 87%). This possibly indicates that the pandemic may have hindered pupil participation in PIRLS 2021 more in Serbia than elsewhere.

Yet these findings should be considered in the context that the absolute level of the pupil response rate is still admirably high; it remains above the 85% minimum set by IEA and compares favorably with many other sample surveys. While the risk of bias from pupil non-participation may be slightly higher in PIRLS 2021 than in previous ILSAs—and if the data collection had not occurred during the pandemic—it is still likely to remain relatively low in absolute terms.

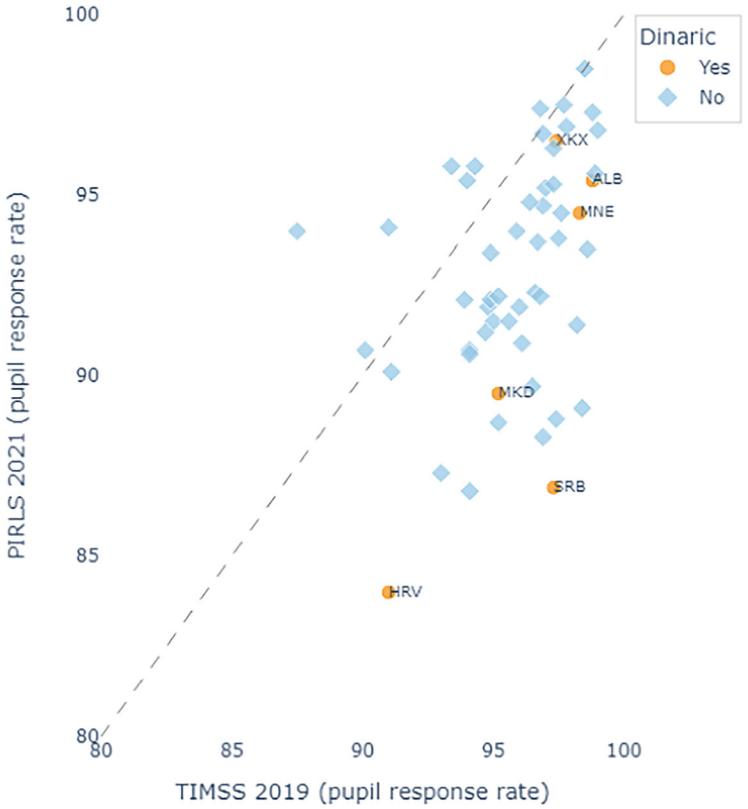

Fig. 8.3 TIMSS 2019 versus PIRLS 2021 pupil participation rates across countries
Notes: *45-degree line* indicates where the pupil response rate from TIMSS 2019 and PIRLS 2021 are equal. *MNE* Montenegro, *SRB* Serbia; *XKX* Kosovo, *ALB* Albania; *MKD* North Macedonia; *HRV* Croatia. *Orange circles* refer to the Dinaric education systems, blue diamonds are all other jurisdictions that participated in both PIRLS 2021 and TIMSS 2019

8.3.3 Comparison of Background Characteristics

To conclude this chapter, we explore how the PIRLS 2021 and TIMSS 2019 samples compare in terms of key background characteristics. Recall that the motivation for doing so is to provide some insight into whether the higher level of exclusions and lower pupil response rate have translated into a different composition of the sample. If so, then this may bring into question whether the PIRLS 2021 data are indeed representative of the intended population.

Figure 8.4 begins with age. This is perhaps the factor that has the greatest potential to differ across TIMSS 2019 and PIRLS 2021, given that data collection had to be delayed in some countries due to the COVID-19 pandemic.

Most education systems, including those in the Dinaric region, sit close to the 45-degree line, illustrating that the average age of the PIRLS 2021 participants was

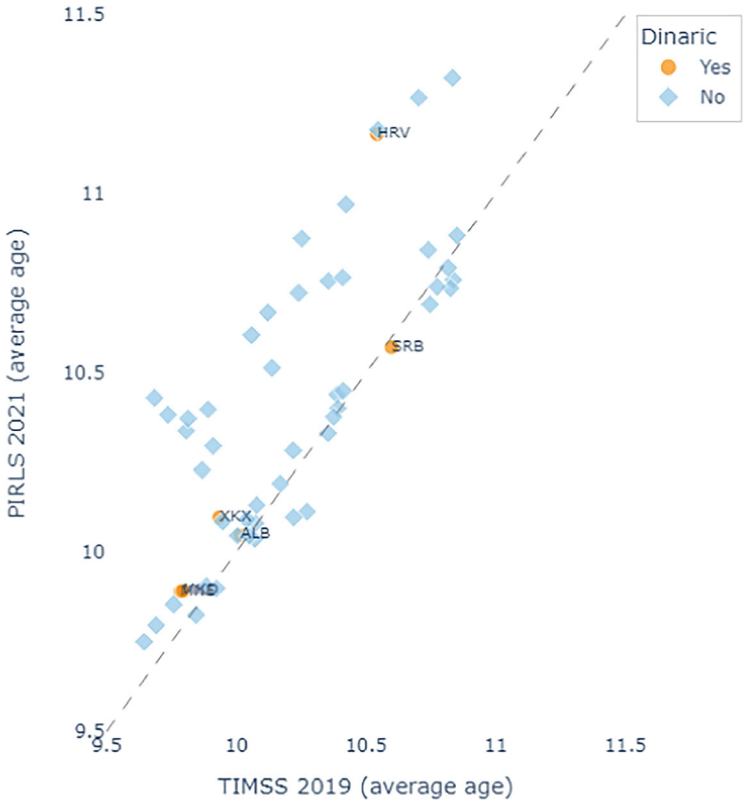

Fig. 8.4 Average age of participants in TIMSS 2019 and PIRLS 2021 across countries
Notes: *Dashed 45-degree line* indicates where the average age of participating pupils in TIMSS 2019 and PIRLS 2021 are equal. *Orange circles* refer to the Dinaric education systems, *blue diamonds* are all other jurisdictions that participated in both PIRLS 2021 and TIMSS 2019

very similar to those who took part in TIMSS 2019. There are, however, a selection of other education systems where the average age in PIRLS 2021 was around six months higher, such as Hungary. More generally, it is interesting to note the cross-national variation in the average age of participants, with those in countries such as Italy, Oman, Malta, North Macedonia, and Montenegro below the age of 10, while the average child who participated in PIRLS 2021 in Hungary, Croatia, Lithuania, and Latvia is older than 11.

Table 8.3 turns to the percentage of students from high socioeconomic backgrounds, defined as either parent holding a degree (right-hand columns) or either parent working in a professional job (left-hand columns). This information has been reported by students' parents as part of a home questionnaire. Response rates to the home questionnaire in TIMSS 2019 and PIRLS 2021 are reported in Table 8.2. In Albania, Montenegro, and Serbia, the response rates to the home questionnaire

Table 8.2 Percentages of TIMSS 2019 and PIRLS 2021 participants with missing home questionnaire data across Dinaric education systems

	Percentage (%) missing parental questionnaire	
Education system	TIMSS 2019	PIRLS 2021
Albania	1.7%	1.9%
Croatia	1.4%	5.6%
Kosovo	1.4%	6.0%
Montenegro	1.9%	1.5%
North Macedonia	9.2%	3.0%
Serbia	1.9%	1.3%
Slovenia	–	8.5%

across the two studies are very similar. There has on the other hand been an increase in parental nonresponse in Kosovo and Croatia and a decrease in North Macedonia.

Starting with parental education, in most of the Dinaric education systems (except Albania), the percentage of parents holding a university degree is higher in PIRLS 2021 than in TIMSS 2019, with the difference reaching statistical significance at the 5% level. The difference is clearest in Kosovo (21% versus 31%) but can also be observed in Serbia (25% versus 34%), Croatia (33% versus 40%), Montenegro (28% versus 37%), and North Macedonia (32% versus 39%). This potentially suggests that, at least in some education systems, the PIRLS 2021 sample may be more socioeconomically advantaged than participants in TIMSS 2019. In additional analysis, we have found a similar difference in several other education systems as well, including Lithuania (51% in TIMSS 2019 versus 72% in PIRLS 2021), Chinese Taipei (48% versus 57%), and the Republic of Ireland (44% versus 50%), amongst others. Consequently, this increase in the percentage of parents with a degree does not seem to be unique to the Dinaric education systems. It is not clear why there has been such a big change—other than it being potentially due to differences in the characteristics of who has decided to participate in the study—or how this is otherwise linked to the COVID-19 pandemic.

The left-hand columns of Table 8.3 provide analogous figures for the percentage of parents working in a professional job. In several education systems, a similar pattern emerges. The most prominent example is Montenegro, where the percentage of parents working in a professional job has increased by 16 percentage points (21% to 37%). Sizeable increases can also be observed in Serbia (30% to 38%) and Kosovo (21% to 28%). Fig. 8.5 puts these results for the Dinaric education systems into a broader international context. This illustrates how the increase in the percentage of parents reporting working in professional jobs is bigger in Montenegro than in any other education system. Indeed, Lithuania (44% to 57%) is the only other nation where there has been an increase of a similar magnitude.[3] In conjunction with the high exclusion rate reported in the preceding sub-section, these results potentially

[3]The Kingdom of Saudi Arabia is the only education system where there has been a sizeable decline.

Table 8.3 Percentages of TIMSS 2019 and PIRLS 2021 participants from a high socioeconomic status background across Dinaric education systems

	Percentage of highest reported occupation level		Percentage of highest reported higher education level	
Education system	TIMSS 2019	PIRLS 2021	TIMSS 2019	PIRLS 2021
Albania	21% (1.46)	22% (1.35)	20% (1.41)	21% (1.38)
Croatia	40% (1.42)	44%* (1.51)	33% (1.44)	40%* (1.62)
Kosovo	21% (1.08)	28%* (1.84)	21% (1.19)	31%* (2.11)
Montenegro	21% (1.04)	37%* (0.97)	28% (1.22)	37%* (0.90)
North Macedonia	25% (1.67)	30%* (1.80)	32% (2.14)	39%* (2.49)
Serbia	30% (1.17)	38%* (1.55)	25% (1.27)	34%* (1.55)
Slovenia	–	51% (1.25)	–	57% (1.20)

Notes**:** Information reported by students' parents. Students with missing home questionnaire data have been excluded from the analysis. Standard errors of the percentages are reported in parentheses. * indicates statistically significant difference between PIRLS 2021 and TIMSS 2019 as the 5% level

indicate that the PIRLS 2021 data for Montenegro may overrepresent students from more advantaged socioeconomic backgrounds. As higher socioeconomic status students also tend to be better readers, it is likely that this has led to a degree of upward bias in Montenegro's PIRLS 2021 test scores. The same may also be true for some of the other participating education systems where statistically significant differences in parental socioeconomic status have emerged across the TIMSS 2019 and PIRLS 2021 samples.

Table 8.4 draws a similar comparison for the percentage of students rarely absent from school. There are some sizeable changes for some education systems, but not others. In particular, there has been a large increase in the percentage of students who reported rarely being absent in Croatia (57% in TIMSS 2019 to 67% in PIRLS 2021) and North Macedonia (54% to 68%). These results are somewhat surprising, given that school absence rates in most education systems tended to increase—not decrease—during the pandemic. Hence, rather than being evidence of potential bias emerging in the sample, such a finding could conceivably be driven by a reporting effect caused by the disruption of the pandemic.

Table 8.5 then considers the percentage of students who did not attend preschool, again based upon parental reports. There have been clear decreases in Croatia (16% versus 7%) and Montenegro (23% versus 16%), while there has been an increase in Serbia (1% to 10%). These appear to be non-trivial changes over a relatively short period of time (two years), and we are unaware of any sizeable system-level changes that are likely to explain this. This could feasibly be driven by changing response and exclusion patterns across the two studies, rather than reflecting genuine increases or decreases in preschool attendance per se.

In additional analysis we have also explored differences in the distribution of gender and preschool childhood activities (as reported by parents) between the TIMSS 2019 and PIRLS 2021 samples. Differences across the TIMSS and PIRLS

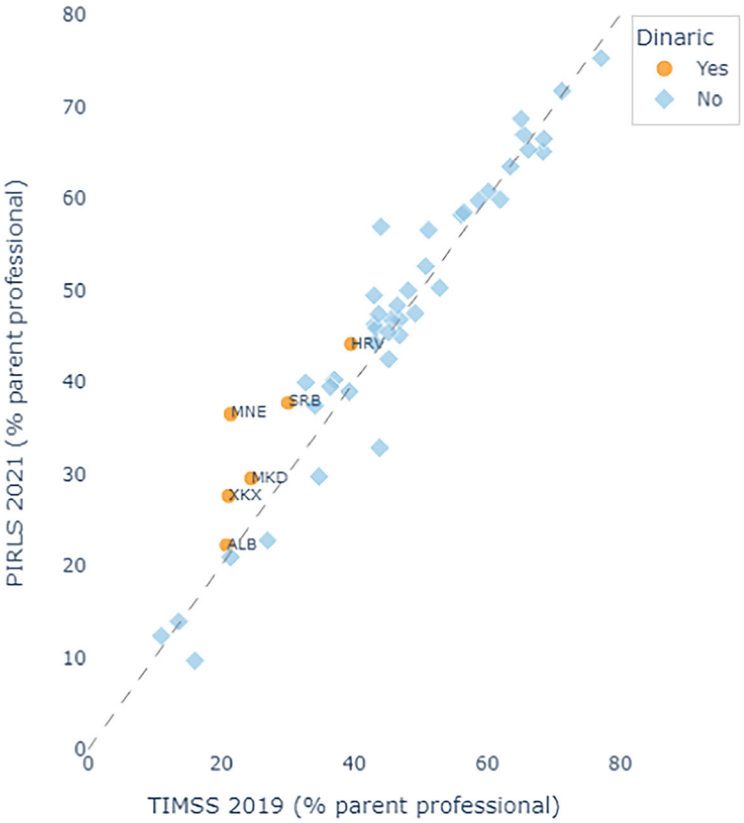

Fig. 8.5 The percentage of participants in TIMSS 2019 compared to PIRLS 2021 with at least one parent working in a professional occupation across countries
Notes: *Dashed 45-degree line* indicates where percent of parents working a professional job in TIMSS 2019 and PIRLS 2021 is equal. *MNE* Montenegro, *SRB* Serbia; *XKX* Kosovo, *ALB* Albania; *MKD* North Macedonia; *HRV* Croatia. *Orange circles* refer to the Dinaric education systems, blue diamonds are all other jurisdictions that participated in both PIRLS 2021 and TIMSS 2019

Table 8.4 Percentages of TIMSS 2019 and PIRLS 2021 participants who reported being rarely absent from school across Dinaric education system

	% Rarely absent	
	TIMSS 19	PIRLS 21
Albania	69% (1.48)	66% (1.35)
Croatia	57% (1.11)	67%* (1.11)
Kosovo	66% (1.05)	63%* (1.26)
Montenegro	72% (0.70)	69%* (0.77)
North Macedonia	54% (1.91)	68%* (1.64)
Serbia	68% (1.51)	64% (1.52)
Slovenia	–	74% (0.71)

Notes: Standard errors of the percentages are reported in parentheses. *indicates statistically significant difference between PIRLS 2021 and TIMSS 2019 as the 5% level

Table 8.5 Percentages of TIMSS 2019 and PIRLS 2021 participants who did not attend preschool

	Percentage of students not attending preschool	
	TIMSS 19	PIRLS 21
Albania	8% (0.93)	9% (0.94)
Croatia	16% (1.38)	7%* (0.88)
Kosovo	33% (1.61)	29% (1.53)
Montenegro	23% (0.77)	16%* (0.57)
North Macedonia	42% (2.13)	38% (1.96)
Serbia	1% (0.21)	10%* (1.40)
Slovenia	–	4% (0.35)

Notes: Information reported by students' parents. Students with missing home questionnaire data have been excluded from the analysis. Standard errors of the percentages are reported in parentheses. *indicates statistically significant difference between PIRLS 2021 and TIMSS 2019 as the 5% level

samples in these characteristics were small across our education systems of interest, with no suggestion of there being major systematic differences.

8.4 Conclusions

A key aim of ILSAs, including PIRLS, is to provide robust estimates of pupils' skills that can be validly compared across countries. One aspect of achieving this goal is for the assessment to be completed by a representative cross-section of students. This requires a random sample to first be selected, as few students to be excluded from this sample as possible, and then high participation rates amongst those selected to be achieved. Even in normal times, these are challenging requirements to meet. With the pandemic leading to school closures, higher absence rates, and learning loss, the challenges with collecting representative data in PIRLS 2021 increased still further.

This chapter has investigated issues surrounding the representativeness of the PIRLS 2021 data across the Dinaric education systems that are the focus of this book. Specifically, we have compared exclusion and participation rates achieved in PIRLS 2021 to analogous figures from TIMSS 2019—the most recent pre-pandemic ILSA in which most Dinaric education systems participated. The chapter has also considered how selected background characteristics—including parental education and occupation—differ across these two studies and what this implies for the PIRLS 2021 sample.

We find that exclusion rates have increased in PIRLS 2021 relative to TIMSS 2019 in some of the Dinaric education systems, most notably Albania and Montenegro. This has been driven by an increase in within-school exclusions, encompassing students with functional or intellectual disabilities and non-native speakers. On the other hand, student response rates have fallen significantly between TIMSS 2019 and PIRLS 2021 in Croatia, Serbia, and (to some extent) North Macedonia. In most of the Dinaric education systems (except Albania), more parents

are from higher socioeconomic backgrounds in PIRLS 2021 than in TIMSS 2019. The difference is perhaps starkest in Montenegro, where the percentage of parents working in professional occupations increased from 21% to 37%. Surprisingly, in some education systems there has been a fall in absence rates reported by pupils between TIMSS 2019 and PIRLS 2021 (e.g., Croatia, North Macedonia), with an increase in reported preschool attendance rates in some education systems as well (e.g., Croatia, Montenegro).

Based on these findings, we advise readers of this book to keep in mind the important caveats that apply to the PIRLS 2021 data. It is likely that in some of the Dinaric education systems, the challenges associated with collecting data during the pandemic have led certain groups to be underrepresented. Some statistics are likely to be affected more than others, such as reading proficiency estimates for the lowest-achieving students and those from disadvantaged socioeconomic backgrounds. It may also impact our understanding of socioeconomic inequality in primary school students' reading skills as well. While the PIRLS 2021 data for Montenegro may be at greatest risk from such issues, they may (to some extent) also affect other education systems as well.

These conclusions should be interpreted considering the limitations of our work. Ideally, one would have available a high-quality independent measure of participants and non-participants reading skills from an external source, such as a national assessment. This would provide stronger evidence of any potential issues surrounding the representativeness of the PIRLS 2021 data and, critically, offer a way to partially correct estimates to account for the underrepresentation or overrepresentation of higher or lower-achieving children. Likewise, it has not been possible to compare the characteristics of the PIRLS 2021 sample to known population values. The chapter has hence had to rely upon comparisons between the TIMSS 2019 and PIRLS 2021 data as the next best alternative. Looking forward to future data collections, the Dinaric education systems might explore options to link PIRLS (and other ILSAs) to young people's school records or other administrative data. This would help provide further insight into the representativeness of the data collected while also opening up a wide array of further analytic opportunities.

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Chapter 9
An Analysis of PIRLS 2021 Mode Effects: Differences in Reading Achievement Related to the Assessment Mode for PIRLS 2021 in Croatia and Slovenia

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9.1 Introduction

With the increasing dominance of digital reading over paper reading, gaining an understanding of the effects of the medium on reading comprehension has become critical (Delgado et al., 2018). Throughout the COVID-19 pandemic, the emphasis on online/digital teaching and learning heightened due to school closures. Topics such as the differences between paper and digital reading have been areas of discussion for decades, albeit with different emphases.

A substantial body of research has focused on comparing digital books to print books, with evidence of both positive and negative effects for children's developing literacy skills (e.g., at preschool) (Kucirkova, 2019), but this research can also be relevant for the older population. Results on previous reviews and meta-studies for different target populations and subjects showed that the media effects (what we call in this chapter the mode effect) are inconsistent (Delgado et al., 2018). This may be partially explained by the difficulty of comparing paper texts to digital texts, which include incomparable features (such as hyperlinks, animations, or adaptive tests that may confound and hide media effects on learning processes), and that most of the previous analyses did not consider or did not find moderating factors (Delgado et al., 2018). It seems that studies that focus on comparing digital books to print books follow different theoretical and methodological approaches and reach different

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conclusions (Delgado et al., 2018; Kucirkova, 2019), which we can also see from more recent studies comparing literature (e.g., Peras et al., 2023). At the same time, it is clear that the debate comparing paper vs. digital reading or uses of technology for reading and learning in general (in the context of education) will remain.

As shown by Peras et al. (2023), particularly in the context of students aged 6–18, the literature comparing digital and paper reading (papers published in WOS, Scopus, ERIC, and JSTOR databases in the period 2015–2022) yields varied results. This suggests that the effect of the reading medium on comprehension and other related aspects is subtle and contingent on specific circumstances and that there is no definitive evidence favoring one method over the other. When comparing the IEA Progress in International Reading Literacy Study (PIRLS) results for informational reading via assessment mode (digital and paper) in the 2016 cycle, Mullis et al. (2017) found significant differences favoring e-reading in seven countries, five countries (including Slovenia) favored paper reading, and there was no statistically significant difference in two countries. Delgado et al. (2018) examined the results of reading texts that were comparable on paper and on digital devices (by including only studies that used linear reading materials) in their meta-study comparisons that examined research published in the period 2000–2017. Their research found that paper-based reading yields better comprehension outcomes than digital-based reading. However, as Díaz et al. (2024) pointed out, three recent studies providing comprehensive literature reviews and analyses to clarify the controversy around utilizing technology integration practices to assist students in reading display controversial results (Chuang & Jamiat, 2023; Kong et al., 2018; Schwabe et al., 2022). The first study found that reading comprehension of narrative texts showed no significant variation based on the reading medium (screen vs. paper); the second one indicated that multimedia features (e.g., dictionaries, background music, and animated pictures) in children's interactive reading apps effectively enhanced emergent literacy; and the third one found that reading on paper outperformed screen reading in terms of reading comprehension (ibid.). Díaz et al. (2024) concluded that the conflicting findings of these three studies illustrate that the merits of digital reading vs. paper-based reading are an ongoing debate that generates various misunderstandings regarding the role that information and communication technologies (ICT) play in school for reading comprehension. It is obvious that the interplay between reading formats and reading outcomes is shaped by factors at the individual, familial, and school levels; it becomes clear that there is not a "one type fits all" explanation for differences in digital vs. paper reading, as there are differing results even on representative samples of students at grade four (Peras et al., 2023) as from the ePIRLS 2016 cycle (presented above).

It should be mentioned that PIRLS data does not provide information on how tiring it was for the student to read from either mode or on other potentially important aspects that some studies in different fields (e.g., Mangen et al., 2013) also pay attention to when comparing both modes of reading. However, it should also be noted that the selected target grade for assessment in PIRLS (fourth-grade students) has a special focus change from "learning to read" to "reading for learning," which is essential for reading development and learning in general (Klemenčič & Mirazchiyski, 2023). This is why investigating this specific target population when

analyzing reading (whether it is online or paper) is essential. The strength of PIRLS data, compared to many other studies in the field, is that it can provide information on reading performance from representative samples of fourth graders (in the case of Croatia in the PIRLS 2021 cycle, the originally sampled fourth graders participated in the study at the beginning of their fifth grade as a second-phase country due to the COVID-19 pandemic).

The present study is important for the Croatian and Slovenian education systems and can provide valuable information for other systems in the Dinaric region. Even prior to the COVID-19 pandemic, it was much debated to what extent technology ought to be integrated in the teaching and learning processes. Since the use of digital means to deliver educational content, improve instruction, and assess knowledge is still increasing, each study, especially international large-scale student assessments (ILSAs), is a welcomed contribution to the topic.

This chapter aims to investigate the ICT factors related to the gaps in achievement in the two test delivery modes.

9.1.1 Problem Statement

In the process of transitioning to e-assessments, some earlier studies of the International Association for the Evaluation of Educational Achievement (IEA) have shown the absence of a mode effect when comparing results obtained by the traditional approach via paper and pencil and digitally (via e-assessment). One regional example of this finding is TIMSS 2019, where no differences in mathematics and science scores were found in Croatia when comparing the two assessment modes (Japelj Pavešić et al., 2022). At the same time, researchers noted differences when acquiring knowledge digitally (online), and in particular for digital reading. Divergences occur especially on the cognitive level of organizing learning and remembering, concentrating on, and retrieving content. Reading experts noted that schoolchildren have a shorter span of concentration, and longer texts are getting harder to digest (Baron et al., 2017). Reading and working with a computer result in a higher cognitive workload compared to paper. Navigating digital texts is known to hamper the reading process through spatial instability and, hence, comprehension (Mangen et al., 2013). This could lead to differences in student performance when replacing the traditional paper test administration with the innovative computer-based online reading test. A regional example in this regard is data from Slovenia obtained in PIRLS and ePIRLS 2016, where the average informational reading score was 20 points higher when obtained from the paper assessment (Klemenčič Mirazchiyski & Mirazchiyski, 2020).

One of the key points in the Digital Education Action Plan (2021–2027) of the European Commission is that besides the deployment of digital technologies in education (applications, platforms, and software) for online, distant, and blended learning, enhancing online learners' key competencies (knowledge, skills, and attitudes) is needed for achieving digital transformation (Digital Education Action Plan (2021-2027), n.d.). As the world becomes more and more digitally dependent,

one of the key skills of today's learner is to read and understand digital texts. Online reading comprehension requires blending new digital literacies with paper reading comprehension processes. As Hooper et al. (2015) point out, students using digital resources may benefit more in reading literacy, especially the lower achievers. Reading online texts, however, requires reading strategies and skills in contexts that are very different from traditional paper reading. In online reading, content is multimodal, presenting the information enriched with interactive and experiential features that are not available in printed sources. Given these differences, it is possible that the difficulty of reading assessments differs depending on the test stimuli delivery mode (paper vs. digital) (Hooper et al., 2015). The digital assessment in PIRLS 2021 does not just present the reading passages and the test items on screen by replicating the paper format but instead uses an interactive test environment where students navigate both within and across webpages when answering questions, integrating information, and exploring and explaining relationships. This is achieved by organizing the stimuli material and the associated items in several complex interactive tasks (Martin et al., 2019). If a change in the assessment delivery mode occurs, while trend comparisons should remain valid, it is necessary to test whether such differences occur. IEA PIRLS 2021 data can shed more light on these processes in one of the most important areas in education—reading literacy—at the end of the ISCED 1 level.[1]

9.1.2 Purpose and Research Questions

This chapter investigates whether differences in test difficulty reflected in average reading achievement scores depend on the assessment mode (paper and digital) in Croatia and Slovenia. The results from the two countries are compared in general and by the degree of student access to digital technology and its use in classroom work. The purpose of this chapter can be broken down by the following aims, which are addressed by the research questions below them.

- To determine whether there are differences between the overall results of the traditional paper-and-pencil test and the e-assessment in Croatia and Slovenia.
- To examine the differences in reading for literary and informational purposes in Slovenia and Croatia by the mode of assessment.
- To examine the differences in the processes of comprehension (retrieving and straightforward inferencing/interpreting, integrating, and evaluating) by the mode of assessment in Slovenia and Croatia.
- To test if the possession and use of digital resources for students reading at home are related to the results in both modes of the assessment.

[1]The International Standard Classification of Education (ISCED) provides a classification of educational level applicable to all educational systems. ISCED 1 refers to primary education. PIRLS tests students' reading literacy at the end of this ISCED level.

The versatile purpose of this chapter is addressed by the following research questions:

1. *Are there differences in students' reading achievement depending on whether they completed the assessment on paper (PIRLS 2021 'bridge study') or digitally (ePIRLS 2021), i.e., through the modes of testing in Croatia and Slovenia, and how large are the differences?*
2. *Are there differences in student achievement for the purpose of reading (literary and informational) by the mode of testing in Croatia and Slovenia, and how large are they?*
3. *Are there differences in student achievement for the processes of comprehension (retrieving and straightforward inferencing, and interpreting, integrating, and evaluating) by the mode of testing in Croatia and Slovenia, and how big are they?*
4. *Is more frequent use of digital reading technology in reading classes and for schoolwork at home related to higher student reading achievement by the mode of testing in Croatia and Slovenia?*
5. *Are there differences in student reading achievement by the mode of testing depending on ownership of digital technology assets at home in Croatia and Slovenia?*

9.2 Methods

9.2.1 Data and Measures

The data for this study stems from the PIRLS 2021 database (IEA's TIMSS & PIRLS International Study Center, 2023). In PIRLS 2021, participating education systems could choose to assess their students by either paper or digitally (digitalPIRLS), as not all education systems could conduct the test digitally. For education systems that decided on digitalPIRLS, an optional "bridge" module was offered. The purpose of the bridge module was to assess a separate, smaller sample of students on paper in order to form an intermediate link between the PIRLS 2016 paper assessment and the 2021 cycle (Fishbein et al., 2024). As both Croatia and Slovenia participated in both modes of assessment, their paper PIRLS and digitalPIRLS data are used in this study to test the differences between the two reading modes (research questions 1–3) and to test the differences (by different contexts) related to the digital environments in class and student homes (research questions 4–5). The bridge samples were smaller than the digitalPIRLS samples; around 1500 students per country decided to participate in the bridge study. Additionally, the bridge samples are separate from the digitalPIRLS samples, and the students in these samples were administered the paper versions of the trend items from ePIRLS 2016 during the main data collection of PIRLS 2021. This way, the digital and paper modes in PIRLS 2021 were bridged on an equivalent population linking. The bridge sample used the same schools as the digitalPIRLS samples, sampling an additional class at random to take the paper test

Table 9.1 Sample sizes for digitalPIRLS 2021 and bridge (paper) study for Croatia and Slovenia

Mode	Education System	Sampled cases	Population estimate	(SE)
Digital PIRLS	Croatia	3937	35,511.37	(1365.32)
Digital PIRLS	Slovenia	5110	21,386.71	(472.33)
Bridge PIRLS	Croatia	1226	42,458.31	(3482.07)
Bridge PIRLS	Slovenia	1414	21,248.27	(719.76)

(Almaskut et al., 2023). The linking between the digitalPIRLS and the bridge booklets used four common reading passages, along with the items related to them in the concurrent calibration model (for more details, see Yin et al., 2023). The sample sizes for the digitalPIRLS and the bridge (paper) study that were conducted to test the mode effect in the 2021 cycle are presented in Table 9.1. The variables used in this study are listed in Table 9.2. The original items, along with their response categories, can be found in Supplement 1 of the PIRLS 2021 User Guide (Fishbein et al., 2024).

The variables in Table 9.2 in descending order of the categories were reversed, so that higher values mean a higher manifestation of a trait, frequency of an event or behavior occurring, or agreement with a certain statement. For example, the order of the original categories of ATBR12C ("When doing reading activities with the whole class, how often do you have students use digital devices?") is "at least once a week," "once or twice a month," "a few times a year," and "never or almost never," with "at least once a week" being the lowest and "never or almost never" being the highest; these categories were reversed before being used in any analysis, so that "at least once a week" becomes the highest and "never or almost never" was the lowest.

9.2.2 Analysis Methods

To meet the aims of this chapter, the analyses related to research questions one, two, and three compared the average reading achievement in the PIRLS 2021 bridge study (i.e., on paper) and digitalPIRLS (overall, for literary experience, to acquire and use information, retrieving and straightforward inferencing, interpreting, integrating, and evaluating) in both countries. In addition, for each of the three questions, linear regression models were fitted with the achievement scores on the purposes for reading (informational reading) and processes of comprehension (retrieving and straightforward inferencing/interpreting, integrating, and evaluating) as dependent variables, and student, home, and classroom IT resources; student IT use; classroom IT use (general and for reading tasks); and student general ability to use IT as independent variables. The purpose of these additional analyses is to test the strength of the relative effect these independent variables have on paper and digital reading achievement. The coefficients and the model statistics are compared between the two modes of administration. The formal presentation of the models can

Table 9.2 Variables used in the analyses of the differences between paper and digital reading in PIRLS 2021

Contextual domain	Instrument	Question/Scale	Variable name
Reading achievement (PVs) in paper and digital modes	Student test	Overall reading	ASRREA01–05
	Student test	Literary experience (purpose of reading)	ASRLIT01–05
	Student test	Acquire and use information (purpose of reading)	ASRINF01–05
	Student test	Retrieving and straightforward inferencing (comprehension process)	ASRRSI01–05
	Student test	Interpreting, integrating, and evaluating (comprehension process)	ASRIIE01–05
Students using IT equipment for schoolwork	Student questionnaire	How much time do you spend using a computer, tablet, or smartphone to do these activities for your schoolwork on a normal school day?	–
	Student questionnaire	Finding and reading information	ASBG08A
	Student questionnaire	Preparing reports and presentations	ASBG08B
Students' general ability in using IT equipment	Student questionnaire	Student digital self-efficacy scale	ASBGSEC
IT resources at home	Student questionnaire	Do you have any of these things at your home?	–
	Student questionnaire	A shared computer or tablet that you can use	ASBG05A
	Student questionnaire	Access to the internet	ASBG05D
	Student questionnaire	A shared smartphone that you can use	ASBG05E
	Student questionnaire	Your own computer or tablet	ASBG05F
	Student questionnaire	Your own smartphone	ASBG05G
	Home questionnaire	Do you have any of these things in your home?	–
	Home questionnaire	Access to the internet	ASBH14A
	Home questionnaire	A computer, tablet, or e-reader	ASBH14B
	Home questionnaire	A smartphone	ASBH14C

(continued)

Table 9.2 (continued)

Contextual domain	Instrument	Question/Scale	Variable name
IT resources in classrooms for reading lessons	Teacher questionnaire	What access do the students have to digital devices?	–
	Teacher questionnaire	The school provides each student with a digital device	ATBR12BA
	Teacher questionnaire	The class has digital devices that students can share	ATBR12BB
	Teacher questionnaire	The school has digital devices that the class can use sometimes	ATBR12BC
	Teacher questionnaire	Students bring their own digital devices	ATBR12BD
	Teacher questionnaire	When doing reading activities with the whole class, how often do you have students use digital devices?	ATBR12C
Dividing students for personalized reading activities using digital devices	Teacher questionnaire	In addition, how often do you have specific groups of students do personalized reading activities using digital devices?	–
	Teacher questionnaire	Low-performing students	ATBR12DA
	Teacher questionnaire	High-performing students	ATBR12DB
	Teacher questionnaire	Students with special needs	ATBR12DC
How often do you have students use digital devices to do the following in reading instruction	Teacher questionnaire	During reading instruction, how often do you have students use digital devices to do the following?	–
	Teacher questionnaire	Read digital texts	ATBR12EA
	Teacher questionnaire	Look up facts and definitions	ATBR12EB
	Teacher questionnaire	Do a research project on a particular topic or problem	ATBR12EC
	Teacher questionnaire	Write stories or other texts	ATBR12ED
	Teacher questionnaire	Create a presentation or communication (e.g., video)	ATBR12EE

be seen in Eqs. (9.1) and (9.2) listed below. The variable names can be matched against the questions in Table 9.2.

$$Y = \beta_0 + \beta_1 ASBG05A + \beta_2 ASBG05D + \beta_3 ASBG05E + \beta_4 ASBG05F + \beta_5 ASBG05G + \beta_6 ASBG08A + \beta_7 ASBG08B + \beta_8 ASBGSEC + \epsilon \quad (9.1)$$

$$Y = \beta_0 + \beta_1 ATBR12BA + \beta_2 ATBR12BB + \beta_3 ATBR12BC + \beta_4 ATBR12BD + \beta_5 ATBR12C + \beta_6 ATBR12DA + \beta_7 ATBR12DB + \beta_8 ATBR12DC + \beta_9 ATBR12EA + \beta_{10} ATBR12EB + \beta_{11} ATBR12EC + \beta_{12} ATBR12ED + \beta_{13} ATBR12EE + \epsilon \quad (9.2)$$

Notes:

Y = outcome variable, five PVs in different purposes or processes of reading
β_0 = regression intercept
β_1 to β_n = regression slopes
ϵ = error term

For research question four, the analyses compared the reading achievement of students for the purposes of reading (informational or literary purpose of reading) and the processes (retrieving and straightforward inferencing/interpreting, integrating, and evaluating) for teachers choosing different categories of the questions related to the use of computer devices for reading or related tasks in class. For research question five, the analyses compare the reading achievement of students according to the IT equipment available at home.

In addition to the analyses outlined here, the relationship between student achievement (overall and per purpose of reading and process of comprehension) and student digital self-efficacy (see Table 9.2) has been tested. The scale is composed of eight statements on how confident students feel with using computer devices and software, finding, filtering, and processing information on the internet, and creating different digital outputs. For more information on how this scale is created, see Yin and Reynolds (2023).

The analyses use "plausible values" (PV) scores provided in the international database. These are optimal for reporting on population levels and for groups within the populations, which ILSAs are designed for. Comparison on the item level or correct percentage was not used, as this approach has been shown to provide biased estimates because they are not optimal for studies with complex sampling and assessment designs, as shown by IEA (International Association for the Evaluation of Educational Achievement) (Mirazchiyski, 2013). As the paper PIRLS and digitalPIRLS 2021 data use complex sampling design with probability proportional to the size of the units (i.e., schools), all estimates and their standard errors need to be computed using weights; their replicates, using each of the PVs, are then summarized. For more information, see Foy and Almaskut (2023). All computations are performed using the RALSA R package (see Mirazchiyski, 2021).

9.3 Results

The descriptive results for research questions one and three are presented in Fig. 9.1. As the graph shows, in all cases the average achievements for the different purposes and processes of reading in paper and digital testing modes are quite close in both

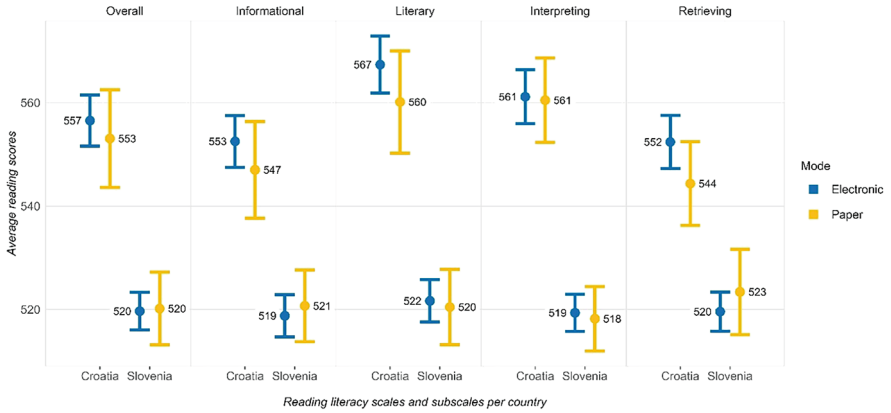

Fig. 9.1 Average reading scores for different purposes and processes in Croatia and Slovenia Notes: Reading literacy scales and subscales: Overall – Overall reading, Information – Acquire and use information, Literary – Literary experience, Interpreting – Interpreting, integrating, and evaluating, Retrieving – Retrieving and straightforward inferencing

Croatia and Slovenia. All the confidence intervals for the overall reading achievement in both modes overlap, suggesting that there are no significant differences between digital and paper reading in both countries. As the confidence intervals do not represent a precise test for the significance of the differences, exact tests (*t*-tests) were performed. The results from these tests are presented in Table 9.4 in the appendix. No significant differences were found in Croatia or Slovenia.

The results from the linear regression models related to research questions one, two, and three with student and home variables for the two different modes of testing are presented in Table 9.5 in the Appendix. The general finding is that regardless of the mode of administration (paper or digital), most of the independent variables in the models are related to the subscales of reading achievement (processes or purposes). However, the following details need to be considered for the coefficients of each independent variable when controlling for all other variables in the model:

1. The number of ICT-related variables with significant coefficients is larger for the digital reading mode compared to the paper mode. The number of significant coefficients is higher in Croatia, especially for the digital mode, for all three subscales of reading achievement (interpreting, integrating, and evaluating; to acquire and use information; and retrieving and straightforward inferencing).
2. In general, the coefficients (regardless of their sign) for the ICT-related variables are, in most cases, stronger for the paper administration than for the digital mode, both in Croatia and Slovenia.
3. When controlling for all other variables (i.e., using devices for schoolwork and digital self-efficacy), most of the coefficients of variables on home possessions for digital means are negative, meaning that the higher the presence of a certain characteristic, the lower the achievement tends to be. For example, sharing a

smartphone in Croatia means 26.1 score points lower for reading achievement on paper and 16.5 score points lower for reading achievement for the digital mode of testing, compared to not sharing a phone. Most notably, this occurs for shared smartphone use, where the coefficients are negative, strong, and statistically significant in both modes of administration in both countries. The coefficients range from −15.3 to −29.6 score points for the paper mode and from −14.61 to −21 score points for the digital mode for the different processes and purposes of reading (i.e., sharing a smartphone is related to lower achievement). The coefficients are stronger for the paper reading mode in Croatia but stronger for the digital reading mode in Slovenia.

4. As for owning a smartphone, when controlling for all other possessions, digital self-efficacy, and the variables for using technology for schoolwork, the coefficients in Croatia are positive (owning a phone is related to higher reading achievement). The results are strong and statistically significant, ranging from 27.5 points to 37.9 points for the reading mode and from 33.5 to 35.9 for the digital mode. On the contrary, in Slovenia all coefficients are negative (owning a smartphone is related to lower achievement). The results are strong, and in almost all cases, significant, ranging from −12.9 to −17.6 for the paper mode and from −11.6 to −12.7 points for the digital mode.
5. When controlling for all other variables on possessing technology and use of technology for schoolwork and digital self-efficacy, sharing a computer shows no significant relationship with the outcome variables for the paper reading mode. It does so, however, for the digital reading mode, where the coefficients are negative (sharing a computer is related to lower achievement) and are significant for interpreting, integrating, and evaluating in Croatia, and positive (sharing a computer is related to higher achievement) and significant for acquiring and using information in Slovenia. However, despite their significance, these coefficients are weak (−9.5 and 5.7, respectively).
6. When controlling for all other variables on possessing technology, use of technology for schoolwork, and digital self-efficacy, having their own computer or tablet at home is negatively related to the outcome variables in both countries (i.e., having their own computer is related to lower achievement) for both assessment modes, with much stronger coefficients in Slovenia than in Croatia. In Croatia, these coefficients are insignificant in almost all cases (except for interpreting, integrating, and evaluating), but are quite strong and significant in all cases in Slovenia. That is, in Slovenia, students with identical self-efficacy, the same levels of using technology for schoolwork, and possessing different other technological means will have lower reading achievement in both modes of testing if they have their own computer compared to those who do not have their own computer.
7. When controlling for all other variables on possessing technology, use of technology for schoolwork, and digital self-efficacy, access to the internet is strongly, positively, and significantly related to the subscales of achievement (purposes and processes in reading) in both countries and for both reading modes (i.e., access to the internet is related to higher reading achievement in both modes). The relationship is not significant, only in Croatia for the interpreting, integrating, and evaluating scale. The coefficients range from 28.1 to 47.3 score points for the

paper reading mode and from 19.64 to 40.19 score points for the digital reading mode in both countries.

8. Given the different levels levels of home possessions and digital self-efficacy, the results for the two items on technology use also differ between the two countries and modes. While the coefficients are negative in Croatia (i.e., using technology is related to lower student achievement) and positive in Slovenia, finding and reading information is not significantly related to the outcome variables for the paper reading mode. For the digital reading mode, the coefficients are negative (using technology is related to lower achievement) in both countries but are significant only in Croatia, i.e., the more time students spend on finding and reading information, the lower their achievement tends to be. The coefficients in Croatia for the digital reading mode, however, are weak, ranging from −5.5 to −8.3. The other variable on using a computer or tablet for study purposes (preparing reports and presentations) is positively (usage is associated with higher achievement) and significantly related to the outcome variables in both modes of testing and in both countries. However, the coefficients for all three outcome variables in Croatia are much stronger for the digital reading mode compared to paper reading, while in Slovenia the coefficients are about the same, and in some cases (e.g., for retrieving and straightforward inferencing), they are even lower.
9. When controlling for all variables on possessing technology and use of technology for schoolwork, the digital self-efficacy is positively related to the outcome variables (achievement scores by purposes and processes of reading) in both countries (i.e., the more self-efficacy students have, the higher their achievement tends to be). While for the paper mode the coefficients are significant only in Croatia, for the digital mode they are significant in both countries. The only exception for the digital reading mode in Slovenia is for retrieving and straightforward inferencing where the relationship is not significant. Although the coefficients are significant, they are rather weak, ranging from 3.3 to 4.7 score points only in Croatia for the paper mode of administration and from 2.3 to 5.3 for the digital mode in both countries.

The results for research question four, using classroom and teacher ICT variables (not published here), did not show any significant relationships with the outcomes of reading (subscales of reading achievement—purposes and processes). The only exception is the use of digital devices in reading instruction to create a presentation or for communication (e.g., video), but only in Slovenia and only for the digital test in reading for interpreting, integrating, and evaluating, and retrieving and straightforward inferencing subscales of achievement. The coefficients are 17.2 and 16.5 score points, respectively.

The results for research question four on the variables related to IT resources, dividing students for personalized reading activities using digital devices, and the frequency of having students using digital devices for specific activities in reading instruction (see Table 9.2) did not reveal differences between the two reading modes. The only question that revealed differences between the two modes is the general question, “When doing reading activities with the whole class, how often do you

have students use digital devices?" (see Table 9.2). The results are presented in Table 9.5 in the Appendix. The expectation would be that the higher frequency of using digital devices in class during reading instruction would be related to higher reading achievement for the digital assessment compared to the one in paper mode. However, in Croatia an interesting trend is observed: firstly, the achievements in regard to the different processes and purposes for the digital reading assessment remain about the same across the different categories of the frequency for using digital devices or increase slightly for the middle categories. Secondly, for the paper assessment, the achievements for the different purposes or processes tend to decrease as the frequency of using digital devices in reading instruction increases. Thirdly, the differences in reading achievement across the categories of using digital devices in reading instruction tend to favor paper reading, not the digital one (i.e., the differences in paper reading are higher than for the digital one). In some cases, the differences are 40–60 score points. The results for Slovenia differ a lot from those obtained for Croatia. While the results in digital reading for literary experience and retrieving and straightforward inference do not vary a lot, for the other two achievement subscales (interpreting, integrating, and evaluating, and to acquire and use information), they show a general downward trend (achievement tends to decrease as frequency increases), although the pattern is not very clear. For the paper assessment, the achievements tend to steadily increase with increasing the frequency of student use of digital devices during reading instruction until it drops down again for the last category ("at least once a week"). Different to Croatia, where the differences in achievement for all subscales favor the digital assessment.

The results from the analyses related to research question five are presented in Table 9.4 in the Appendix. The analysis tests the average achievements in digital and paper reading modes depending on the presence of the technology at home. The differences between the paper and digital assessment modes regarding overall reading achievement scores for students who do or do not have ICT resources are rather small and statistically insignificant in both Croatia and Slovenia. The most likely reason for this is that the percentages of students in both populations who do not possess these digital items at home are very small (e.g., 1.33% of students in Slovenia do not have a smartphone, and 8.22% do not have internet at home) and, thus, the standard errors of the achievement estimates are very large. The only exception where a statistically significant difference exists between the digital and paper testing modes is in Croatia for the students who do not possess a computer, tablet, or e-reader. The difference is 39.32 score points, favoring paper reading.

Table 9.3 presents the results of correlation analysis where the associations between student digital self-efficacy and student achievement in overall reading and the separate subscales by purposes and processes of reading were tested. All correlation coefficients in the table are positive (the higher the student self-efficacy is, the higher the achievement tends to be) except one, which is strictly zero. In Croatia, in all cases the correlation is statistically significant for both reading modes (digital and paper), although the coefficients are weak, ranging from 0.09 to 0.15. The coefficients for the digital mode are slightly stronger compared to the paper mode of administration but are still quite close. In Slovenia, all coefficients are insignificant and close to zero.

Table 9.3 Correlation between the student digital self-efficacy scale, overall reading achievement, and its subscales

Scale	Education system	Digital			Paper		
		Correlation	(SE)		Correlation	(SE)	
Overall reading	Croatia	0.12	(0.02)	***	0.11	(0.04)	*
Overall reading	Slovenia	0.02	(0.02)		0	(0.05)	
Literary experience	Croatia	0.11	(0.02)	***	0.09	(0.04)	**
Literary experience	Slovenia	0.01	(0.02)		0.01	(0.04)	
Acquire and use information	Croatia	0.14	(0.02)	***	0.12	(0.04)	**
Acquire and use information	Slovenia	0.03	(0.02)		0.01	(0.05)	
Retrieving and straightforward inferencing	Croatia	0.10	(0.02)	***	0.10	(0.04)	*
Retrieving and straightforward inferencing	Slovenia	0.01	(0.02)		0.03	(0.05)	
Interpreting, integrating, and evaluating	Croatia	0.15	(0.03)	***	0.09	(0.04)	*
Interpreting, integrating, and evaluating	Slovenia	0.04	(0.02)		0.00	(0.05)	

Notes: () – Standard errors appear in parentheses
** – Statistically significant at $p < 0.01$
*** – Statistically significant at $p < 0.001$
a – Statistically significant at $p < 0.05$

9.4 Discussion and Conclusions

The study in this chapter touches on an ongoing debate in educational research on the "impact'"of digital device usage during reading instruction and its relationship with reading achievement, particularly when assessment is conducted digitally versus on paper. Our study did not find significant differences between digital and paper overall reading in the PIRLS 2021 cycle for Croatia and Slovenia. However, the general finding is that regardless of the mode of administration (paper or digital), the investigated variables are related to the subscales of reading achievement (processes or purposes). Our results can raise awareness towards an important issue: that educational outcomes (in reading literacy or any other literacy) can be influenced by numerous factors, including the specific technology used, the instructional design, the learning context, individual student backgrounds, and especially students' needs that have to be meaningfully incorporated into teaching practice. What about the frequency of digital device use? Normally one may expect that a higher frequency of using digital devices in class during reading instruction would be related to higher reading achievement when presenting reading tasks in a digital environment compared to a test on paper. However, in Croatia, an interesting trend is observed:

1. The achievements in regard to different processes and purposes for the digital reading assessment remain about the same across the different categories of the frequency of using digital devices or increase slightly for the middle categories.

Table 9.4 Significance tests for the differences in reading literacy achievement scales in electronic and paper reading modes

Achievement scales	Country	Population estimates (electronic reading)	Population estimates (paper reading)	Average achievement (electronic reading)	(SE)	Average achievement (paper reading)	(SE)	Difference (electronic - paper)	t-testvalue	p
Overall reading	Croatia	35,511	42,458	556.55	(2.52)	553.08	(4.83)	3.48	0.64	0.523
	Slovenia	21,387	21,248	519.66	(1.86)	520.17	(3.59)	−0.51	−0.13	0.900
Acquire and use information	Croatia	35,511	42,458	552.53	(2.56)	547.02	(4.77)	5.5	1.02	0.309
	Slovenia	21,387	21,248	518.76	(2.09)	520.69	(3.54)	−1.94	−0.47	0.637
Literary Experience	Croatia	35,511	42,458	567.38	(2.81)	560.16	(5.05)	7.23	1.25	0.211
	Slovenia	21,387	21,248	521.66	(2.11)	520.45	(3.71)	1.21	0.28	0.777
Interpreting, integrating, and evaluating	Croatia	35,511	42,458	561.16	(2.66)	560.51	(4.18)	0.65	0.13	0.896
	Slovenia	21,387	21,248	519.34	(1.83)	518.2	(3.18)	1.14	0.31	0.755
Retrieving and straightforward inferencing	Croatia	35,511	42,458	552.42	(2.62)	544.35	(4.14)	8.07	1.65	0.099
	Slovenia	21,387	21,248	519.58	(1.95)	523.38	(4.21)	−3.81	−0.82	0.412

Note: *SE* standard error

Table 9.5 Coefficients of linear regression models by modes of testing (paper and digital) for different purposes and processes of reading in Croatia and Slovenia (student and home data)

				Paper			Digital		
Assessment domain	Country	Background domain	Variables	Coefficients	(SE)	p	Coefficients	(SE)	p
Interpreting, integrating, and evaluating	Croatia	Home possessions	(Intercept)	434.07	(69.17)	<0.001	430.18	(23.80)	<0.001
			A shared computer or tablet that you can use	−0.67	(8.56)	0.938	−9.51	(3.49)	0.006
			Access to the internet	28.12	(18.55)	0.130	28.50	(6.67)	<0.001
			A shared smartphone that you can use	−26.06	(6.34)	<0.001	−16.46	(3.61)	<0.001
			Your own computer or tablet	−3.52	(7.80)	0.652	−8.30	(3.77)	0.028
			Your own smartphone	37.92	(15.06)	0.012	33.45	(6.67)	<0.001
		Using computer or tablet for schoolwork	Finding and reading information	−3.41	(3.67)	0.354	−5.48	(2.56)	0.032
			Preparing reports and presentations	8.34	(3.38)	0.014	12.15	(2.49)	<0.001
		Digital self-efficacy	Digital self-efficacy	3.25	(1.61)	0.043	5.32	(1.02)	<0.001
	Slovenia	Home possessions	(Intercept)	479.23	(28.24)	<0.001	500.50	(14.94)	<0.001
			A shared computer or tablet that you can use	0.76	(6.31)	0.904	4.85	(3.28)	0.140
			Access to the internet	47.30	(11.48)	<0.001	32.07	(5.63)	<0.001
			A shared smartphone that you can use	−15.31	(5.22)	0.003	−21.03	(3.12)	<0.001
			Your own computer or tablet	−17.95	(5.62)	0.001	−23.07	(3.07)	<0.001
			Your own smartphone	−12.96	(7.35)	0.078	−11.61	(2.97)	<0.001

		Using computer or tablet for schoolwork	Finding and reading information	0.47	(3.41)	0.891	−1.28	(2.21)	0.561
			Preparing reports and presentations	7.97	(2.64)	0.003	7.49	(1.54)	<0.001
		Digital self-efficacy	Digital self-efficacy	0.65	(1.61)	0.685	2.69	(0.79)	0.001
Acquire and use information	Croatia	Home possessions	(Intercept)	403.93	(58.49)	<0.001	419.96	(23.36)	<0.001
			A shared computer or tablet that you can use	−0.57	(8.68)	0.948	−6.98	(4.08)	0.087
			Access to the internet	46.14	(19.17)	0.016	26.83	(6.71)	<0.001
			A shared smartphone that you can use	−29.64	(5.72)	<0.001	−15.25	(3.63)	<0.001
			Your own computer or tablet	−6.11	(7.14)	0.392	−4.39	(3.36)	0.191
			Your own smartphone	29.34	(10.92)	0.007	33.45	(6.35)	<0.001
		Using computer or tablet for schoolwork	Finding and reading information	−4.72	(4.55)	0.300	−7.14	(2.79)	0.011
			Preparing reports and presentations	6.21	(3.09)	0.044	12.67	(2.18)	<0.001
		Digital self-efficacy	Digital self-efficacy	4.69	(1.88)	0.013	4.74	(0.85)	<0.001
	Slovenia	Home possessions	(Intercept)	488.31	(31.58)	<0.001	491.81	(16.52)	<0.001
			A shared computer or tablet that you can use	0.71	(5.30)	0.894	5.74	(2.76)	0.038
			Access to the internet	45.54	(11.03)	<0.001	34.20	(6.38)	<0.001
			A shared smartphone that you can use	−16.37	(5.25)	0.002	−17.73	(2.74)	<0.001
			Your own computer or tablet	−19.24	(4.67)	<0.001	−19.81	(3.14)	<0.001
			Your own smartphone	−17.10	(8.79)	0.052	−12.10	(3.73)	0.001

(continued)

Table 9.5 (continued)

Assessment domain	Country	Background domain	Variables	Paper			Digital		
				Coefficients	(SE)	p	Coefficients	(SE)	p
		Using computer or tablet for schoolwork	Finding and reading information	2.28	(4.41)	0.605	−2.96	(2.27)	0.192
			Preparing reports and presentations	7.55	(3.15)	0.017	7.64	(1.59)	<0.001
		Digital self-efficacy	Digital self-efficacy	1.17	(1.43)	0.414	2.33	(0.68)	0.001
Retrieving and straightforward inferencing	Croatia	Home possessions	(Intercept)	429.61	(60.97)	<0.001	441.56	(23.66)	<0.001
			A shared computer or tablet that you can use	−3.57	(6.39)	0.577	−6.06	(3.89)	0.119
			Access to the internet	35.31	(17.77)	0.047	19.64	(6.93)	0.005
			A shared smartphone that you can use	−19.64	(5.34)	<0.001	−14.61	(3.73)	<0.001
			Your own computer or tablet	−5.77	(7.63)	0.450	−1.78	(4.03)	0.658
			Your own smartphone	27.51	(12.15)	0.024	35.96	(6.38)	<0.001
		Using computer or tablet for schoolwork	Finding and reading information	−4.88	(4.25)	0.251	−8.34	(2.89)	0.004
			Preparing reports and presentations	5.39	(2.65)	0.042	12.76	(3.23)	<0.001
		Digital self-efficacy	Digital self-efficacy	3.58	(1.33)	0.007	3.09	(0.83)	<0.001
	Slovenia	Home possessions	(Intercept)	472.84	(27.70)	<0.001	488.46	(14.73)	<0.001
			A shared computer or tablet that you can use	4.24	(6.57)	0.518	4.36	(2.99)	0.145
			Access to the internet	46.39	(11.74)	<0.001	40.19	(5.81)	<0.001
			A shared smartphone that you can use	−18.01	(5.93)	0.002	−14.78	(3.22)	<0.001

			Your own computer or tablet	−19.23	(5.43)	<0.001	−20.94	(3.20)	<0.001
			Your own smartphone	−17.57	(8.65)	0.042	−12.67	(3.41)	<0.001
		Using computer or tablet for schoolwork	Finding and reading information	2.25	(4.13)	0.585	−2.46	(2.28)	0.282
			Preparing reports and presentations	9.70	(3.36)	0.004	8.05	(1.60)	<0.001
		Digital self-efficacy	Digital self-efficacy	2.07	(1.57)	0.188	1.55	(0.70)	0.026

Note: *SE* standard error

2. For the paper assessment, the achievements for different purposes or processes tend to decrease as the frequency of using digital devices in reading instruction increases.
3. The differences in reading achievement across the categories of using digital devices in reading instruction tend to favor paper reading, not the digital one.

When it comes to Slovenia, the findings are quite unlike those in Croatia. While the results in digital reading for literary experience and retrieving and straightforward inference do not vary a lot, for the other two achievement subscales (interpreting, integrating and evaluating, and acquiring and using information), they generally show a downward trend (achievement tends to decrease as frequency increases), although the pattern is not very clear. For the paper assessment, the achievements tend to steadily increase with increasing the frequency of students' use of digital devices during reading instruction until it drops down again for the last category (at least once a week). In Croatia, the differences in achievement for almost all subscales favor the paper assessment. A lot of supportive and opposing views can be found when thinking about using digital devices more often in reading classes and that this should logically lead to better scores on digital tests compared to paper ones. But Higgins et al. (2012) issue a very telling warning that "the quantity of technology use is not the key factor to student learning… 'How much matters only when 'what and how' are identified" (Higgins et al., 2012, p. 8). And again, this indicates a complex relationship between digital device usage in educational settings and student (reading) achievement. While there is evidence on both sides of the debate, a key takeaway is the importance of context, execution, and individual student differences in determining the effectiveness of digital versus traditional reading instruction and assessment methods. Further research, particularly in contemporary settings where digital natives are increasingly common, would help clarify these relationships.

In our study, no special attention was paid to the general importance of reading, especially the motivation to read and associations with reading achievements. However, from the literature, it appears some positive and reinforcing relationships between intrinsic motivation, self-efficacy, and literacy achievement—intrinsic reading motivation leads to more engaged reading activities that help the student to become a better reader, and they are more likely to have a higher reading self-efficacy and better literacy achievement, which in turn help the growth of reading motivation (Yang et al., 2018). In Croatia, there is consistent evidence that higher digital self-efficacy correlates with improved performance across all reading scales, with all p-values indicating statistical significance. In contrast, Slovenian students do not show this trend, with most p-values well above the typical 0.05 threshold for significance, indicating that digital self-efficacy does not significantly predict reading skills in the same way in this sample. These disparities could be due to a range of factors, potentially including differences in education systems, digital access and usage, or broader cultural factors influencing digital engagement and reading.

Our study highlights the importance of participating in ILSAs to gain insights into educational outcomes (not only achievement) and international comparisons, while emphasizing the need to adapt lessons learned to country-specific circumstances as digitalization becomes increasingly significant in education. At the same time, our study demonstrates that researching different individual (students, family, teachers),

school, and out-of-school factors relating to reading achievements needs to be an ongoing task nationally (via secondary analyses), as there is no "one fits all" explanation of associations with reading achievements.

9.5 Limitations

The study in this chapter, as is often the case, does not come without limitations. The major ones are outlined below. Some of these can be considered as foreseen obstacles for this study due to the changing schedules of administration and release plans for different components of the final PIRLS 2021 database.

- Since PIRLS 2021 was conducted in the second year of the COVID-19 pandemic, smaller samples, i.e., larger dropout rates within the original samples, were noticed at the data analysis stage in Croatia. Croatia had fewer participants in both digital and paper samples, but the numbers were still acceptable for analysis.
- The paper PIRLS sample was used exclusively for the bridge study. Testing the mode effect of the test delivery with these bridge samples (smaller than the digitalPIRLS samples) may lead to larger standard errors, and potentially obscuring significant differences. These samples are smaller than the usually required minimum sample sizes and could potentially produce estimates with larger standard errors. And in general, conducting a bridge study aimed for other reasons than comparing online and paper reading (as was the purpose of ePIRLS in 2016); the aim was to be able to compare results between countries regardless of the mode in which they took the assessment and for securing trends with previous cycles.
- PIRLS is a cross-sectional study, and no causal inferences can be made from the results. All analyses are correlational, and the interpretations imply only correlation; causal inferences are not possible. Thus, the inferences could be with less strength. The direction of the relationship (i.e., the reading achievement, regardless of the mode, depends on the predictors) in these models is just presumed, but the actual direction (what depends on what) is not known.
- This study does not test for the relative effect of socioeconomic status, gender, and language at home. The reason for this is that the regression models seek to find unadjusted effects the predictors have on reading achievement.

Results Related to the Research Questions

Results related to the research questions are presented in Tables 9.6 and 9.7.

Table 9.6 Differences in student overall reading achievement by mode of testing and by possession of different ICT-related items at home

			Digital reading					Paper reading					Mode differences(digital - paper)		
Do you have any of these things at your home?	Country	Responses	Population estimates	Percentages	(SE)	Overall Reading Achievement average score	(SE)	Population estimates	Percentages	(SE)	Overall Reading Achievement average score	(SE)	Difference	t-testvalue	p
A shared computer or tablet that you can use	Croatia	No	7274.72	20.79	(0.95)	563.52	(4.44)	8507.01	20.39	(1.41)	564.31	(5.86)	−0.79	−0.11	0.914
	Croatia	Yes	27720.48	79.21	(0.95)	555.21	(2.39)	33220.80	79.61	(1.41)	550.38	(5.37)	4.83	0.82	0.411
	Slovenia	No	5947.32	28.16	(0.85)	517.38	(2.19)	5292.84	25.42	(2.04)	518.14	(6.13)	−0.76	−0.12	0.907
	Slovenia	Yes	15173.58	71.84	(0.85)	521.31	(2.15)	15525.59	74.58	(2.04)	522.46	(3.76)	−1.15	−0.27	0.791
Access to the internet	Croatia	No	2277.19	6.55	(0.76)	515.88	(8.27)	1244.51	2.99	(0.73)	503.89	(19.77)	11.99	0.56	0.576
	Croatia	Yes	32508.29	93.45	(0.76)	560.09	(2.44)	40424.59	97.01	(0.73)	555.05	(4.52)	5.04	0.98	0.326
	Slovenia	No	1731.39	8.22	(0.57)	486.8	(5.31)	1605.95	7.73	(1.16)	476.01	(11.11)	10.79	0.88	0.381
	Slovenia	Yes	19332.8	91.78	(0.57)	523.35	(1.95)	19180.36	92.27	(1.16)	524.79	(3.81)	−1.44	−0.34	0.737
A shared smartphone that you can use	Croatia	No	16358.06	47.12	(1.54)	563.36	(3.30)	21504.81	51.63	(2.74)	566.18	(5.04)	−2.82	−0.47	0.640
	Croatia	Yes	18354.39	52.88	(1.54)	551.11	(2.35)	20143.69	48.37	(2.74)	539.80	(5.38)	11.31	1.93	0.054
	Slovenia	No	11757.23	56.14	(0.92)	527.93	(2.12)	11471.23	55.38	(1.93)	527.97	(4.07)	−0.04	−0.01	0.993
	Slovenia	Yes	9186.9	43.86	(0.92)	510.67	(2.40)	9244.22	44.62	(1.93)	513.23	(4.70)	−2.56	−0.49	0.628
Your own computer or tablet	Croatia	No	9222.15	26.46	(1.01)	553.09	(4.34)	11875.49	28.22	(2.23)	556.15	(9.29)	−3.06	−0.3	0.765
	Croatia	Yes	25637.12	73.54	(1.01)	558.63	(2.77)	30204.87	71.78	(2.23)	552.27	(3.93)	6.36	1.32	0.186
	Slovenia	No	8077.35	38.35	(1.04)	532.96	(2.42)	7859.69	37.66	(2.20)	529.18	(5.50)	3.78	0.63	0.529
	Slovenia	Yes	12983.93	61.65	(1.04)	512.67	(2.30)	13010.16	62.34	(2.20)	515.79	(4.00)	−3.12	−0.68	0.499
Your own smartphone	Croatia	No	2926.09	8.4	(0.49)	517.33	(6.90)	2388.16	5.72	(1.17)	508.13	(17.55)	9.20	0.49	0.626
	Croatia	Yes	31915.54	91.6	(0.49)	560.93	(2.30)	39397.16	94.28	(1.17)	556.46	(4.54)	4.47	0.88	0.380
	Slovenia	No	5695.04	27.14	(0.93)	529.78	(2.87)	5462.54	26.19	(1.81)	528.29	(9.06)	1.49	0.16	0.875
	Slovenia	Yes	15288.41	72.86	(0.93)	517.14	(1.98)	15394.90	73.81	(1.81)	518.47	(3.74)	−1.33	−0.31	0.753
Access to the internet	Croatia	No	1043.18	3.11	(0.50)	500.08	(15.71)	948.24	2.35	(0.71)	532.60	(12.87)	−32.52	−1.6	0.109
	Croatia	Yes	32502.11	96.89	(0.50)	559.66	(2.37)	39469.32	97.65	(0.71)	555.22	(4.82)	4.44	0.83	0.408
	Slovenia	No	46.04	0.23	(0.08)	412.66	(16.27)	27.00	0.14	(0.05)	405.36	(89.05)	7.30	0.08	0.936
	Slovenia	Yes	19579.46	99.77	(0.08)	523.28	(1.88)	19115.40	99.86	(0.05)	526.11	(3.73)	−2.83	−0.68	0.498

A computer, tablet, or e-reader	Croatia	No	1253.14	3.73	(0.52)	490.54	(10.81)	1355.05	3.35	(0.55)	529.86	(15.96)	−39.32	−2.04	0.041
	Croatia	Yes	32303.24	96.27	(0.52)	560.47	(2.31)	39062.51	96.65	(0.55)	555.55	(4.84)	4.92	0.92	0.359
	Slovenia	No	209.86	1.07	(0.17)	467.82	(10.60)	119.30	0.62	(0.32)	419.41	(23.07)	48.41	1.91	0.057
	Slovenia	Yes	19419.2	98.93	(0.17)	523.61	(1.86)	19023.09	99.38	(0.32)	526.61	(3.70)	−3.00	−0.72	0.469
A smartphone	Croatia	No	1379.45	4.11	(0.40)	519.09	(9.39)	1902.38	4.71	(1.40)	537.93	(9.57)	−18.84	−1.41	0.160
	Croatia	Yes	32177.89	95.89	(0.40)	559.53	(2.43)	38515.17	95.29	(1.40)	555.52	(4.97)	4.01	0.72	0.469
	Slovenia	No	260.49	1.33	(0.22)	481.72	(10.79)	240.72	1.26	(0.33)	497.22	(22.36)	−15.50	−0.62	0.533
	Slovenia	Yes	19372.79	98.67	(0.22)	523.53	(1.88)	18901.67	98.74	(0.33)	526.30	(3.71)	−2.77	−0.67	0.505

Note: *SE* standard error

Table 9.7 Differences in student achievement for different purposes and processes of reading by mode of testing and by use of digital devices in class

			Digital		Paper			
When doing reading activities with the whole class, how often do you have students use digital devices?	Country	Responses	Average score	(SE)	Average score	(SE)	Difference (digital - paper)	
Interpreting, integrating, and evaluating	Croatia	Never or almost never	541.55	(8.98)	602.21	(19.39)	−60.66	*
		A few times a year	559.04	(6.33)	549.05	(11.25)	9.99	
		Once or twice a month	563.48	(8.90)	591.95	(7.43)	−28.47	*
		At least once a week	552.57	(10.27)	543.89	(27.96)	8.68	
	Slovenia	Never or almost never	519.04	(12.66)	494.76	(6.82)	24.28	*
		A few times a year	529.66	(6.29)	498.31	(12.18)	31.35	*
		Once or twice a month	520.75	(5.16)	515.04	(6.63)	5.71	
		At least once a week	510.33	(7.44)	485.60	(14.31)	24.73	*
Acquire and use information	Croatia	Never or almost never	536.65	(9.89)	593.38	(16.98)	−56.73	*
		A few times a year	551.24	(6.22)	539.10	(9.45)	12.14	
		Once or twice a month	554.90	(8.70)	579.92	(7.47)	−25.02	*
		At least once a week	541.45	(9.38)	522.45	(30.53)	19	
	Slovenia	Never or almost never	519.47	(13.73)	499.34	(6.29)	20.13	*
		A few times a year	528.64	(7.46)	499.37	(13.20)	29.27	*
		Once or twice a month	521.15	(6.67)	516.60	(7.77)	4.55	
		At least once a week	504.20	(8.20)	488.60	(10.14)	15.6	
Literary experience	Croatia	Never or almost never	555.03	(10.90)	597.51	(17.26)	−42.48	*
		A few times a year	566.32	(6.68)	549.57	(10.44)	16.75	
		Once or twice a month	569.10	(9.01)	594.37	(5.87)	−25.27	*
		At least once a week	556.50	(11.74)	539.68	(27.70)	16.82	
	Slovenia	Never or almost never	524.79	(14.94)	497.08	(9.32)	27.71	*
		A few times a year	532.28	(7.19)	498.80	(11.67)	33.48	*
		Once or twice a month	523.80	(4.27)	513.69	(7.64)	10.11	

		At least once a week	515.58	(8.11)	484.52	(20.43)	31.06	*
Retrieving and straightforward inferencing	Croatia	Never or almost never	541.77	(9.07)	578.82	(16.27)	−37.05	*
		A few times a year	552.29	(6.35)	533.55	(10.38)	18.74	*
		Once or twice a month	552.37	(8.81)	571.12	(11.60)	−18.75	
		At least once a week	541.57	(9.53)	527.06	(25.02)	14.51	
	Slovenia	Never or almost never	520.59	(13.43)	488.92	(11.50)	31.67	*
		A few times a year	528.12	(6.17)	499.97	(16.28)	28.15	*
		Once or twice a month	521.15	(4.96)	517.61	(8.30)	3.54	
		At least once a week	510.99	(10.16)	481.03	(12.82)	29.96	*

Notes: * - Statistically significant ($p < 0.05$), *SE* standard error

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