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## What does science tell us about teaching reading?

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### Abstract

*The article explores the importance of early reading proficiency and its long-term impact on academic and life outcomes, particularly in Romania. Analyzing PISA data, the article highlights significant literacy gaps between advantaged and disadvantaged students, as well as urban and rural learners. These disparities perpetuate intergenerational poverty and limit future opportunities. The importance of early interventions is presented, as research shows that reading difficulties in first grade often persist through later years. Key components of emergent literacy are identified, such as phonemic awareness, letter recognition, word recognition, and story structure. Proven methods like screening tools, phonics instruction, and leveled reading materials are presented, which are critical for overcoming early confusion and preventing reading failure. While research in English offers valuable insights, it has its limitations when applied to Romanian, a language with simpler orthography. Targeted studies are necessary to address gaps in understanding Romanian-specific reading processes, including phonics, fluency norms, and intuitive spelling stages. To advance literacy outcomes, there is a need for stronger teacher preparation programs, interdisciplinary research, and collaboration with international literacy experts. By fostering a research-driven approach tailored to Romanian needs, educators can implement effective strategies to close literacy gaps and ensure all students achieve reading proficiency, ultimately improving their life prospects.*

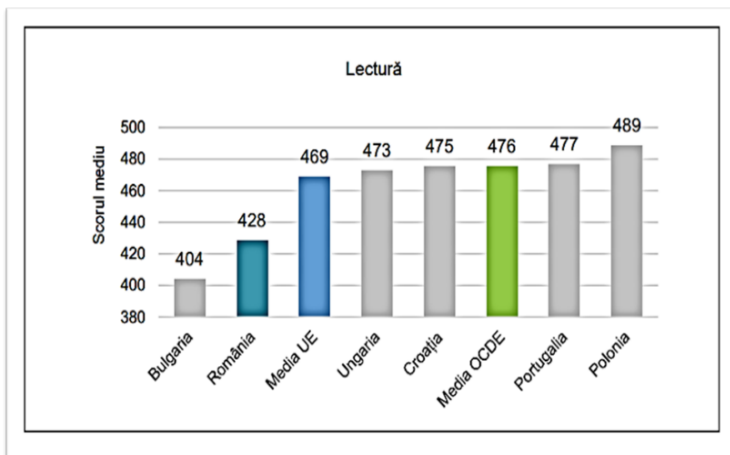
**Keywords:** Reading instruction; emergent literacy; early intervention; Romanian literacy.

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**Does it matter how well Romanian students score on the PISA exam?**

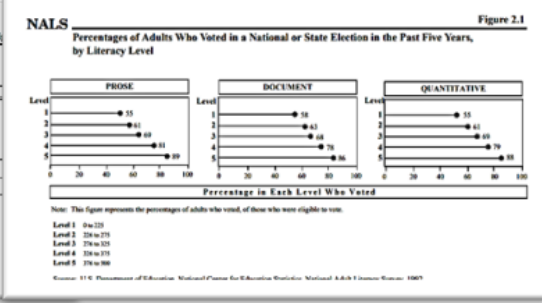
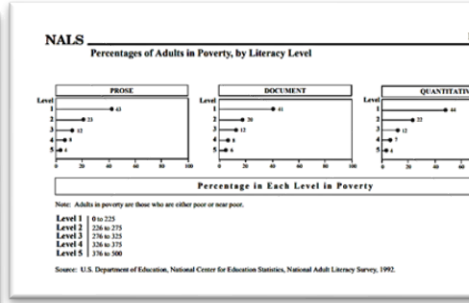
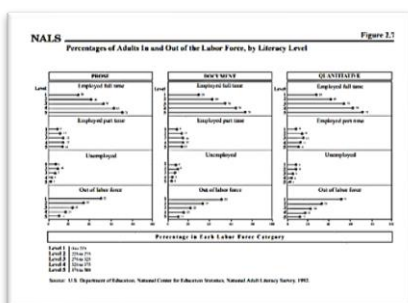
Much of our attention will be focused on Romanian students’ PISA scores from 2022. Because PISA is an international measure, some may be interested in Romania’s scores compared to those of other countries; but I will argue that students’ having or not having the skills measured by the PISA examination is the main thing that should matter to us. I



will further suggest there are steps we can take to teach those skills and improve the concomitant outcomes in the future, but there is more we need to know about teaching reading in the Romanian language.

Showing why PISA scores matter is easy. The fifteen-year-olds who took the PISA exam

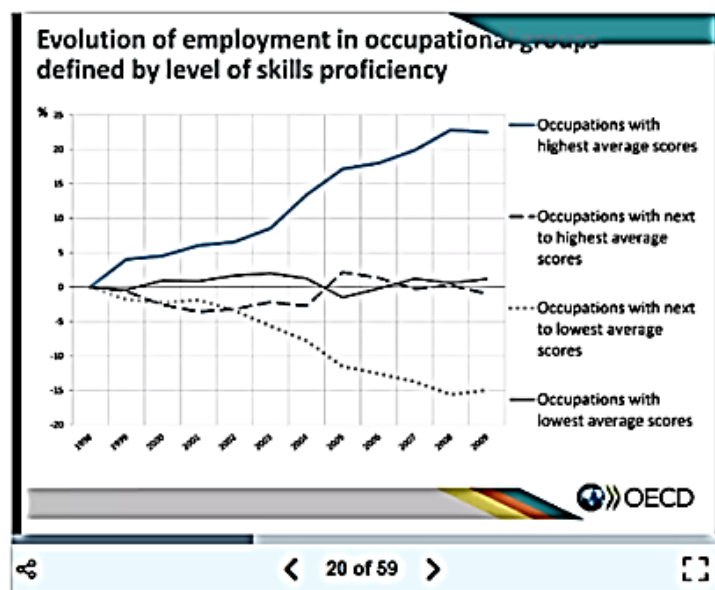
will soon be adults, and the OECD’s other testing programs link adults’ literacy and numeracy skills to quality-of-life factors, and show pretty clearly that low-scoring students are likely to be shut out of good-paying jobs, to have lower incomes and poorer health, to rely more on public assistance, be less attuned to news that affects them, to vote less often, and to have high rates of incarceration (Governors’ Early Literacy Foundation (2023)). The charts below from the US *National Adult Literacy Survey* (Kirsch, et al.) are several years old, but they graphically show some of the unfortunate results we are talking about.



The OECD's PIAAC (Program for the International Assessment of Adult Competencies) suggests that the news is getting worse. When they enter the labor market, those who score below the middling range on PISA will find themselves competing for fewer and fewer jobs, as automation and outsourcing eliminate lower-skilled jobs. So, yes, we should care about students' performance on the PISA exam.

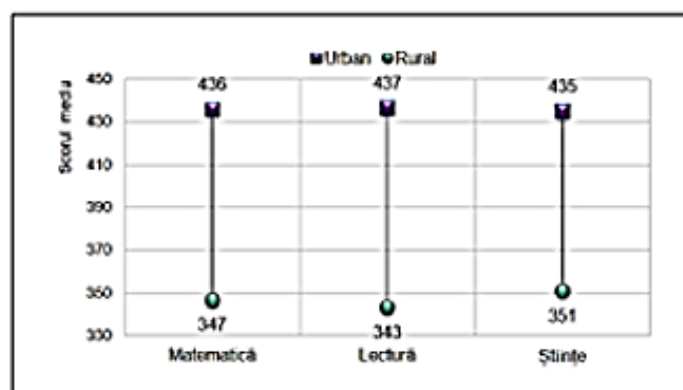
We should also be concerned about the gap in PISA scores between students from better-off and poorer families. The gap is wider here in Romania than in other OECD countries. Save the Children-Romania estimates that students from advantaged families are three years ahead of students from disadvantaged families. The gap has widened by a year since the last PISA test was administered in 2018 (Dumitrescu, 2023).

There are extreme differences between the scores of children from urban and rural school in Romania (Noveanu, et al., 2023).



Why Skills Matter - Further Results from the Survey of Adult Skills from EduSkills OECD

Figura 2.13. Diferențele de scor la matematică, lectură și științe între elevii din școlile din mediul rural și cei din mediul urban, în România



Sursa: Baza de date PISA 2022.

Having consistent groups of under-achieving students either because of their family's income levels, rural status, or both can breed cycles on intergenerational poverty as underachieving students grow up to be underachieving adults whose children are underachieving students, and so on.

But here is a twist: when the people with the very lowest quintile of scores on the US

**NALS** Table 1.2

Percentages of Adults Who Reported Not Being Able to Read or Write English Well, by Literacy Level

	Total Population	Level 1	Level 2	Level 3	Level 4	Level 5
<b>Reading</b>						
Prose	7	29	3	1	0*	0*
Document	7	25	3	1	0*	0*
Quantitative	7	26	3	1	0*	0*
<b>Writing</b>						
Prose	10	34	6	2	1	0*
Document	10	30	6	3	1	0*
Quantitative	10	30	7	3	1	0*

\*Percentages below .5 are rounded to 0.

Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

*National Adult Literacy Survey* were asked if poor reading ability was a problem for them, only a third of them said it was. When people in the next lowest quintile were asked the same question, almost none of them said so. We know that low literacy and numeracy skills are likely to be limiting these people's options in life, but if they don't know it, what are they

telling their children?

As an American educator I can tell you that intergenerational cycles of low literacy and numeracy and poverty are real, they're troublesome, and they're hard to disrupt.

But not impossible. My distinguished colleagues on this panel will tell you how to help older students who are falling behind and how to keep the others on track to becoming functionally literate adults. I will focus on getting younger students off to a strong start as readers.

### Start Early

It's likely that the students who did well on the PISA exam are the ones who had already gotten off to a good start years before. It's also probable that most of the students who scored poorly could have been identified—and helped—many years earlier, even in first grade. How do we know those things?

### Knowledge from Research

#### 1. What's important for the youngest learners?

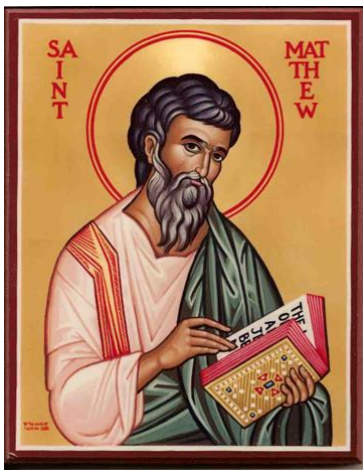
Here are some things that research has taught us about reading and teaching reading in English.

We know with some certainty that a child's early confusion over just a few aspects of reading can result in serious disabilities over time. In an often-quoted study, the least proficient quartile of the first-grade readers in one school were identified by testing, and 54 of them were tested three years later. Theirs was an average public primary school with trained teachers, special education programs, and plenty of resources, so it was reasonable to expect that most of the children would be learning well by then. But

“The probability that a child would remain a poor reader at the end of fourth grade, if the child was a poor reader at the end of first grade was .88; the

probability that a child would become a poor reader in fourth grade if he or she had at least average reading skills in first grade was .12. The probability that a child would remain an average reader in fourth grade if the child had average reading ability in first grade was .87; the probability that a child would become an average reader in fourth grade if he or she was a poor reader in first grade was only .13. The evidence ... indicates that the poor first-grade reader almost invariably remains a poor reader by the end of fourth grade.”

But by 4<sup>th</sup> grade, frustration had set in. The researcher asked one fourth grade student, “Would you rather play a game or read a book?” The boy replied, “Lady, I’d rather scrub the mold around the bathtub than read a book!” (Juel).



We have a good idea why early success in learning to read points upward and early confusion points downward. Reading skills build on each other, and every skill requires extensive practice to be mastered. But practice takes determination: success fuels it, and failure discourages it. So, a young cognitively normal child who experiences confusion about some early aspect of reading may become a severely disabled reader after a few years, because his confusions discouraged him from practicing, and that led to compounded failures. This pattern has been called “Matthew Effects” after the Gospel According to Saint

Matthew: the rich get richer, and the poor get poorer (Stanovich).

We know what some of those key aspects of early learning are

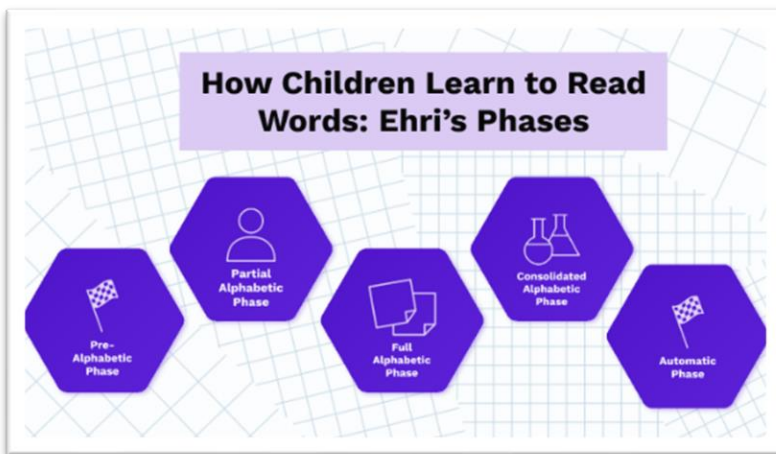
- *the mastery of decontextualized language* (Lowry);
- *competence in the unique language of books* (Stanovich);
- *having concepts about print* (Clay);
- *the concept of word* (Morris; Gehsman and Mesmer);
- *knowing many alphabetic letters* (Morris; Jones);
- *being aware of phonemes in words* (Liberman);
- *making their own discoveries about written language* (Teale and Sulzby);
- *mastering the early stages of word recognition* (Ehri), and
- *knowledge of story structure* (Stein and Glenn).

These taken together go under the term **emergent literacy** (Teale and Sulzby).

2. Research has given us ways to help children overcome early confusions, and head off reading failure. These include:

- screening instruments to identify children who need help with emergent literacy (Morris; Clay);
- teaching and tutoring schemes for emergent literacy (Morris; Invernizzi, et al.);
- books written on stair-stepped reading levels (Scholastic);
- techniques for helping children develop awareness of phonemes, and to help students learn phonics and recognize words (Blachman).

3. For older children, research has produced detailed knowledge of reading ability and resources that include:



- careful descriptions of English orthography (Venezky; Chomsky and Halle);
- aspects of word recognition;
- stages by which children learn to recognize words (Ehri; Lane);
- stages of young children's intuitive spelling (Temple, et al.);
- step-by-step lesson plans

to teach students to read words (Morris; Ganske).

- subskills of reading comprehension (Duke and Pearson);
- instruments to measure reading comprehension (Gillet, Temple, and Temple);
- differences between individual children's vocabularies (Beck, et al.);

**Hasbrouck & Tindal Oral Reading Fluency Data**

This table shows the oral reading fluency rates of students in grades 1 through 8, based on an extensive study conducted by Dr. Hasbrouck and Gold Tindal. The results of this study are published in a technical report entitled "Oral Reading Fluency: 50 Years of Measurement", which is available on their website.

• ERIC website: <http://eric.ed.gov/?q=oral+reading+fluency>

• BRT website: [www.brt.org/technical-reports](http://www.brt.org/technical-reports)

This table can help you assess the oral reading fluency of your students relative to their peers. Students scoring 70 or more words below the 50th percentile using the average score of two unrelated readings from a grade-level standardized fluency-building program. Teachers can also use the table to set long-term fluency goals for struggling readers.

**For more information:**

- Essential Components of Reading: [www.nctes.org/essential-components](http://www.nctes.org/essential-components)
- Correlation Between Oral Reading Fluency and Overall Reading Achievement: [www.nctes.org/reading-achievement](http://www.nctes.org/reading-achievement)
- Read Naturally Tools for Assessing Fluency: [www.readnaturally.com/assessment-tools](http://www.readnaturally.com/assessment-tools)
- Read Naturally Intervention Programs That Develop Fluency: [www.readnaturally.com/intervention-programs](http://www.readnaturally.com/intervention-programs)

Grade	Percentile	Fall WCPM*	Winter WCPM*	Spring WCPM*	Avg. Weekly Improvement**
3	90	128	146	162	1.1
	75	99	120	137	1.2
	50	71	92	107	1.1
	25	44	62	78	1.1
	10	21	36	49	0.8
4	90	145	166	183	1.1
	75	119	139	152	1.0
	50	94	112	123	0.9
	25	68	87	98	0.9
	10	45	61	72	0.8
5	90	166	182	194	0.9
	75	139	156	168	0.9
	50	110	127	139	0.9
	25	85	99	109	0.8
	10	60	74	85	0.7
6	90	177	195	204	0.8
	75	153	167	177	0.8
	50	127	140	150	0.7
	25	98	111	122	0.8
	10	68	82	93	0.8
7	90	180	192	202	0.7
	75	156	165	177	0.7
	50	128	136	150	0.7
	25	102	109	123	0.7
	10	79	88	98	0.6
8	90	185	199	199	0.4
	75	161	173	177	0.5
	50	133	146	151	0.6
	25	106	115	124	0.6
	10	77	84	97	0.6

\*WCPM = Words Correct Per Minute      \*\*3 weeks worth of week work

- strategies for teaching vocabulary (Beck, et al.);
- strategies whereby writing supports reading (Temple, et al.; Shanahan);
- relations between reading fluency and reading comprehension (Samuels and Farstrup);
- expected levels of reading fluency per grade level (Hasbrouck and Tindal; Zutell and Rasinski);

**Matching Readers With Text**

Lexile reader measure: 540L

- strategies for teaching children to read fluently (Rasinski);
- thousands of books on different levels and in different genres (Scholastic);



- relation between the amount of reading children do and reading ability (Allington and McGill-Frantzen);
- genres of books children need if they are to become versatile readers (Duke);
- detailed criteria for

Appendix A: Criteria for Book Levels  
Adapted from Chall, J.S., Glazer, G.L., Conrad, S.S., & Harris-Shapiro, V. (1996). Quantitative assessment of ERIC database: A practical guide for teachers and parents. Cambridge: Brookline Books.

Lexile level	Approximate grade	Approximate age	Approximate words per minute	Approximate words per year	Approximate number of books	Approximate number of pages	Approximate number of characters	Approximate number of sentences	Approximate number of paragraphs	Approximate number of chapters	Approximate number of illustrations	Approximate number of footnotes	Approximate number of endnotes	Approximate number of appendices	Approximate number of glossaries	Approximate number of indexes	Approximate number of bibliographies	Approximate number of references
100L	1	6-7	50	100,000	100	100	100	100	100	100	100	100	100	100	100	100	100	100
200L	2	7-8	60	120,000	120	120	120	120	120	120	120	120	120	120	120	120	120	120
300L	3	8-9	70	140,000	140	140	140	140	140	140	140	140	140	140	140	140	140	140
400L	4	9-10	80	160,000	160	160	160	160	160	160	160	160	160	160	160	160	160	160
500L	5	10-11	90	180,000	180	180	180	180	180	180	180	180	180	180	180	180	180	180
600L	6	11-12	100	200,000	200	200	200	200	200	200	200	200	200	200	200	200	200	200
700L	7	12-13	110	220,000	220	220	220	220	220	220	220	220	220	220	220	220	220	220
800L	8	13-14	120	240,000	240	240	240	240	240	240	240	240	240	240	240	240	240	240
900L	9	14-15	130	260,000	260	260	260	260	260	260	260	260	260	260	260	260	260	260
1000L	10	15-16	140	280,000	280	280	280	280	280	280	280	280	280	280	280	280	280	280

leveling the books (Chall, Lexiles);

- studies of the ways different SES groups use language and literacy with their children at home (Heath; Hart and Risley);
- measures of how many minutes fifth grade children practice reading in a day;

%	Independent Reading Minutes Per Day	Words Read Per Year
98	65.0	4,358,000
90	21.1	1,823,000
80	14.2	1,146,000
70	9.6	622,000
60	6.5	432,000
50	4.6	282,000
40	3.2	200,000
30	1.3	106,000
20	0.7	21,000
10	0.1	8,000
2	0.0	0

Adapted from Anderson, Wilson, and Fielding (1988).

- studies of the ways written language is used in different disciplines of study (Schleppegrell);
- studies of the reading acquisition of language-minority children and ways to teach them (August, Slavin);
- measures that show surprising differences in the verbal intelligence and the “world knowledge” of people who have the habit of reading and those who don’t (Cunningham

and Stanovich).

Periodically, research on reading and writing is summarized in voluminous *handbooks*. Each volume may be quite different from the last, as research rolls on to new discoveries.

**Is knowledge from research in English useful to teachers of Romanian students, though?**



The general ideas from the above list are applicable in the Romanian language, as they are in other languages with alphabetic writing systems. Many of the teaching strategies mentioned were used in the REFINE project funded by OSI and the World Bank in Romania and five other Central European countries from 2005 to 2008. The strategies are still

used with embellishments in the *Scoli cu ScLipici* teaching initiatives of the *Noi Orizonturi* Foundation here.

But the finer points of English language-based reading research do not travel well. An Israeli literacy expert (David Share) complained that English has an “outlier orthography,” and even though research in English reading tends to dominate the market, he warned that relying too heavily on studies from English could be “perilous.”

Then how do we avoid the perils? If you agree that the knowledge we just surveyed might be useful to have in the Romanian context, you might ask what we know about teaching reading in English that we don’t yet know about reading in Romanian, and should.

As we worked on the REFINE Project, and then with the *Scoli cu ScLipici* initiatives, questions arose about aspects of learning to read in Romania and in the Romanian language that did not appear to have answers yet:

- **Emergent Literacy:** Based on the available science, what are the best ways to teach early reading in Romanian, that balances *concepts about print, phonological awareness, phonics, spelling, word recognition, vocabulary development, comprehension, and writing*?
- **Intuitive spelling:** What are the stages of children’s intuitive spelling in Romanian? How do we assess them? What will they tell us about children’s developing knowledge of orthography, and their ability to recognize words? Has anyone looked at this?
- **Phonics:** What are the patterns of Romanian orthography that are most useful to point out to children at different levels? With what emphases, in what order, and with what methods should we most productively teach children to read words in the Romanian language? How do we know?
- **Levels:** Books used in schools need to be written on specific difficulty levels so that children of different ages can understand them. What are those levels in Romanian text? How do you describe them exactly to writers, and measure them precisely for teachers and parents? Does anyone know?
- **Fluency:** We are told that reading fluently is important, but what does that look like in Romanian? What should the targets be? How many words are average children able to read correctly per minute in each grade level in Romania? Does anyone know?
- **Genres:** What genres of texts are available for students to read at different grade levels here? How should we teach students to read in each of the genres? Has anyone looked into this?



- **Reading materials:** We know that children should be given many pages of connected text at each grade level to have the practice they need to become proficient readers. How many pages of materials are provided for children to read in each of the Romanian primary grades?
- **Family literacy:** What could we learn from studying the home language and literacy environments of different SES groups in Romania?
- **Disciplinary literacy:** What are the language challenges of texts written for different disciplines, and what are the best strategies for helping students meet them?
- You surely have other questions of your own, too.

### **How do we answer these questions?**

Most of what we know about reading in English came from research, of course. But here's an aside from the sociology of science that may be offensive to some—and if it is, I apologize, but I hope you will see the point.

When you train teachers for primary grades in normal schools, but you train teachers for the secondary level in universities, the university faculty will give you research on educational topics like philosophy, history, and psychology and perhaps on teaching subjects at the secondary level, because faculty at universities have research in their job descriptions: "Publish or perish." But you will get very little research into primary level-teaching, because faculty in normal schools aren't expected to do research. It's not that reading in the primary years isn't important; it's just that beginning reading has stayed out of the spotlight because of the way teacher education and research have been organized.

In the US, we had high school-level normal schools from 1839 until the late 1920's, and from then to the mid-twentieth century, our normal schools made a slow transition into teachers' colleges. Later some of them were folded into universities or became universities themselves. Though there had been some investigations by experimental psychologists into reading processes in general—notably Edmund Burke Huey's *Psychology and Pedagogy of Reading*, published in 1908--research into reading and reading instruction in the primary grades only got serious in the 1950's and 60's, when universities began preparing teachers for the lower grades and professors had to publish research about primary education to keep their jobs and be promoted.

A key ingredient to most reading research has been the practical aspect. Teachers' colleges often operate laboratory schools, where teachers-in-training get to practice what their professors preach. Many universities operate "reading clinics," where parents bring

their children for testing and teaching. Research on reading education is almost always expected to involve interventions with students, and better yet, to compare interventions against the progress of control groups.

To give you an example, the School of Education at the University of Virginia in the United States houses the McGuffey Reading Center, a clinic where children come and have their reading assessed one-on-one by a graduate student in a testing room with a one-way mirror, while other graduate students and the professor observe from another room. In the afternoons, children come in for one-on-one tutoring by the graduate students, supervised by the professors. The graduate students have long classes twice a week in which they review what they learned from testing and tutoring, and try to square it with what they read in research articles. They have another weekly seminar where they read and discuss recent or classical research and theoretical works. They take courses in other departments on educational psychology, research methodology, statistics, linguistics, psycholinguistics, cognitive psychology, literary theory, and such. The Reading Education department offers a donor-funded lecture series twice a year that brings in the most insightful researchers from outside. And doctoral students do research and write dissertations.

Interdisciplinary collaborations have been important, too. What we know about emergent literacy came about through partnerships with educators, psychologists, linguists, and sociologists. The most important research on reading comprehension has come from collaborations between educators, cognitive psychologists, and literary theorists. Many of the ideas that formed the Reading and Writing for Critical Thinking project which engaged hundreds of teachers in Romania came from a partnership between reading educators and professors of philosophy.

### **How do you prepare teachers to teach reading?**

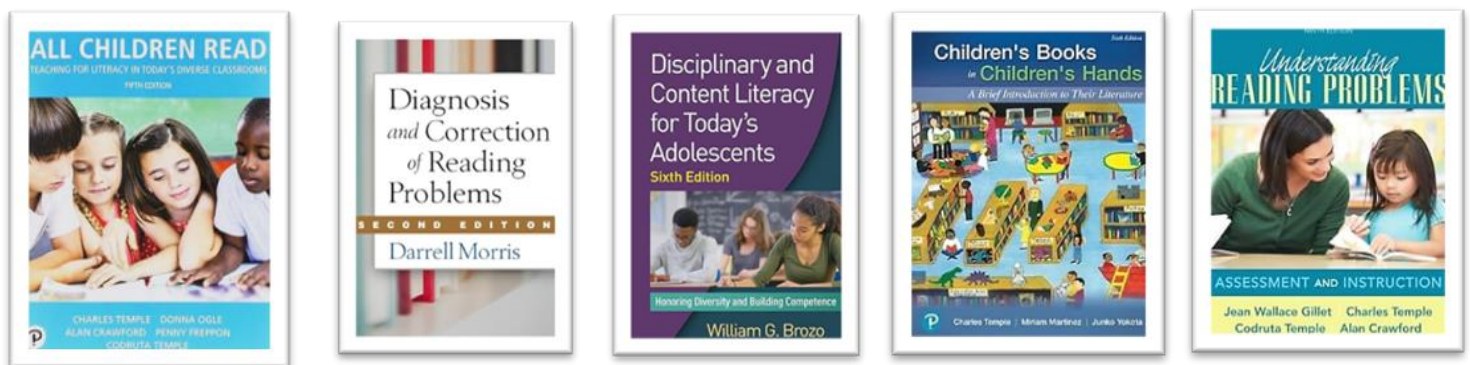
Like graduate education in literacy, training teachers blends the theoretical and the practical. In most of the US, students preparing to be primary teachers must take at least three courses in the teaching of reading (each course meets for 45 hours in a semester) and have extensive practice in school classrooms. Secondary teachers may or may not be required to take literacy courses depending on the state in which they live, but courses on teaching reading in the content areas are available to them. They also must have extensive practice in school classrooms.

A typical course on teaching reading may have the whole class go out and work with children in a local school two mornings each week, then come back to a seminar on campus to discuss the experiences and relate them to class reading assignments.

For a full semester in their final year, each student takes over a class and teaches full time in a local school, with weekly supervisory visits from a university professor or other staff person.

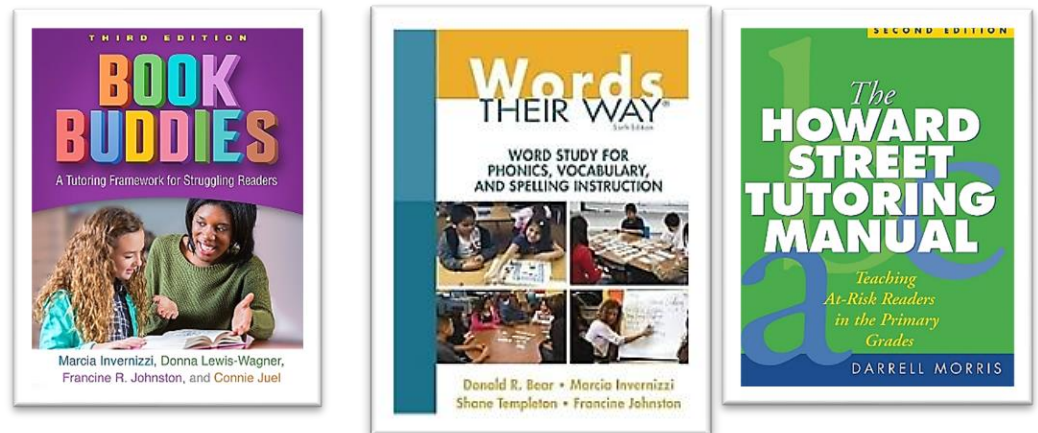
### Books!

Comprehensive textbooks used in teacher-training courses are written by university professors, and their publishers typically have juries of other university professors review the manuscripts to ensure that the information in them is accurate and up-to-date. Textbooks for courses are usually published in updated editions every three to five years. Most are now available online and in print.



Other single-topic books may be written by professors or classroom teachers. Schools or individual teachers purchase these books for teachers to use.





### Service Learning.

Service learning is popular with university students. At my school, the America Reads tutoring program is open to any interested student regardless of major, and gives students several hours of training before having them tutor children in local schools two hours each week. The key is to give the tutors tightly scripted lesson plans each day, and have a trained supervisor for every eight tutors. Our America Reads program engages 100 tutors at a time, and has run continuously for 30 years.

### Who does reading research in Romania?

Many, if not most, of our American universities have graduate programs that focus on literacy—offering courses and conducting research by professors and by doctoral students. Many classroom teachers pursue “action research,” in which they try new instructional procedures. They may share their results within their own schools, at conferences, in articles published in educational journals, or in books for other teachers. There are three major national and international associations and many smaller regional groups that focus on literacy—the International Literacy Association, The National Council of Teachers of English, and the Literacy Research Association. They all host conferences on instruction and research. They publish journals, sometimes several for different audiences from each association. The International Literacy Association has “special interest groups” of researchers, many of whom are willing to collaborate with international colleagues to conduct research outside of the US.

Who does reading research in Romania? Who will in the future?

What international collaborators help?

What journals publish the research?

At what conferences is the research shared?

How does the research influence policy and teaching practice?

How do children and future adults in Romania benefit from the efforts?

How do educators in other countries benefit from what you learn here?

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