

LITERACY: THE CASE OF ESTONIA

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Abstract. In 1990-91 the International Association for the Evaluation of Educational Achievement (IEA), with the co-operation of researchers from 32 countries investigated the reading literacy of 9- and 14-year-old pupils world-wide. Using the same methodology, Estonian data was gathered in 1994. The international analysis demonstrated a significant correlation between children's achievement and economic welfare in one particular society: but the level of Estonian children was close to, or slightly higher than, the international mean - higher than the international results would lead one to predict. It is suggested that the postulated economic determinants of reading literacy need more careful investigation. The Estonian data agreed with the international results in that it was hard to find any clear relationship between teaching methods and student performance: on the other hand there are indications that literacy is related to a variety of out-of-school conditions and activities. The international analysis focused on reading as an independent activity, while the Estonian study favoured the theoretical framework of "New Literacy" (Bloome and Talwalkar, 1997) – the relation between 'reading the word' and 'reading the world'. It is demonstrated that this theoretical framework gives a satisfactory explanation of a large number of independent and isolated empirical facts.

Keywords: Literacy, reading, educational outcome, Estonia.

1. Problem and background

Literacy seems to be a real problem today: unexpected, controversial, intriguing, and therefore important to very different people, institutions, and states. This seems to surprise many people, since the first function of educational systems and schools has always been to teach people to read and write, nearly everyone has attended school. Most Western industrialised nations attained universal literacy by the early 20th century. (Venezky 1996). This was equally the case in Estonia. (Table 1).

Table 1

Literacy in Estonia: data of Censuses of 1881, 1922 and 1934, (%)

Census	Unable to read or write	Able only to read	Able to read and write
1881*	5.7	51.6	42.7
1922*	3.2	6.2	90.6
1922**	5.9	5.8	88.3
1934**	4.1	2.3	93.6

*comparable territories; 14 years and older citizens

**comparable territories (= borders of Estonian Republic); 15 years and older citizens

Sources of data: Rahva demograafiline, 1924; Rahva koostis, 1934.

It is evident that schools need financing. OECD countries currently spend between 5–8 % of their Gross Domestic Product on educational institutions and nearly half of that on primary and secondary education (Education 1995). But at the same time, the problem of effectiveness, as well as the functions of different educational systems and institutions, are other factors which are highly relevant today (Performance 1995): If people have problems with reading and writing, where is the money being spent, and what are the schools doing?

The reading process is one of the fields in psychology and education which has been investigated thoroughly enough. The history of reading research is inseparable from the history of psychology in general. Among the first experiments in the history of psychology, were reading investigations carried out by E. Javal in Paris and, in the laboratory of Wilhelm Wundt by James McKeen Cattell in Leipzig in the 1880s. The measurement of reading as an educational outcome also dates from a century ago, and this can be seen as a significant first step in the subsequent movement concerned with the measurement of educational achievement (Venezky 1984, Kamil 1984, Johnston 1984). Very much should be clear, investigated and tested and used in practice. Richard Venezky (1984) has described as Herculean the task of applying research results on reading into school practice. And it seems that he is right: no more than a few percent of the variance in students' reading achievement can actually be attributed to teaching method, and very little evidence could be found to demonstrate the impact of teaching on students' reading skills (Lohnes and Gray 1972, Thorndike 1973, Lundberg 1994). Ecological validity seems to be problem no. 1 in reading research (Kamil 1984).

It is now clear that there are two rather different realities – reading as a technical skill, and text comprehension. Ability to read a text does not mean necessary comprehension and application of knowledge into practice. The situation when a reader fails to monitor whether or not comprehension has been successful has been termed “the illusion of knowing”(Commander and Stanwyck 1997).

There is a body of research from the later 20th century which demonstrates that a rather large proportion of the adult population is functionally illiterate – not only in the developing, but also in the industrialised countries. The most influential research into literacy was carried out in the early 1990s: the International Adult Literacy Survey. The aim of this survey was not to deal with the problem of illiteracy in the 3rd or 4th worlds, but in economically developed western countries. Its main findings may be summarised here (Murray 1997):

- lack of literacy skills affects large proportions of the entire population;
- important differences in literacy skills exist, between and within nations;
- adults with low levels of literacy do not usually acknowledge, or even recognise, that they have the problem.

In 1991, the US Congress passed the National Literacy Act: this includes the assertion that nearly 30 million adults in the United States have serious problems with literacy: it also describes literacy problems as inter-generational, as closely associated with poverty, and as posing a major threat to the economic well-being of the United States. It further asserts that there is no reliable nor central source of information about the base of knowledge in the area of literacy (Public Law 1991). Three years later, in 1994, Congress passed the *Goals 2000: Educate America Act*, which defines national educational goals in legal terms, one of which is that by the year 2000, every adult American will be literate – and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship (Goals 1994, sec. 102).

Other nations have their concerns too: in Britain in 1996, for example, Alec Webster *et al.* wrote that the Department for Education for England and Wales had described teachers as lacking a full and organised understanding of how children acquire literacy, and what teaching should be aiming to achieve at different stages of schooling.

Literacy – or illiteracy – is a problem for the European Community in general (Slavenburg, 1992), and is a current concern of the OECD (Literacy 1995; Literacy Skills 1997). The full title of this second OECD analysis suggests a challenging paradigm – *Literacy Skills for the Knowledge Society*.

The perception of problems at the public and political level is closely connected with discussions and research at the scientific level: they are two sides of the same discourse. Table 2 is compiled from the database of Educational Resources Information Centre, ERIC, and shows the number of database records from the period 1966–1995 which include the word literacy in the title or in the abstract.

As can be seen, there is a whole family of concepts which seem to share the common idea of literacy. This diversity is the basis of the following conclusions:

1. Literacy is very much a current theme for both practitioners and researchers.
2. Literacy in the modern sense means more than the elementary skills of reading and writing: it is synonymous with a general competence which is needed in a great variety of fields – as, for example, a *sine qua non* for competition in a

global economy. Reading and writing are secondary problems in the general literacy discourse.

3. One theme which concerns many today is the competence of adults – or more precisely, a number of skills which are needed, reading among them – in real situations. (See Tuijnman et al. 1997).

Table 2

Number of studies, recorded in ERIC, which include the word “literacy”
in title or abstract 1966–1995

Term	1966–1975	1976–1985	1986–1995	Year of including the term to the ERIC thesaurus
Literacy	1934	5909	14370	1966
Adult literacy	457	934	3198	1970
Computer literacy	12	1631	1753	1982
Workplace literacy	0	8	1229	
Scientific literacy	199	373	650	1966
Technological literacy	5	251	592	1982
Functional literacy	290	464	585	1980
Visual literacy	244	366	504	1972
Cultural literacy	5	46	381	1993
Numeracy	4	102	378	1993
Information literacy	1	16	302	1992
Reading literacy	8	22	82	
Environmental literacy	8	11	59	
Quantitative literacy	0	2	27	1993
Civic literacy	2	6	22	
Writing literacy	1	5	21	
Mathematical literacy	4	10	18	
Historical literacy	0	1	18	
Political literacy	3	2	11	
Musical literacy	3	2	4	
Reading comprehension	2066	5117	3859	1966
Intelligence	4216	4397	3635	1966

For comparison, the frequencies of two “classical” psychological concepts – reading comprehension and intelligence have remained on the same level. The conclusion is inescapable: literacy, which in the 1960s was significantly overshadowed by other topics in terms of frequency of exploitation, is in the ‘90s used twice as often as intelligence and reading comprehension taken together. There is a clear tendency towards a new paradigm, which uses a person’s actual, practical skills. It seems that European civilisation is today ready to abandon an earlier interpretation of literacy, as the minimal ability of reading, and experience its own Renaissance of the world of Cicero, to whom the *litteratus* was a learned person (Venezky 1996).

Inadequate literacy is a cause of great concern over the whole world. The finding of the adult literacy survey that adults do not usually acknowledge the existence of a problem, leads to an analogy: perhaps nations might be similarly reluctant to acknowledge the existence of a problem?

2. The IEA comparative study on the reading literacy of students

The starting point for this discussion is an international survey, in which Estonia did not take part, but which was used as a model for a study conducted by the present writer three years later.

In the academic year 1990–91, the IEA began an investigation into the reading literacy of children in 32 countries. A serious degree of uncertainty about students' abilities had been recognised, and an international comparison was seen as necessary. An overview is given in Elley, 1994, from which these points are an extract.

Two main aims were:

- to describe achievement levels in reading literacy, in comparable samples of students from different educational systems: and
- to identify differences in methods of teaching reading, and to study possible influences of context on students achievement.

Two target populations were defined:

- population A – the school grade in which most students are 9 years old; and
- population B – the grade of 14-year-olds.

Reading Literacy was defined as “the ability to understand and use those language forms that are required by society and/or valued by the individual”.

Three types of text were distinguished:

- narrative texts: continuous texts in which the author tells a story. Such texts follow a time-line, and are usually intended to entertain or to involve the reader emotionally (Graesser et al 1996):
- expository texts: continuous texts which are intended to convey factual information or opinion (Weaver and Kintsch 1996):
- documents: information set out in the form of graphs, charts, maps, lists, or sets of instructions.

Subsequently, three dimensions of reading literacy were identified and evaluated, one for each of the categories of text. A summary score was also obtained.

Tests were administered on a variety of passages of text, with questions designed to measure comprehension, and the level of literacy was evaluated on the basis of correct answers.

The passages were of about 1500 words each, and there were 3–6 questions on each. The total number of items was 66 for the 9-year-olds, 89 for the 14-year-olds. Standardised international scales with Rasch transformation were also developed, with a mean of 500 and standard deviation of 100.

To meet the second goal, three questionnaires were used:

- the student was asked about home environment, personal interests, study habits;
- the teacher of the student's native language was asked about teaching methods and aims;
- the school principal was asked about the school environment.

It must be noted that since the data for this second goal was gathered only by a questionnaire, the users will need to make normal allowances for subjective bias - a point which was not always brought out clearly in written materials concerning the study.

3. An Estonian comparison: sampling methods and adaptation of the IEA testing

During 1994, the present author - with a number of assistants, based at the University of Tartu - conducted a survey in a representative selection of Estonian-speaking schools. One prime purpose was to gather data which could be compared with the IEA results, and to analyse them in the same way to illustrate Estonia's situation in a wider context.

Measurement procedures followed the principles laid down in the manuals produced by the IEA for the international study three years earlier: these included the translation of tests and questionnaires, adaptation to local conditions, the conduct of the tests, and sampling procedures.

One factor which might negatively affect the comparability of results was the time perspective: the fact that the Estonian studies were carried out three years later than the international research. The question of changes in the level of reading literacy over time was investigated in Sweden by Karin Taube (1993), who found no significant differences over a 20 year period.

It should be recognised that since the international survey was completed before there was any possibility of Estonia taking part, it is evident that the Estonian data were not included in the international analysis. The Estonian data in Table 5 are thus a composite of the IEA data and the separate Estonian study.

Data about the Estonian target populations and the approach to sampling are given in Table 3. In sampling, the general population was divided into three degrees of urbanisation: the capital city, provincial centres and rural areas. The unit of selection was the school class, and this led to a small difference (< 4%) between the sizes of the planned and actual samples in group B. The size of the sample was planned as 1500 students in both populations.

Complete comparative data about the gender structure of the target population as a whole are not available, but it is at least possible to say that the proportions in sample A reflect the differences in the birth-rate between boys and girls. The figure of 10.6% for the gender difference within population B is relatively high - there were more girls than boys at school on the day of the test. Since the samples

were selected by complete school classes, two explanations suggest themselves: the dropout rate of boys is higher, and their absence from school is higher in the teenage years.

Table 3

General population and sampling

	Grade 3		Grade 8	
	General population	Sample	General population	Sample
N	12,667	1409	11,717	1492
Mean age (years)	–	9.7	–	14.2
Gender				
Boys	–	50.8%	–	44.7%
Girls	–	49.2%	–	55.3%
Rural areas	54	54	50	51
Provincial centres	25	25	29	25
Capital	21	21	21	24

Table 4

Reliability of scales:
international and Estonian data
(Cronbachs' alpha)

Scale	Grade 3		Grade 8	
	International mean	Estonian	International mean	Estonian
Narratives	.84	.87	.85	.82
Expository texts	.81	.86	.79	.74
Documents	.79	.80	.80	.77
Total scores	.93	.93	.92	.90

Source of international mean: Elley 1994:27.

It had been noted that since this was a comparative study, international methodology was used. Table 4 presents comparative data about reliability (Cronbach alpha) of scales. From the viewpoint of the classical test theory, the Estonian adaptations of the tests seem to have good psychometric properties, but there are some problems, too. For one thing, the discriminatory power of the items is relatively small – the texts and the test items are too easy for Estonian students. In group A, the mean of correct answers per item was 63%: in group B, 71%. The

second problem is with dimensionality of scales. Factor analysis shows that in group A one factor dominates, and it explains 19,8% of the variance of items. But the test for group B was multidimensional, and the first dominant factor explains only 10,8 % of variance.

4. Reading literacy of Estonian students in an international perspective

The Estonian results can be compared with the international ones in two ways: in a standardised international scale ($M = 500$, $SD 100$), and by raw data. The standardisation of Estonian data to the international scale is done with the help of coefficients: and it is therefore important to use the raw data also where possible. Standardisation was done for purposes of international comparison, the raw data are useful above all to get an overview of the diversity of Estonian students.

Using standardised scale results, it is possible to conclude that the Estonian results lie rather near the international mean (Table 5): from six means only one is below the international mean of 500.

There are two specific aspects of the Estonian results: it is noteworthy that both Estonian groups scored highest in the documentary scale (517 and 519) and lowest in the expository scale (489 and 505). Texts in the expository scale are rather typical of those which are familiar to students from school textbooks and it is reasonable to expect that the abilities of students in this area would be good. Ingvar Lundberg (1994) believes that teachers of reading generally give more emphasis to narration and one could expect good results here, too. In Estonian case it appears that Estonian students were best at reading documents, which means that they are better with texts with which they have intensive contact also outside school. But Estonian students were relatively poor with text-book specific texts. Two different explanations are possible. Firstly, tables, maps, graphs etc. are given a leading role in Estonian schools, which can explain why the Estonian results were relatively good in the document scale. And secondly, out-of-school influences on the reading literacy of Estonian students are more important than in other countries, while the role of school is comparatively less. But in both cases it is important to recognise that Estonian students have problems with expository, text-book like texts, where their comprehension is worse than that of their contemporaries in other countries.

It is also possible to compare the Estonian results with the international ones in another way. There were three reading texts (a document text, "Temperature", an expository text, "Marmots", and a narrative text, "Shark") and the two groups were asked the same questions. Here the aim was to create a developmental scale: to be able to compare achievement levels between the two age-groups. The previous conclusion, that Estonian results are near to the international mean, is confirmed also here. The results can be followed at the level of test items and at the summary level, and the pattern of correspondence is seen to be similar. Test

Table 5

Literacy of Estonian students: international perspective (mean 500, SD 100)

Narratives	A group: 9-years old				B group: 14-years old						
	Expository texts		Documents		Narratives		Expository texts		Documents		
Finland	568	Finland	569	Finland	569	Finland	559	Iceland	548	Finland	580
USA	553	Sweden	542	Hong Kong	554	Sweden	556	France	546	Hong Kong	557
Sweden	536	USA	538	USA	550	France	556	Finland	541	New Zealand	552
New Zealand	534	Italy	538	Sweden	539	Iceland	550	Hong Kong	540	Sweden	550
Italy	533	France	533	France	527	New Zealand	547	USA	539	Switzerland	549
France	532	New Zealand	531	Switzerland	522	USA	539	Singapore	539	France	544
Norway	525	Norway	528	Germany(E)	522	Switzerland	534	Hungary	536	Germany(E)	543
Singapore	521	Singapore	519	New Zealand	521	Slovenia	534	New Zealand	535	Hungary	542
Iceland	518	Iceland	517	Germany(W)	520	Hungary	530	Sweden	533	Slovenia	537
Ireland	518	Ireland	514	Norway	519	Singapore	530	Switzerland	525	Singapore	533
Greece	514	Greece	511	Iceland	519	Canada	526	Slovenia	525	Netherlands	533
Belgium	510	Switzerland	507	Italy	517	Greece	526	Italy	524	Denmark	532
Estonia	506	Belgium	505	Estonia	517	Portugal	523	Denmark	524	Germany(W)	532
Switzerland	506	Spain	505	Spain	509	Italy	520	Portugal	523	USA	528
Canada	502	Hong Kong	503	Hungary	509	Estonia	518	Germany(E)	523	Portugal	523
Slovenia	502	Canada	499	Belgium	506	Denmark	517	Germany(W)	521	Canada	522
Spain	497	Germany(W)	497	Singapore	504	Cyprus	516	Norway	520	Estonia	519
Hungary	496	Hungary	493	Slovenia	503	Norway	515	Canada	516	Ireland	518
Hong Kong	494	Germany(E)	493	Canada	500	Germany(W)	514	Greece	508	Norway	512
Netherlands	494	Estonia	489	Denmark	496	Germany(E)	512	Estonia	505	Iceland	509
Cyprus	492	Slovenia	489	Ireland	495	Ireland	510	Ireland	505	Italy	501
Germany(W)	491	Netherlands	480	Greece	488	Hong Kong	509	Netherlands	503	Greece	493

Continuing Table 5

Literacy of Estonian students: international perspective (mean 500, SD 100)

Narratives	A group: 9-years old			Narratives	B group: 14-years old				
	Expository texts	Documents			Expository texts	Documents			
Portugal	483	Portugal	480	Netherlands	506	Spain	495	Belgium	483
Germany(E)	482	Cyprus	475	Spain	500	Cyprus	492	Cyprus	482
Denmark	463	Denmark	467	Belgium	484	Thailand	486	Thailand	478
Trinidad	455	Trinidad	458	Trinidad	482	Trinidad	485	Spain	475
Indonesia	402	Indonesia	411	Thailand	468	Belgium	477	Trinidad	472
Venezuela	378	Venezuela	396	Philippines	421	Philippines	439	Philippines	430
				Venezuela	407	Venezuela	433	Venezuela	412
				Nigeria	402	Nigeria	402	Nigeria	394
				Zimbabwe	367	Zimbabwe	374	Zimbabwe	373
				Botswana	340	Botswana	339	Botswana	312

items that were easy for Estonian students were also easy for other students, and vice versa. The summary result for group A is the same: 56% of responses were correct. In group B the Estonian result is slightly higher than the international mean, 85% and 80% of responses respectively were correct. Five years of schooling (from grade 3 to grade 8) added 29% of correct responses in Estonia and 24% in international mean.

Both indicators – the level of general reading literacy and the indicator of development of this ability from group A to group B – were regarded as sufficiently important educational indicators to be included in the compendium of OECD educational statistics (Education, 1995).

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The fact that Estonian results are near to the international mean is significant not only at the level of educational politics. The result also needs to be recognised in the conceptual framework of international comparison. The result is surprising in the context of the first conclusion drawn by project leader Warwick Elley (1994), that at the national level of reading literacy is highly correlated with levels of economic development. Relevant economic data is not available, but it is inconceivable that the economic situation in Estonia during the last half-century was comparable with the mean of those countries who took part in the international study: on the contrary, the early 1990s in Estonia has been described as a period of economic collapse. The result is positive for Estonian self-concept, but what reasons can be found? To what extent can reading development be predicted by economic indicators and what are the other determinants?

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One of the most important conclusions of the International Adult Literacy Survey was that not only are there differences between nations, but at the same time within nations (Murray 1997). This may also be taken as the starting theses in the following analysis of Estonian student data.

How widely do Estonian students differ amongst themselves? – what variance and differences are there in their ability to understand and use written materials? The data in Table 6, which describe variance among students in group A, lead to the following conclusions:

There are significant gender differences. The gender difference in the raw score means that, from 66 items, the girls gave two more correct answers than the boys. The second important gender difference: the girls were more homogeneous in their reading ability level than the boys. Although the gender gap is statistically significant, the influence of gender is rather small: gender explains less than 1% of reading literacy variance (linear relationship).

Table 6

Variance of reading literacy of Estonian students: grade 3
(raw score/Rasch scale)

	Average	SD	ANOVA: Eta squared, p
Total (Max.raw score 66)	41.8/504	13.1/85	
Gender differences			0.0083; p < 0.001
Boys	40.6/497	13.3	
Girls	43.0/511	12.8	
Urbanisation differences			0.0881; p < 0.001
Rural schools	38.6/483	13.4	
Provincial centres	43.0/511	12.5	
Tallinn	48.4/546	9.9	
School differences *			0.237; p < 0.001
School Y (N=21)	31.7/445	14.0	
School X (N=27)	55.3/592	4.5	

* From among 82 schools, two relatively extremes were chosen: both had more than 20 students.

Earlier research (Thorndike 1973) has shown differences in the reading achievement of boys and girls in favour of girls. The results of the IEA study in 1990–91 gave the same picture: in 19 countries out of 32 these differences were statistically significant (Purves and Elley 1994). The Estonian gender difference of 14 Rasch points approximates to a mean position: the most extreme gender difference was in Denmark (26 points).

More important than gender difference was the difference in the urban/rural dimension. The test results correlate with these steps: highest scorers were the Tallinn students, lowest were the rural students – in the raw scores the difference was about 10 right answers, while at the same time the rural students were the more heterogeneous. Gender and the school's location interact: the lowest scores were shown by rural boys (37 correct answers), the highest by Tallinn girls (50). The three-level urbanisation variable predicts 9% of reading achievement, nearly one order of magnitude greater than gender.

Urban/rural differences also exist in most countries, but here the picture is more composite. As a rule, urban students read better, but at the same time the situation in several (post-modern?) countries is the reverse – for example in New Zealand, Germany, France, Switzerland, the Netherlands (Purves and Elley 1994). The very clear urban/rural differences in Estonia, in favour of urban areas, place it closer to developing countries. The Estonian gap between students from Tallinn and from rural schools is without precedent in the international study – 63 Rasch scale points, more than 50% standard deviation from the international scale.

Precisely similar data – capital schools vs. rural schools – are not available from other studies, but in the data of Purves and Elley (1994), the most striking contrast was of 50 Rasch points, between rural and urban schools in Indonesia.

The biggest differences were differences between schools. Table 6 gives data about two relatively extreme schools (for example, schools with few students were excluded). It is apparent that the difference between means can exceed 24 points out of 66. Nearly 25% of variance of reading literacy can be predicted by the school variable. The differences between schools are influenced by urban/rural dimension, but even if this influence is eliminated, the differences will still be significant. For example, the school variable in Tallinn (the most homogeneous context in this research and in this sense) predicts 15,6% of variance of the test result.

The international comparison revealed that large differences within national educational systems can produce differences between schools. The three most homogenous school systems in this sense were those of Finland (7% of variance due to differences between schools), Sweden (8%), and Slovenia (9%). The three most heterogeneous were Indonesia (30%), Italy (29%) and Venezuela (28%) (Postlethwaite & Ross, 1992). In Estonia 24% variance in student achievement is predicted by school variable, and it is higher than the average differences between schools internationally. The difference of means of extreme schools is about 1,5 standard deviation of the scale (147 Rasch points).

Basically the same differences are to be observed in group B (table 7), but some developments are specific.

Table 7

Variance of reading literacy of Estonian students: grade 8
(Raw score/Rasch scale)

	Mean	SD	ANOVA: Eta squared; p
Total (Max. raw score 89)	63.4/514	11.6/63	
Gender differences			0.0221; p < 0.001
Boys	61.5/505	12.3	
Girls	64.5/521	10.7	
Urbanisation differences			0.049; p < 0.001
Rural schools	61.2/501	11.3	
Provincial centres	63.8/517	11.9	
Tallinn	67.6/537	10.7	
School differences *			0.2574; p < 0.001
School Z (N=22)	53.4/462	14.2	
School Q (N=29)	79.5/619	4.6	

* From among 74 schools, two relatively extremes were chosen: both had more than 20 students.

Gender differences exist, and they are more specific. But here it is important to recognise that the gender structure is not balanced – there are 10% more girls than boys in the sample. The higher drop-out and absence rates among teenage boys has already been noted, and it is logical to assume that the boys from this cohort who did not take the test would have increased the proportion of low scores, and the gender differences would have been even greater.

The differences between schools are more specific: more than 25% of students' achievement in the reading literacy test is predicted by the school variable. It has already been noted that in the Tallinn group A, 15.6% of test variance was predicted by school differences. In group B this difference is 28.2%. This result is consistent with the hypotheses of the "Matthew" effect – the gap between good and poor readers tends to increase (see Shaywitz et al. 1995). Here one additional point of information is important. In this study "class" and "school" are synonymous – each school was represented by a single class, since the class was the unit of selection: but in Estonia, classes as a rule are streamed according to ability or scholastic achievement, so a school average can be very different from the mean score for a specific class.

There was only one important difference between the Estonian and the international data. Seen internationally, there is a general tendency that the gender gap in group B is smaller than in group A. The situation in Estonia is different: gender differences in reading achievement still exist, but they are not smaller in group B than in group A (14 Rasch points in group A and 16 in group B). As with the international data, the Estonian result is that urban/rural differences are greater with younger learners: the difference between Tallinn and rural schools in group A was 63 Rasch points, in group B 36. International data are not available about increasing or decreasing differences between schools for the two student groups. It seems important to know whether or not the Estonian development – the increasing differences – is reflected internationally.

5. Teachers' gradings as a measure of reading literacy

Although it seems self-evident to view literacy as a central outcome of the educational process, there are great variations in the traditions of assessing it. The U.S, for example, has a long tradition of using tests of standardised functions: and the assessment of reading performance is so important that it is included among the eight most important indicators of educational outcomes (Mini-Digest 1995). The educational system in today's Estonia has no tradition of using externally-administered tests of achievement, and here the only method of assessment is the teacher's subjective grading. But to determine which school subjects and grades reflect literacy is no simple matter. The task is easier in primary school where reading *per se* is graded, but in the older classes neither reading nor reading comprehension are assessed separately.

In the present study, marks were collected in three subjects: Estonian language (mother tongue), reading or literature (3rd and 8th grades respectively), and mathematics. The choice reflects those subjects which are traditionally regarded as central in the curriculum, although new paradigms in educational thinking might indicate another approach in a future study. The following analysis explores the possible relationship between the two ways of measuring reading literacy – external testing, and teachers' subjective grades.

From a starting assumption that external tests and teachers' grades may be in a mutual relationship, multiple regression analysis was used to establish the validity of teachers' grades to predict the literacy rate, and *vice versa* (Table 8). The conclusions follow:

Table 8

Regression of school grades and reading literacy

	Independent variables	Multiple R ²	Dependent variable
9 years old			
boys	EL(.26), R(.31), M(.19)	.38	RL
girls	EL(.23), R(.34), M(.22)	.46	RL
boys	RL (.26), R(.13), M(.35)	.38	EL
girls	RL (.23), R(.13), M(.43)	.45	EL
boys	RL (.34), EL(.15), M(.20)	.32	R
girls	RL (.37), EL(.15), M(.20)	.37	R
boys	RL (.19), EL(.36), R(.19)	.37	M
girls	RL (.21), EL(.42), R(.17)	.46	M
14 years old			
boys	EL(.22), L(.21), M(.22)	.32	RL
girls	EL(.21), L(.29), M(.20)	.36	RL
boys	RL (.14), L(.39), M(.36)	.56	EL
girls	RL (.15), L(.46), M(.26)	.54	EL
boys	RL (.16), EL(.47), M(.17)	.48	L
girls	RL (.22), EL(.48), M(.13)	.51	L
boys	RL (.17), EL(.44), L(.17)	.46	M
girls	RL (.19), EL(.35), L(.17)	.38	M

In brackets beta coefficients, $p < .001$

Abbreviations:

- RL** – reading literacy test result
- EL – estonian language grade
- R – reading grade (9 years old)
- L – literature grade (14 years old)
- M – mathematics grade

It is indeed possible to predict the literacy rate by teachers' grades and *vice versa*. To begin with, one grade can be predicted by another, but adding the literacy rate improves the validity of the prediction. However, the prediction of one grade by another is better than the prediction of reading by grades. In group A, the relationship between teachers' grades and IEA test scores is closer than in group B: but in group B, grades are predicted by other grades better than in group A.

The data for group B reveal the tendency for teachers' grades in one subject to be highly predictable from other grades, while not correlating with the test scores. Information about two or three grades helps to predict some other grade variance to about 50%, but the role of the literacy test score in this prediction decreases.

There is a contradiction: since the reading literacy of Estonian students both in groups A and B was found to be at the same level as the international means for those groups, then it could be expected that the validity of reading performance as a predictor of teachers' grades should be similar for the two groups. But this was not the case: the validity of the test scores in predicting teachers' grades actually decreases with the older learners. Of course, it is possible to argue that the IEA test measured simpler skills than the teachers' grades for group B, which reflect more complex skills: but the other conclusion is that the teachers' grades reflect test achievement less well with the older learners.

The problem is not only the decreasing relative validity of teachers' grades in predicting test scores, but at the same time, teachers' grades in group B are lower than in group A overall (Table 9). The obvious conclusion is, that in the group of older Estonian learners, the relatively good level of reading literacy is not reflected in teachers' grades.

Table 9

Schoolgrades			
Grade 3			
	Estonian language	Reading/Literature*	Mathematics
Boys	3.8	4.1	4.0
Girls	4.2	4.4	4.2
Grade 8			
Boys	3.3	3.6	3.3
Girls	3.8	4.2	3.7

*reading is 3. grade subject and literature is 8. grade subject

One conceptually important factor is the correlation between reading literacy test score and the grades given by teachers for maths: for the older boys, for example, this grade is an equally valid predictor of reading scores as grades for Estonian language and literature. This means that teachers' grades for all three

selected subjects were equally valid as predictors of reading scores: which in its turn raises the reflection that grades given for other subjects, or all subjects, may be equally valid. These questions, as also the relationship with less traditionally considered subjects and intelligence, must await further study. This fact demonstrates that the problem of reading literacy is not an exclusive province of language studies, but is to be seen as a genuine cross-curricular phenomenon.

6. Self-evaluation of reading ability

In the international study, a considerable amount of attention was given to the responses to a single self-evaluation question in the students' questionnaire: the attitude taken here is that metacognition and self-evaluation is of central importance in human behaviour generally, but that more sophisticated measurements would be needed for the results to be useful in the present context.

Teachers' grades form one possible framework for evaluating reading literacy: but self-evaluation of reading ability can be used for the same purpose. Alan Purves and Warwick Elley (1994), have found that there were significant differences between countries in this respect.

Students were asked to rate their own reading ability on a four-point scale, where four was the most positive. The international mean was 2.8 in group A: the mean correlation of self-esteem with achievement measured by test scores was rather low – $r = .19$. Corresponding results for the Estonian sample were 2.6 and .49, indicating a low self-estimation, but at the same time one more closely related to the test scores.

The development of students' self-evaluation is a complicated process influenced by a variety of factors. School grades are one. Regression analysis demonstrates that teachers' grades in all three subjects (Estonian language, reading, mathematics) predicted 33% in variance of self-estimation, while at the same time the contributions of all three were about equal. As has already been noted, the results of the Estonian students were not inferior to those in the international study, and so it might be assumed that the self-estimation would correspond: in fact it was found to be disproportionately low.

7. The problem of determining reading literacy: some results and ideas

The second main objective of the international IEA research was to identify methodical differences in the teaching of reading, and to study the ways in which they relate to students' achievement. As noted earlier, the international team developed three questionnaires for this purpose, aimed at the student, the teacher and the school principal. The remarkable result of the data gathered from field research is that the teaching method is of only secondary significance for student achievement.

A few papers (Lundberg and Linnakyla 1993, Lundberg 1994, Munck and Lundberg 1994) deal with the teaching of reading, and the material received from teachers is quoted. In the preface to the overview of the IEA study, the view is expressed that most pupils achieved acceptable levels of literacy in most systems, despite the diversity of methods and traditions of teaching reading (Elley 1994). Without making light of the seriousness of the problem for a large minority of learners, this conclusion gives cause for a measure of satisfaction, since it means that different methods will give the same result: but if teaching has any effect at all, one might think that there ought to be something in common between the different approaches, and pose the question "What is it"?

Lundberg (1994), and Munck and Lundberg (1994), give some insights into why the teaching method had only a secondary effect on reading achievement.

Methodological reasons: the achievement level of students was measured according to accepted norms, tests designed to reflect 'real' performance in reading were developed and their psychometric properties were estimated, but the teaching method was not measured in the same depth. The questionnaires aimed at teachers and school principals gave some useful information about the whole school environment and about teaching attitudes of school personnel, but no quantifiable data about teaching methods in reality. The empirical methods used are unsatisfactory for describing methods of teaching reading.

In Ingvar Lundberg's overview (1994) the question is several times raised as to a possible relationship between teaching method and literacy rate. His main conclusion is that the pattern of teaching methods – as indicated in the teachers' own responses to the questionnaire – was not clearly reflected in the pattern of students' achievement. No evidence was found of a strong relationship between teaching and reading.

But Ingvar Lundberg and Ingrid Munck (Lundberg 1994, Munck and Lundberg 1994) have proposed the following solution for understanding the development of reading. They suggest that it is impossible to find satisfactory results at the level of univariate and bivariate analyses, and that the pattern of reading development should be analysed as interaction on different levels of influence and determination. They propose a model that consists of four interdependent levels or stages:

- wealth and resources in the learner's surroundings (community and home: e.g., the number of books at home)
- school environment (size of school, size of school library etc.)
- teachers' instructional behaviour and practices (in the study in question, this meant mainly teaching attitudes and self-perceived activity)
- student achievement.

The researchers demonstrated that from the point of view of multivariate analyses, this model gives a rather good prediction of reading achievement – about 40% variance.

Thus the present study took as its main aim to continue to evolve a conceptual framework of reading achievement development.

Data about how teachers describe their teaching is not presented here, because no significant relationship was found between, on the one hand, teachers' self-image and self-presentation of their teaching behaviour, and on the other hand, real student reading achievement as indicated by IEA test results. The exception was that the present study used Lundberg's path analyses of the correlation between teachers' views of reading instruction and their students' achievement on the IEA reading tests (Lundberg 1994) – and a similar result was obtained. In predicting students' reading achievement, an important variable is the teachers' orientation towards accuracy and order: the relationship is inversely proportional – the more teachers are oriented towards accuracy and order, the worse the students' results. The correlation in the Estonian data was weaker, but still statistically significant.

Our aim is first of all to find new ideas. Multiple regression analysis was used to determine which indicators were important in predicting reading test scores at the student level – the results published to date on this topic apply at the level of school class.

7.1. Grade 3

No significant predictors of reading achievement were found from indicators of how students describe their learning activities in the questionnaires, although there were many such indicators in the questionnaire. It may be that students' self-reflection abilities in 3rd grade are too weak. But we received from all student indicators the following multiple linear prediction ($R^2 = 0.27$, all independent variables are significant at 0.05 level, variables are listed on the base of beta coefficient):

1. Beta = 0.23. Estonian Encyclopaedia at home, dummy variable. (Estonian indicator) After introducing this variable in analyses, the international indicator – how many books there were at home – proved to have no significance. The explanations are two: firstly, that the home environment is important, but in Estonia the question of how many books there are at home is not so important for the development of the child as what kind of books they are. And secondly, for the 9-year-olds it is easier to identify specific books than to say how many books are needed at home.

2. Beta = 0.22. The strata of urbanisation, three levels. The urban/rural difference was discussed earlier, and is a rather strong and easily explained influence.

3. Beta = -0.13. The question whether attention is paid at home to what the children read. Note the minus sign. How is this relationship to be interpreted? The first important question is why this indicator was included in the international questionnaire at all. No satisfactory explanation is to be found in any of the detailed descriptions of the methodology of the study: it can only be assumed which were the arguments and theories adduced. It seems that the initial hypothesis was rather straightforward: the more a child is surrounded by books,

the more s/he is in contact with them – the more a child's reading comes into focus, the better the child's literacy skills will be. Yet the opposite is found to be the case - as indeed with the contradiction revealed earlier, when no relationship was found between indicators of student's learning style and reading achievement. The following interpretation of this negative correlation is proposed here: a concentration on learning skills in the home is an indicator of poor student skill – a student with good skills does not need home control and s/he experiences this checking-up as negative.

4. Beta = 0.11. This is the question of how frequently a student reads simply for the pleasure of reading. A high level of reading skill evidently presumes that reading does not happen simply because of outside pressure and control, but that it has some kind of intrinsic and internal motivation.

5. Beta = 0.10. Two indicators. Firstly, the reading of bedtime stories at home (Dummy Estonian indicator). In understanding children's reading, it needs to be recognised that it is insufficient to think about home as only a statistical environment where things exist (books, magazines, rooms etc.). One important aspect is the view of home in the dimension of activity: not only home as a collection of things, but home as a collection of activities: home is a place where things happen. Statistical data now confirm the intuitive insight that the telling of a variety of stories, stimulating children's imagination, is an important determinant of the development of their mental abilities, including reading abilities. A second discovery concerns a correlation with the reading of comics: and here the interpretation is the same – stimulating the imagination is important and with comics it is rather clear that reading is needed for another purpose - to understand the pictorial situation. Reading the text is not an objective in itself, but the means to another end.

6. Beta = 0.09. Two indicators: regularity of meals and how frequently the child reads a newspaper. The first of them is related to the influence of general economic conditions of the child's education. It has not been possible to propose any direct explanation. The second correlation is possible to interpret in the same way as in point 4 about voluntary reading. Reading is taught by reading, if reading is functional - the more a child reads, the better s/he gets at reading, provided the reading is motivated.

7. Beta = -0.07. The learner's private room at home. The indicator of the student's private TV also showed a negative influence (beta = -0.06). The contributions are weak, but substantially they indicate that the influence of general economic context is not simple and direct. We see that indicators of domestic economic welfare are not positively correlated with students' achievement.

8. Beta = 0.06. Two indicators: watching TV and whether a newspaper is delivered to the home. The international comparison revealed that in different countries the influence of TV-watching had different consequences for child development. Countries where a positive correlation was found between students'

TV-watching and reading achievement, were those where subtitles were frequently used on TV (Purves and Elley 1994). The same interpretation can be offered for the findings of the present study, since subtitles are often used on Estonian TV. But at the level of interpretation, it should be noted that watching TV is again not a contextual influence, but a specific activity, an opportunity to practise reading which is motivated by a specific need – in this case, understanding the auditive and imagery stimulus of the TV broadcast.

7.2. Grade 8

The general tendencies in group B are the same as in group A. The most important difference between the groups is that the role of additional context variables in the prediction of reading achievement is smaller. The analogous context variables predicted only 19% of the reading achievement of 8th-grade students. At the level of interpretation, the main result is the same:

- 1) the urban/rural dimension is a major influence;
- 2) the home is important, and especially the pattern of activity at home;
- 3) some material elements of the home did not correlate positively with reading literacy: here the critical issue was personal audio and video equipment.

The international questionnaire included about 20 indicators of how frequently in different school classes textbooks are used for students in group B. One could hypothesise a positive relationship between school assignments and students' achievements – it would be natural to show that the more a child uses school-books at home, the better his ability to use texts at school: but the situation is not as simple as that. Indicators of learning predict at least 17.5% of the reading literacy score of 8th-grade students, but some of the indicators have in fact a negative correlation with reading achievement: the less a child says that s/he uses books in studying, the higher the literacy score. For example, the negative contributions in regression prediction had indicators of the use of books in language and literature, science and maths classes. The best positive predictor of the reading ability was the frequency of using reference books, dictionaries, encyclopaedias in learning assignments. It may be concluded that there is a non-linear positive correlation between the frequency of using textbooks, and reading ability. The declared frequency of using textbooks is an indicator for students who experience problems with comprehension – they books use more because they do not understand. But at the same time the purpose for which the books are used is significant. The positive role of the use of encyclopaedias and other books not directly used at school, indicates that if there is a personal interest and goal, the correlation will be positive.

Relatively good regression prediction of reading literacy was received from indicators of leisure-time reading ($R^2 = 0.23$). The reading of books, journals or newspapers makes a relatively strong contribution to the prediction: for example classical literature, comics, news, politics, economics. Some indicators had a negative correlation: jokes, biographies, cars/motorcycles, horoscopes. It should

not be forgotten that this is information about perceived reading behaviour, and first of all they are indicators of student interest. This leads to the conclusion that interests in areas that need intensive reading and information-processing predict higher reading scores.

The international student questionnaire for group B included a block of attitudinal statements (29) about school, teaching and learning, teachers, school-mates, about the student themselves. The origin and the function of this block is unknown. Factor analysis reveals no structure which lends itself to a simple interpretation. But it is interesting that from these attitudinal statements it is possible to predict 16% of the reading literacy of 8th-grade students. The strongest contribution to the prediction was made by statements which describe students' critical attitudes toward school, instruction and themselves. A common theme of these statements is the self-image of students, their relations with 'significant others', with activities etc. It is possible to conclude that these statements are related to the students' search for an answer to the question "Who am I?" At 14, students in group B are at an age when the development of self-image is intensive. Consequently it can be seen that there is a connection between reading and the development of a critical self-view.

8. Further discussion of central topics

This section contains a broader discussion of topics which were touched on earlier. In particular, the need for more a more sophisticated basis of description is indicated: and in conclusion, emphasis is placed on the view of literacy as functional communication, and of real achievement in reading determined primarily by the fulfilment of this function.

In the presentation of the results of the IEA study, the first place was given to the economic determination of reading literacy (Elley 1994). There must be valid reasons for this emphasis, but at the same time it must be pointed out that the Estonian data give rise to other kinds of speculation also.

Two empirical findings demand attention. Firstly, the Estonian scores are relatively high and are not seen to correspond to Estonia's low economic status as an emerging ex-Soviet economy; and secondly, it was found that several indicators of economic well-being were – contrary to the IEA conclusion – in inverse proportion to reading achievement. These facts support David Bloome's view of reading and writing as a set of social and cultural events: it means that these processes are important dimensions of the cultural behaviour of the group or community, and they contribute to establishing and maintaining – and of course changing – social identities and relationships. Reading is seen not only as a reader-text interaction, but as a social and cultural event involving written language (Bloome 1993). In the Estonian case, significant factors are not only Estonia's relative economic poverty during the second half of the 20th century,

but also the country's heritage in the cultural sphere – and that of education in particular.

Estonia is traditionally Lutheran, and from its beginning the Lutheran philosophy – of salvation based on a personal relationship with the scriptures – had an intrinsic interest in teaching people to read and write. The Estonian national school system is more than 300 years old, and this can be seen as one main reason why Estonia attained universal literacy almost as soon as the western industrialised nations by the early 20th century. The sound basis of a national educational system was laid during the 17th-century Swedish period, which was strong enough to withstand the 19th-century russification under the Czars, to blossom again during the first Estonian republic between the two world wars, and thriving even under Soviet influence during the later 20th century and up to today's independence.

It is a matter of common experience that in Soviet times, education, reading and books were highly valued by everyman: in schooling and reading, Estonians found a way of maintaining their identity during the Soviet occupation.

The Estonian case demonstrates the importance of a variety of cultural influences in analysing data about reading achievement. As well as economic determination, cultural determination also takes place. The same model is applicable at the level of home and family – not only the material environment of the home, but general cultural traditions, and in particular reading in the family are also important. Reading does not take place in a cultural vacuum. It is so tempting to conclude that the richer the nation and the more money is put into the educational system, the better will be the result, e.g., of students' reading. But as Brian Street (1993) argues, figures that are gathered about literacy by statistical methods are frequently biased, because those figures are affected by different grant and aid programs: without these, the situation may be different.

No satisfactory explanation was found for the weak relationship – which both the international and the Estonian data revealed – between teaching methods and literacy scores. On the other hand, many other relationships were found which did indeed correlate with, and predict, reading literacy: examples are the gender gap, the rural/urban dimension, inter-school comparisons, the relationship between teachers' grades for reading and for maths, the inversely proportional relation between literacy and the use of books for home study. The present study was able to show these results and the fact that they are related: but to provide them with adequate and systematic interpretation must await further study, and the elaboration of a more sophisticated theoretical model.

New insights are to be found from works of social anthropologists from the New Literacy movement (Street 1993, Bloom 1993, for critiques see Gough 1995) and especially the connection with Norman Fairclough's critical discourse analyses (Bloome and Talwalkar 1997, Fairclough 1995). New Literacy emphasises a distinction between the "autonomous" and the "ideological" approaches to reading and writing. The "autonomous" conception of reading is

described by Street and Bloome as concentrated on the text-reader interaction: it is almost exclusively concerned with what intellectual processes constitute reading, and what factors might mediate this interaction. At the centre of attention are the rather impersonal decoding skills and information processing, although it is acknowledged that the social context can mediate and influence them.

By contrast, at the centre of the “ideological” approach is the concept of literacy practices. “Literacy practices” are taken to mean any event in which reading and/or writing has a role. It means taking account of the broad social and ideological context – values, meanings and goal systems etc. – in which concrete acts of literacy take place. The heart of the ideological approach seems to be the idea that reading and writing are not purely cognitive coding and decoding events (as they are, for example in the isolated classroom) – and are not taught as such. Central is the aim, the objective for which the skills are used. This approach sees reading and writing as a way to view, and review, the world in which the reader lives. It means connecting “reading the word” with “reading the world”: it means that student readers view the process of learning to read as one in which they develop a critical perspective of their world. In this context the teaching of reading is viewed as a social process which can either foster or inhibit the empowerment of students (Macedo 1993, Bloome and Talwalkar 1997).

It seems that what is important for the satisfactory analysis of the data is to know in which real situations students need to read and write. Some facts need attention from this viewpoint.

Correlation between teachers’ grades for maths and reading scores: Some observers might see this relationship as trivial, but it is a good example of the concretising of reading practice. Reading is not only a prerequisite for mathematics, but also develops through the learning of mathematics.

Gender differences: In the analyses of the IEA results hypotheses were elaborated (Purves and Elley 1994) about the influence of the teacher’s gender and the beginning of formal reading instruction on the gender gap in students’ reading achievement. It seems that it is important also to know whether or not there are differences in social and cultural practises in society which affect the proportion of boys and girls who are engaged in different reading activities.

Study habits of students: the Estonian study found that the relationship between the declared study habits of students and reading scores was not simple: some indicators were even in negative correlation. It is possible to hypothesise that those who are active students in the practical sense also have an active relation with the real world in other fields than schoolwork, and this is why their test scores were high. The correlation of some negative attitudes toward school and studying with the reading achievement of 14-year-old students can also be interpreted in the same way. It may be that a reason is to be found in the development of self-concept, and related to the young learner’s interest in himself, the world, and the relationship between the two.

Urban/rural differences. There are indeed more libraries, bookshops, and books generally in cities, and the causality of differences of context may be speculated here. But at the same time, it may be realistic to hypothesise that rural/urban differences are caused by the factor that these environments also demand, and create, reading situations, and that this is more influential than a more passive environment.

Finally, it is rather common to speak about the Estonia of the 1990s as a society in transition. One aspect of transition is that people are concerned with redefining themselves: individuals and society in general are very critical and this also creates and enhances reading activity, skills and comprehension.

In sum: seen as social and cultural activities, reading and writing are first of all acts of communication. School, teachers, parents can teach them as autonomous skills, but once the skills develop, they start to function independently: they begin to take part in wider relationships and communications. And the practice of reading or writing as real communication, to fulfil real needs, should be taken account of when the development of reading literacy is investigated. The first function of reading and writing is that of communication: and the fulfilment of this function is the most important determinant of reading literacy.

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