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ABSTRACT
                Differences in student knowledge about democracy,
institutions, and citizenship and students skills in interpreting political
communication were studied through multilevel regression analysis of results
from the second International Education Association (IEA) Study. This study
provides data on 14-year-old students from 28 countries in Europe, North
America, South America, Asia, and the Pacific. Item response theory estimates
for Civic Knowledge were used as independent variables in the multilevel
regression models presented in this paper. To facilitate the interpretation
of the results, countries were grouped tentatively into nine groups that
should reflect common characteristics related to geography, history, culture,
or educational systems. Looking at the whole international database and
estimating the proportions of the overall variance between students and
schools, and between countries, it can be shown that approximately 66% of the
total variance exists between students, 25% between schools, and only 9%
between countries. These results demonstrate that most of the variance is
found on the student level. These analyses confirm some earlier findings from
single-level analyses of Civic Knowledge. Gender does have an effect in a
considerable number of countries when controlling for other factors. Expected
Education and Home Literacy are consistent predictors. Classroom Climate
appears to have considerable effects in most countries, and reported
participation in school council or parliaments does have positive effects on
Civic Knowledge in a number of countries. (Contains 3 tables and 14
references.) (SLD)

Explaining Differences in Civic Knowledge:

Multi-level Regression Analysis of Student Data from 27 Countries.

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Introduction

What explains the differences in student knowledge about Democracy, institutions and Citizenship and their skills in interpreting political communication? Does the amount of 'civic knowledge' depend mainly on the home environment, on the students' level of communication and activities in the area of politics, or does school make a difference in acquiring this knowledge? Which student-level and school-level factors do have an effect on cognitive abilities in this domain?

The second IEA Civic Education Study provides data on 14-year-old students from 28 countries from Europe, North America, South America, Asia and the Pacific which can be used to study the effects of gender, home environment, school-related variables, communication and participation on Civic Knowledge both on the student and school level.[1] Civic Knowledge was tested using 38 multiple-choice items covering a broad range of civic-related content domains. IRT estimates for Civic Knowledge were used as independent variables in the multilevel regression models presented in this paper. In order to facilitate the interpretation of the results, countries were grouped tentatively into nine groups which should reflect common characteristics regarding geography, history, culture or educational systems.

How to explain differences in Students' Civic Knowledge?

A crucial role in acquiring this cognitive domain plays general literacy. Chall and Henry (1991) noted that considerably more than a minimal level of literacy is required for understanding documents such as constitutions or for locating information in sources such as newspapers. This was also confirmed for the National Assessment of Educational Progress (NAEP) in the United States where students at Grades 4, 8 and 12 (ages approximately 9, 13 and 17) are regularly tested in civic-related content areas: Use of English at home had a significant influence on test performance (Niemi and Junn, 1998) which indicates that proficiency in reading is important for understanding political communication.

Gender differences in Civic Knowledge have been a results of many studies in this field: The first IEA Civic Education study in 1971 showed that at age 14, males performed higher on the test than females in the Federal Republic of Germany, Finland and the United States but not in Italy (Torney, Oppenheim and Farnen, 1975). Gender differences in the National

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[1] For reasons of cross-country comparability, student data from Cyprus had to be excluded from the analyses presented in this paper.

Assessment of Educational Progress (NAEP) have been variable. In the 1988 assessment, males tended to perform at a somewhat higher level than females. Gender differences were especially pronounced in knowledge of political parties, elections and protest activities. In the 1998 assessment, these differences were either very small or showed females to have slight superiority. A study in Australia with 1,000 students from Grades 5 and 9 tapping political understanding found that females at Year 5 had higher scores than males, but there were no significant gender differences among the older students (Doig, Piper, Mellor & Masters, 1993/94).

There is a substantial gap between the scores of students from more and less affluent and highly and less educated home backgrounds (Niemi & Junn, 1998). In the first IEA Civic Education Study this was also found on the international level: Those from higher socio-economic backgrounds performed at a higher level in all the countries, although the differences were especially large in the United States (Torney *et al.*, 1975, pp.138, 156).

One of the most crucial questions in analysing what makes students understand Democracy and the political system is certainly whether school makes a difference and whether the aim of having knowledgeable and participating citizens can be achieved through civic instruction and democratic exercises within school. Experiments with self-governance in school and increased student participation in U.S. schools have been described as examples of how schools can contribute to the task of forming citizens with higher levels of self-efficacy and political participation (see Mosher, Kenny and Garrod, 1994). Other studies have shown how Civic Education can increase tolerance among adults (Finkel 2000).

In their analyses of the NAEP assessments in the United States Niemi and Junn (199) found that the taking of classes in which civic topics were studied and participation in role-playing elections or mock trials had a positive effect. Earlier, one of the main findings of multiple regression analyses of the data of the first IEA Civic Education Study of 1971 was that encouragement of independent expression of opinion in the classroom was a positive predictor in all of the ten participating countries (Torney, Oppenheim & Farnen, 1975, p.140).

In the first international report on the Civic Education Study multiple regression models were estimated to predict Civic Knowledge which focused merely on between-student differences across and within countries, and regressing two outcomes on several indicators of home background, school and the individual (Torney-Purta, Lehmann, Oswald and Schulz, 2001, pp. 146 ff.).

Gender (female) had moderate negative effect in 11 countries, which means that controlling for other factors revealed males do have slightly higher knowledge scores than females. This finding led to moderate previous findings about the absence of gender differences in a bivariate comparison. Frequency of listening to television news has a significant positive effect in about half of the countries. For students in Hong Kong, this variable was found to be the strongest positive predictor. Spending evenings outside the home was negatively related to civic knowledge in all but four countries, its effect being strongest in England, Estonia and Hong Kong. Time spent 'hanging out' with peers seemed to be detrimental to achievement.

Some of the findings were quite similar to the multivariate analyses of the data from the IEA Civic Education Study of 1971. Expected further education, perception of the encouragement of expression in the classroom as well as interest in public affairs television were consistently positive predictors for the knowledge score in that study (see Torney, Oppenheim & Farnen, 1975, p.137*ff*.).

Though for the first analyses of Civic Knowledge in the international report of 2001 sampling design effects were taken into account by applying a jack-knife procedure to compute correct standard errors, the multilevel structure of the data was not considered. Therefore, effects on the school or class level were not included in the model and context effects could not be analysed.

In single-level analyses it is not possible to distinguish e.g. how much of the effect of home literacy on Civic Knowledge is due to the impact of average student background on school/class performance and how much is due to the individual, within-class differences. This is particularly important in educational systems with large differences in instruction, learning and ability between schools, e.g. in a tracked system like in Germany. Students are not only grouped according to their ability and aspirations, home background also plays an important role in determining school attendance and, hence, may have an effect on the average of Civic Knowledge in schools which is not measured independently when using simple OLS regression. Furthermore, differences in instruction and learning as well as the students' perception of classroom climate may not depend only on the individual teacher but also on the type of school and/or track he or she is attending.

Method, Model and Data

The use of multilevel regression models (Bryk and Raudenbush, 1988, Goldstein 1995) offers the possibility of taking the specific structure of educational systems and complex sampling into account and to estimate variances/covariances and regression coefficients on the student, class, or school level. In a first step, the variance components on each level have to be estimated, then, in a second step predictors on both levels are introduced. These can be considered either as fixed or as random factors, i.e. slopes can be considered as varying across 2nd or 3rd level units. Whereas in OLS regression models the R^2 gives the amount of total variance explained by the model, in multilevel regression model one has to look at how much variance is explained on each level. This done by comparing the estimates of variance on each level without any predictor variables with those for the explanatory model.

Special statistical programmes as HLM and MLwiN are available for estimating this kind of models. For the analysis presented here a SAS procedure for mixed models was used which gives researchers the possibility of estimating multilevel regression models for each country in one run and facilitates the handling of model results (see Littell, Milliken, Stroup and Wolfinger, 1996). All predictors were considered as fixed, i.e. slopes were not assumed to vary across level-2 units. This was done because (a) preliminary analysis for some of the countries had shown that slope variances (where expected) were not significant and (b) it made comparisons across countries more straightforward.

In their analysis of the NAEP data from 1988 Niemi and Junn (1998) introduced an 'exposure-selection model' postulating that students in order to acquire civic knowledge need both to be exposed to relevant information in this field <u>and</u> must be motivated to select this information. Indicators of exposure were mainly home environment and school-related factors like curriculum, course work and recency of study whereas individual factors as planning for college, participation in mock-elections and liking to study government were seen as indicators of selection. This disctinction is not always clear: In their analyses Niemi and Junn interpreted the educational level of parents as an indicator of selection though it certainly also provides an opportunity for exposure to information. Nevertheless it is considered important to distinguish between factors which give the student the opportunity to be exposed to civic-related information and those where he is actively involved in selecting such information.

Another important disctinction is the one between the 'agents of socialisation', i.e. parents, school, peers and social organisations. When analysing differences in Civic Knowledge one

of the most salient questions is clearly how effective schools are in improving the cognitive abilities of future citizens. Furthermore, the importance of all kinds of out-of-school and out-of-home activities has to be considered, not only youth organisations of political parties, trade unions etc. but also less politicized social organisation as community groups, cultural associations or religious groups may have an impact on Civic Knowledge.

For the analyses presented here, predictors were grouped into the following categories:

- Individual characteristics: These are variables which are related to the individual students only, i.e. characteristics like gender, race etc.

- Home environment factors: All variables which are related to the kind of home where the students is growing up and which is highly influenced by his or her parents' education, the resources available to him at home, the language the family uses at home etc.

- School-related variables: All variables which are directly related to the students' education, they comprise instructional factors (e.g. classroom climate, type of school), the students' own educational aspirations and activities undertaken at school.

- Out-of-school activities: Whereas students' cognitive abilities are both shaped at home and in school, they may also be influenced by things happening neither at school nor at home. Therefore, it is important to take into account the kind of activities the student undertakes elsewhere, especially those in the context of political and social organisations, clubs or in peer-groups.

- Communicational variables: Students may receive political communication in any of the three environments described above, therefore these factors are considered separately and comprise use of media for political information as well as political discussions.

In addition, predictors can be grouped into variables on the student-level and factors on the school- or class-level. As for the IEA Civic Education Study generally only one classroom was sampled for each sampled school it is not possible to disentangle school from classroom effects, i.e. only two levels will be considered where students are nested within classrooms which will also be considered as the school-level in these analyses. In the case of Cyprus two classes per school had been sampled and results from this country would not have been comparable with other countries. Consequently, these data were excluded from the present analyses and 27 out of 28 existing data sets in the international CivEd data base were analysed here.

Dependent variable in the model is Civic Knowledge which are IRT scores (about Item Response Theory see Hambleton, 1991) derived from a One-Parameter(Rasch) Scaling of 38 multiple-choice items (for a description of the scale see Torney-Purta, Lehmann, Oswald and Schulz, 2001, pp. 46ff.). An important caveat in these analysis is the use of Maximum-Likelihood estimates as a dependent variable because these estimates are somewhat biased toward the ends of the scale and may lead to an overestimation of variance on the student-level. Simulation studies have shown that using plausible values instead of ML estimates gives more reliable estimates of variance but the computation of plausible values for the whole international data set would have not been possible within the scope of these analysis (about the use of plausible values, see Mislevy, 1991; Adams, Wu and Macaskill, 1997).

Student-level predictors in the explanatory model are

a) Individual characteristics

- Gender (female): This is a dummy variable where females students are coded 1, male students 0. It is the only individual characteristic included in the model because others (like race or ethnic origin) would not have been comparable across countries. Male gender had been found to be a positive predictor for civic knowledge though it was reported to be less important in more recent studies.

b) Home environment

- Other language spoken at home: Students who reported to speak the language of test never or only some of the time where coded 1, other students 0. Previous analyses have shown that this is an important variable when analysing civic knowledge and may be seen as an indicator for general reading problems which makes test of this kind more difficult for the student.

- Home Literacy (number of books at home): This variable has been used before in international studies on educational achievement and has proven to be a very consistent predictor of educational achievement (e.g. in the TIMS Study, see Beaton et. al., 1996). The number of books in the home can be interpreted as a proxy for the emphasis placed on education, the resources available to acquire and support literacy and, more generally speaking, for the academic support a student finds in his or her family. It correlates highly with the educational level of parents and as this question suffered from high levels of non-response and the questionable comparability of educational levels across countries, home literacy was preferred as indicator for home background. As the relationship between

original categories and civic knowledge is almost linear in most of the countries the categories were coded to 0 for 'none or very few books', 1 for '11 to 50 books', 2 for '51 to 100 books', 3 for '101 to 200 books' 4 'More than 200 books'.

c) School-related factors:

- Years of expected education (continuous): Students' reports on how many years of further education they expect to complete after the current year were re-coded to 2, 4, 6, 8, 10 and 12 years. In this case not the midpoints (e.g. 1.5 for '1 or 2 years') were taken but the upper threshold of each category to account for the time left in the ongoing year. This variable is important because it is not only an indicator of the students' general ability but also his general interest and motivation in improving his own knowledge.

- Open Classroom Climate: It indicates individual students' perceptions of the atmosphere for expressing opinions and discussion in class, and involves students' relations with peers in the school setting as well as with teachers. This variable was a strong and consistent predictor of knowledge, attitudes and participation in the 1971 IEA Civic Education Study and also was reported as effective in the first international report for IEA Civic Education Study of 1999. The ML estimates of the students' perception of classroom climate were standardised to a national (within-country) mean of 0 and a standard deviation of 1 in order to make the estimates comparable across countries. Here, it will be important to distinguish between effects on the student and the classroom level because otherwise it will not be possible to infer from the results whether possible effects of an open classroom climate for discussion are related only through the individual perception of students or whether the common perception of class atmosphere has an effect on the civic knowledge.

- Participation in school council/parliament: Students reporting to have participated in such a student body were coded 1, other students 0. This is a variable related to the school environment but also reflecting individual activity. For Niemi and Junn (1998) participation in student government was an indicator of selection and a significant predictor of Civic Knowledge.

d) Out-of-school activities

- Frequency of activities in social, cultural and political organisations: Students were asked to report their participation in a list of organisations and should then report the frequency of attending meetings of any or all of these organisations. Here, only the frequency for those students was counted which reported to have participated in any social, cultural or

political organisation, students who reported to have participated only in sports clubs, student exchange programmes and computer clubs were set to the lowest value regardless of how they had answered this question. It is assumed that participating in an organisation with a political, cultural, social or community-related background expose the student to civic-related information and may give them an opportunity to practise Democracy.

- Spending evening outside of home: Students' reports about how often they spend evenings outside of their homes with friends codes to 0 for 'Never or almost never', 1 for 'A few times each month', 2 for '1 - 3 times a week' and 3 for 'Almost every day'. This variable is similar to one in a World Health Organization survey, where it was found to be a predictor of risky or anti-social behavior (see, for example, Currie, Hurrelmann, Setterobutte, Smith & Todd, 2000). In previous analysis of the Civic Education data from 1999 it proved to be a consistently negative predictor of Civic Knowledge (Torney-Purta, Lehmann, Oswald and Schulz 2001). Students who report to spend many evenings outside the home have probably weakened ties to their home environment, are likely to be rather peer-group oriented, and may tend to neglect their studying.

e) Frequency of Political Communication

- Political discussions with parents: Students' reports about how often they do discuss national politics with their parents were coded to 0 for 'never', 1 for 'rarely', 2 for 'sometimes' and 3 for 'often'. Students who answered that they did not know the answer to this simple factual question were coded to 0 under the assumption that they probably never had discussions with their parents (analyses of this item and it's correlation with civic knowledge, political participation, and efficacy support this hypothesis).

- Newspaper reading on domestic politics: Students' reports about how often they read about national politics in the newspaper were coded to 0 for 'never' or 'don't know' (for the same reasons as described for political discussion with parents), 1 for 'rarely', 2 for 'sometimes' and 3 for 'often'.

- Watching TV news: Students' reports about how often they watch news on television were coded to 0 for 'never' or 'don't know' (for the same reasons as described for political discussion with parents), 1 for 'rarely', 2 for 'sometimes' and 3 for 'often'.

All **School- or Classroom-level predictors** are school-related factors even when home background factor may play a role in shaping the learning context or classroom climate for the student.

- High Expectation Class: Classes with more than 2/3 of students expecting to complete 5 and more years of further education. In some countries students are tracked according to their ability and aspirations and receive different levels of instruction. Therefore, it was deemed important to include an indicator for this kind of tracking. In Germany and the Czech Republic, where information about track was available, this variable showed to be an almost perfect indicator for the highest track. Furthermore, contrary to the average of years of expected education which is highly correlated with the average of home literacy, this indicator is not as prone to cause multicollinearity in regression analysis.

- Average number of books at home: This variable is included as an indicator for the educational level of the parents in the class and should also reflect the average socio-economic status of students. It should be noted here that in countries with tracked school systems (i.e. where schools differ considerably with respect to their educational programmes) this variable will probably be correlated with higher tracks or advanced programmes because parents with higher educational level and/or a higher socio-economic status will tend to send their children to these schools. Another possible interpretation of this variable concerns the learning context within a class: Students may acquire higher levels of Civic Knowledge when everyone in the class comes from families with a higher educational background and provide a more favourable learning climate. Home Literacy scores from 0 to 5 are averaged for each cluster.

- Average Classroom Climate: Students' reports on how they perceive the classroom climate may vary within each classroom depending on the student-teacher relation or interest and motivation of each student but the average should indicate the classroom climate in general. The standardised ML scores (with a mean of 0 and a standard deviation of 1 within each country) were averaged for each cluster.

In order to make the interpretation of these results easier countries were tentatively grouped with respect to common characteristics regarding their cultural, historical, political or educational background and/or their geographical location. The following groups of countries will be presented together:

- **English-speaking countries** (Australia, England and the United States): Clearly, this is not a geographical grouping but rather due to language and similarities in their historical, political and cultural background.

- **Scandinavian countries** (Denmark, Finland, Norway and Sweden): Apart from their geographical location these countries do not only have things in common regarding their culture and societies, but also their educational systems have common characteristics well known in educational research.

- **Western Central Europe** (Belgium/French, Germany and Switzerland): This group is somewhat more homogenous and includes East Germany which has clearly a very different historical, cultural and political background. However, all three countries have had (with the exception of East Germany) a longer democratic tradition with stable democracies and belong to the same geographical and cultural region of Western Central Europe.

- **Southern Europe** (Greece, Italy and Portugal): The grouping of these Mediterranean countries is mainly due to geographical and cultural reasons. Both Greece and Portugal had military regimes until the mid-seventies and now look back on a longer period of stable democracies whereas Italy is known for a long democratic period with rather unstable governments since Word War II.

- **Eastern Central Europe** (Czech Republic, Hungary, Poland, Slovak Republic, Slovenia): All of them are post-communist countries, the common characteristic is the geographical location but also the fact that in most of these countries transition from communist regimes to market democracies was achieved within a relatively short period. Both Slovak Republic and Slovenia are somewhat different from the other countries because both of them had achieved independence in the nineties.

- **Baltic countries** (Estonia, Latvia, Lithuania): All of these countries belong to the same geographical region and formed part of the Soviet Union until 1991.

- **Balkans and Russia** (Bulgaria, Romania, Russia): These countries are all post-communist countries with a considerably longer transition period from communism to market democracies. Common characteristics are the social and economic problems as well as political instabilities since 1989.

- **Latin America** (Chile, Colombia): Both countries certainly have cultural and societal characteristics in common. However, there are important differences between them: Whereas Colombia is characterised by civil war, crime and extreme poverty with a formal democracy since 1972, Chile has a more stable economy but also a very short period of democratic government after the Pinochet regime which ended in 1990.

- **Asia** (Hong Kong): This Special Administrative Region of China is treated separately because it represents the only participating 'country' in Asia.

Results

The first step in multilevel analysis is to determine the amount of variance on each level. Looking at the whole international data base with data from 27 countries and estimating the proportions of the overall variance between students, schools and between countries, it can be shown that approximately 66 percent of the total variance exists between students, 25 percent between schools and only 9 percent between countries. These results demonstrate that most of the variance is found on the student-level and about one quarter of the international variance between schools.

Table 1 shows the decomposition of variance within each country. The international variance of the international Civic Knowledge score had been standardised to 400 (i.e. to a standard deviation of 20) for all equally weighted countries in the study. The intra-class coefficient (rho) in the third column gives the percentage of the overall variance between classrooms/schools: It confirms that there are considerable differences between countries with respect to the proportion of between-school variance.

As known from other educational studies, intra-class correlation is lowest in the Scandinavian countries, i.e. there are few differences between schools with regard to Civic Knowledge. The proportion of between-school variance is also relatively low (between 20 and 25 percent) in English-speaking countries. Countries where students are tracked according to their abilities and aspirations as e.g. Germany and the Czech Republic, have a very high intra-class correlation, here approximately 40 percent of the total variance exists between schools. The highest intra-class coefficients are found in Bulgaria and Russia which indicates that schools differ considerably with regard to the Civic Knowledge of their students.

Table 1: Variance of Civic Knowledge on Student- and School/Class-level

COUNTRY	Variance in scores...		Intra-class coefficient
	within schools	*between schools*	
English-speaking Countries			
Australia	308	81	0.21
England	281	71	0.20
United States	366	124	0.25
Scandinavia			
Denmark	387	32	0.08
Finland	377	34	0.08
Norway	388	26	0.06
Sweden	329	46	0.12
Western Central Europe			
Belgium (French)	214	132	0.38
Germany	204	137	0.40
Switzerland	189	99	0.34
Southern Europe			
Greece	382	76	0.17
Italy	224	154	0.41
Portugal	213	55	0.21
Eastern Central Europe			
Czech Republic	250	176	0.41
Hungary	236	82	0.26
Poland	337	113	0.25
Slovak Republic	198	105	0.35
Slovenia	275	40	0.13
Baltic Countries			
Estonia	209	54	0.21
Latvia	183	102	0.36
Lithuania	194	77	0.28
Balkans and Russia			
Bulgaria	201	180	0.47
Romania	178	98	0.36
Russia	239	200	0.46
Latin American Countries			
Chile	192	122	0.39
Colombia	158	56	0.26
Asia			
Hong Kong (SAR)	338	136	0.29

Variance decomposition using the SAS Mixed Effects procedure. Restricted Maximum Likelihood estimation.

Tables 2a and 2b show the regression coefficients and the explained variance for Civic Knowledge. The explained variance on the student level ranges between 5 percent (in Colombia) and 32 percent (in Slovenia), on average around 15 percent of the student-level variance in these 27 countries are explained by the model. On the school level, the amount of explained variance is higher and ranges between 16 percent (in Romania) and 88 percent (in Chile). On average the model explains around 60 percent of the school-level variance.

Table2a: Multilevel Regression Models for Total Civic Knowledge

	English-speaking countries			Scandinavian countries				Western Central Europe			Southern Europe		
	Australia	England	United States	Denmark	Finland	Norway	Sweden	Belgium (French)	Germany	Switzer-land	Greece	Italy	Portugal
Intercept	64.26 *	65.34 *	50.44 *	65.95 *	69.35 *	69.46 *	61.04 *	57.32 *	60.85 *	61.42 *	62.93 *	67.90 *	77.17 *
Student-level predictors													
Gender (female) (0-1)	-0.98	-1.22	-1.90 *	-3.62 *	-1.41 *	-3.23 *	-3.30	-0.15	-3.78 *	-3.98 *	-0.92	-1.85 *	-3.64 *
Home Literacy (0-4)	1.45 *	2.75 *	1.99 *	1.25 *	1.37 *	2.29 *	2.00 *	1.27 *	1.35 *	1.28 *	0.90 *	1.06 *	1.38 *
Other home language (0-1)	-6.27 *	-8.39 *	-2.86	-12.40 *	-10.81 *	-8.50 *	-9.17 *	-4.83 *	-4.83 *	-3.73 *	-5.19 *	-5.84 *	-3.41 *
Classroom Climate (MLE)	0.79 *	1.32 *	1.58 *	3.56 *	-0.04	2.23 *	2.58 *	1.90 *	1.40 *	1.16 *	1.59 *	1.67 *	1.23 *
Expected Education (0-12)	0.98 *	0.94 *	1.75 *	2.23 *	3.05 *	2.06 *	2.17 *	0.75 *	0.79 *	1.34 *	2.96 *	0.86 *	1.05 *
School Council (0-1)	3.50 *	2.93 *	2.40 *	3.94 *	0.38	5.01 *	3.21 *	0.72	2.31 *	-0.42	5.45 *	0.82	-0.66
Social Activities (0-3)	1.81 *	0.92 *	0.55	0.27	0.28	1.10 *	1.19 *	1.03 *	0.38	-0.03	0.23	0.15	1.41 *
Time spent outside (0-3)	-2.50 *	-3.09 *	-2.43 *	-3.22 *	-2.25 *	-3.18 *	-1.47 *	-1.26 *	-1.54 *	-0.81 *	-1.62 *	-0.59 *	-1.69 *
Discussion with parents (0-3)	1.44 *	0.44	1.12 *	2.32 *	1.73 *	2.07 *	1.52 *	-0.35	0.89 *	1.01 *	0.80 *	0.46	0.98 *
Newspaper reading (0-3)	1.78 *	1.15 *	1.02 *	0.24	0.69	0.66	0.84	1.31 *	0.29	0.09	0.97 *	-0.05	-0.21
TV News (0-3)	1.21 *	1.80 *	1.42 *	1.15 *	2.30 *	1.73 *	0.31	1.42 *	1.32 *	0.78 *	0.95 *	1.22 *	0.32
School/class-level predictors													
High Expectation class (0-1)	5.03 *	2.02	2.81	0.91	0.12	1.81 *	1.14	2.99	5.61 *	1.77	3.28 *	0.95	1.97
Average Home Literacy (0-5)	3.33 *	4.65 *	8.51 *	3.70 *	2.75 *	1.29	3.83 *	5.97 *	7.40 *	7.58 *	6.05 *	9.17 *	3.57 *
Average Class Climate (MLE)	1.97	2.73	2.36	1.36	1.12	0.92	1.70	5.01 *	5.03 *	3.31 *	3.92 *	4.46 *	3.33 *
Explained Variance on ...													
Student level	15%	20%	14%	25%	20%	23%	22%	11%	12%	10%	25%	7%	12%
School/class level	53%	75%	75%	68%	59%	58%	56%	70%	81%	62%	64%	66%	76%

Unstandardised regression coefficents from multi-level estimations with Restricted Maximum Likelihood.

* Coefficient significant at a 95% level.

Table2b: Multilevel Regression Models for Total Civic Knowledge (continued)

	Eastern Central Europe					Baltic countries			Balkans and Russia			Latin America		Asia
	Czech Republic	Hungary	Poland	Slovak Republic	Slovenia	Estonia	Latvia	Lithuania	Bulgaria	Romania	Russia	Chile	Colombia	Hong Kong
Intercept	52.84 *	53.12 *	61.66 *	55.72 *	66.41 *	54.60 *	50.61 *	65.71 *	71.73 *	81.61 *	73.67 *	50.70 *	57.51 *	75.71 *
Student-level predictors														
Gender (female) (0-1)	-4.93 *	-2.09 *	-1.78 *	-1.73 *	0.46	-1.08 *	0.75	-0.06	-1.13	-1.57 *	-2.26 *	-2.18 *	-1.03 *	-0.32
Home Literacy (0-4)	1.45 *	1.13 *	1.44 *	1.26 *	1.01 *	1.51 *	1.17 *	1.01 *	1.48 *	0.97 *	1.60 *	0.70 *	-0.11	-0.01
Other home language (0-1)	-2.22	-6.55 *	-6.21 *	-4.03 *	-3.15 *	-4.04 *	-2.46 *	-1.17	-0.60	-3.39 *	-6.91 *	-4.04 *	-3.70 *	-6.45 *
Classroom Climate (MLE)	0.82 *	1.06 *	-0.12	1.84 *	1.97 *	1.62 *	1.29 *	1.05 *	0.91 *	0.28	2.22 *	1.04 *	0.86 *	0.84 *
Expected Education (0-12)	2.82 *	2.57 *	2.69 *	1.80 *	2.48 *	1.33 *	1.18 *	1.48 *	0.90 *	1.27 *	0.68 *	0.99 *	0.55 *	0.66 *
School Council (0-1)	2.73 *	2.98 *	4.96 *	2.59	5.31 *	2.12 *	3.06 *	2.46 *	1.57	1.23 *	2.57 *	0.20	2.41 *	1.31 *
Social Activities (0-3)	0.81 *	0.49	-0.41	0.00	0.54	0.22	0.54	0.92 *	-0.74 *	-0.22	0.30	0.69 *	0.38	0.08
Time spent outside (0-3)	-1.70 *	-1.87 *	-1.40 *	0.02	-1.09 *	-2.86 *	-1.25 *	-1.15 *	-0.69 *	-1.38 *	-1.88 *	-0.06	-0.42 *	-3.58 *
Discussion with parents (0-3)	0.81 *	-0.10	0.67	0.81 *	0.88 *	0.49	0.82 *	-0.15	0.43	0.00	0.98 *	0.72 *	-0.15	0.27
Newspaper reading (0-3)	0.64 *	1.08 *	0.14	0.66 *	0.13	0.61 *	0.18	0.53	1.43 *	1.16 *	1.06 *	1.26 *	0.46	2.09 *
TV News (0-3)	-0.46	0.43	2.31 *	1.32 *	0.99 *	1.06 *	1.21 *	1.55 *	0.37	0.81 *	0.61	0.98 *	0.95 *	4.03 *
School/class-level predictors														
High Expectation class (0-1)	3.98 *	-0.63	-0.77	-1.02	0.62	0.61	2.39	1.55	10.10 *	5.16 *	1.92	-0.74	0.58	10.28 *
Average Home Literacy (0-5)	7.63 *	6.31 *	4.33 *	7.61 *	3.08 *	5.30 *	5.89 *	3.23 *	2.10	-1.13	3.12 *	10.08 *	9.36 *	0.88
Average Class Climate (MLE)	1.91	-0.37	4.74 *	4.48 *	0.49	5.03 *	6.15 *	7.22 *	6.02 *	4.92 *	6.61 *	2.00 *	2.28	4.69
Explained Variance														
Student level	23%	21%	19%	17%	32%	15%	14%	15%	7%	12%	10%	9%	5%	11%
School/class level	85%	76%	46%	59%	45%	60%	48%	50%	46%	16%	29%	88%	68%	54%

Unstandardised regression coefficents from multi-level estimations with Restricted Maximum Likelihood.

* Coefficient significant at a 95% level.

Typically, the explained within-school variance is negatively correlated with the intra-class correlation, i.e. in countries where variance between schools is small the proportion of variance explained by this model is higher than in countries where differences between schools are large. This is plausible because in highly segregated educational systems e.g. the effect of home background on Civic Knowledge is already captured through the differences in average home background between schools.

Gender effects are highest in three of the Scandinavian countries, Germany, Switzerland, Portugal and the Czech Republic, i.e. in these countries females score three points less than females when controlling for other factors. This shows that though gender seems to make no difference in the bivariate case (see Torney-Purta, Lehmann, Oswald and Schulz, 2001, pp. 62ff.) it still appears to be important in a number of countries when other factors are taken into account.

Home Literacy on the student level has a strong and significant effect in all but two countries (Hong Kong and Colombia). On the school level, this variable is also a strong predictor of average school performance in most countries. The effect of this indicator of average educational background is strongest in Latin American countries which indicates a high level of segregation along home background in their educational systems. The effect is lowest in Hong Kong where this variable in general may not be an appropriate indicator of educational home background. Furthermore, in Scandinavian countries this predictor is still significant in Denmark, Finland and Sweden but the effect is weaker than in most other countries. Average home literacy does not appear to be a strong predictor for school performance in Bulgaria, Romania and Russia.

Generally, it is plausible to assume that the effect of average home literacy is lower in countries with smaller differences between schools because school systems are not segregated. But this is only true for countries from the Western hemisphere (English-speaking countries, Scandinavia, Western and Southern Europe, Latin America): Here, the correlation between the regression coefficient and the intra-class coefficient is -.80, whereas it is -.08 for the post-communist Eastern European countries.

Use of another language at home has a strong effect on Civic Knowledge in most countries, it is strongest in Scandinavian countries where students who report to speak never or only sometimes the language of test perform around 10 score points lower than other students. The effect coefficients are generally smaller in Eastern Europe which is probably due to lower percentages of students from immigrant families in these countries.

The student-level effect of the perception of classroom climate is significant in most countries, i.e. students perceiving civic-related instruction as less restrictive and open for student participation perform higher within classes than others. The interpretation of the causal relationship is not straightforward: If students feel that they can participate and discuss civic-related topics they may learn more than those which perceive the classroom climate as more restrictive, on the other hand it is also plausible to assume that student with lower levels of Civic Knowledge are less likely to participate in discussions in the classroom and do not notice that there are opportunities for expressing themselves.

On the classroom level, the average Classroom Climate has a strong effect in more than half of the countries included in this analysis. It is interesting to note, that there are no such effects neither in English-speaking nor in Scandinavian countries where between-school differences are less pronounced. The correlation between the regression coefficient for this predictor and the intra-class coefficient is .62 across countries., i.e. differences in civic-related instruction are probably larger in those educational systems where students are tracked or where there is a considerable amount of segregation. Therefore, in segregated educational systems this variable is a better predictor for Civic Knowledge than in countries where most schools provide similar kinds of civic-related instruction.

Expected Further Education is a strong predictor in all countries. It is strongest in Scandinavian countries where for each year of expected further education the average performance increases by two to three score points. In countries where school differences are large (e.g. in Germany or Belgium/French), the effect is smaller and Civic Knowledge increases by less than one score point for each expected year. The effect of having more than two-third of the students in a classroom expecting at least 5 years of further education is moderately strong in a number of cases, typically in those countries where students are tracked by ability and with large differences in performance between schools. It is strongest in Bulgaria and Hong Kong where students in these 'High Expectation Classes' score around 10 points higher than other students, in Australia, Germany and Romania the effect size is about 5 points on the international Civic Knowledge scale.

Reported participation in a school council or parliament has somewhat stronger effects in Australia, three Scandinavian countries (Denmark, Norway and Sweden), Greece, Poland and Slovenia where this variable increases the average performance of students by more than three score points. In all other countries participation in school politics has only a weak effect or no effect at all. It should be noted that this may also be influenced by characteristics of how

school council and parliaments are constituted and what role they play in different countries. The reported participation in these bodies ranges across countries from a low 3 percent in the Slovak Republic to a majority of 56 percent of students in Greece. It is noteworthy that the effect of this predictor tends to be stronger in countries with a higher average participation in these kind of school bodies.

Reported frequency of activities in social, political, cultural and religious organisation has moderate effects only in Australia, Belgium (French), Norway, Portugal and Sweden. The effects of this predictor are very small or non-existing for all other countries. Here, it should be kept in mind that participation in such kind of organisations at age 14 may be less a consequence of the student's own initiative and therefore not a good indicator for active participation.

Time spent outside of home, which may be interpreted as a factor of loose family-ties and high levels of peer-group orientation, is a negative predictor in most countries. Only in Chile, Colombia, Italy and the Slovak Republic the effect is not significant. Especially in the case of Latin American countries cultural differences may account for the absence of such an effect of out-of-home orientation on Civic Knowledge.

Stronger effects of political discussions with parents are found only in Denmark and Norway, moderate effects also in Australia, Finland and Sweden. Especially in many Eastern European countries this variable appears to have no effect on Civic Knowledge. This variable is also an indicator of home background but generally it is not a strong predictor in this model.

Effects of the reported frequency of media information generally do not have very strong effects on Civic Knowledge. Furthermore, the pattern of effects is rather homogenous: Watching TV news mostly appears to have somewhat stronger effects than Reading about national politics in the newspaper but there are also countries where newspaper reading is a better predictor of test performance. The strongest effects of media use on Civic Knowledge are found in Hong Kong where Civic Knowledge increases by four score points for each category for TV news and two for each category for Newspaper Reading. Considerable effects for Newspaper Reading are also found in Australia, for Watching TV News in England, Finland, Lithuania, Norway and Poland.

The causal relationship between Civic Knowledge and frequency of media use is not entirely clear: Though it can be expected that higher levels of media information lead to an increase of knowledge about civic-related topics, it is also plausible that without adequate levels of

knowledge and understanding young people may not be able to cope with political media content and, consequently, avoid this kind of information. The analyses show that though in some countries political communication is an important predictor for Civic Knowledge, this is not always the case and it certainly depends very much on the characteristics of the media and media use in the respective countries.

Conclusion

The analyses presented in this paper confirm some of the earlier findings from single-level analyses of Civic Knowledge: Gender does have an effect in considerable number of countries when controlling for other factors, Expected Education and Home Literacy are consistent predictors, Classroom Climate appears to have considerable effects in most countries, and reported participation in school council or parliaments does have positive effects on Civic Knowledge in quite a number of countries.

But taking the school/classroom level into account broadens the view on what explains differences in Civic Knowledge: The amount of between-school variance in each country varies and similar patterns as in other educational studies can be observed: Schools in Scandinavia have mostly a similar average test performance whereas tracked and/or highly segregated school systems show a great deal of variation across schools. Though this may be taken as an indicator for the existence of school effects on Civic Knowledge it is also clear that home background factors (SES, educational level of parents, home literacy) play a role in the choice of schools: Students in countries with a segregated educational system are grouped not only according to their abilities and aspirations but also (and sometimes only) according to the socio-economic status and educational level of their families.

The multilevel regression analysis of Civic Knowledge shows some variation of school- and student-level effects which to some extent depends on the educational system of each country. It can be shown that the effect of Average Home Literacy on test performance is higher in countries with larger differences between schools, notable exceptions are found in Hong Kong and the Balkans. In these cases it is possible that the number of books at home is not an adequate measure of educational background.

The effect of Average Classroom Climate is generally stronger in those countries with segregated school systems. Probably perception of classroom climate in those countries depends more on the level of instruction students receive. In countries where schools do not show a large variation in test performance this variable does not have any significant effects.

The inclusion of three indicators for political communication shows that though effects of these variables are not very strong, at least use of media information does have an impact in some of the countries which should be taken into account when trying to explain differences in Civic Knowledge. It should be noted that at age 14 political communication is generally of minor importance but that one might expect that the strength of these predictors as well as the effect of social and/or political activities will increase over the next years of political socialisation. Here, data from the second part of IEA Civic Education Study collected among older students between 16 and 18 years may help to extend this kind of analyses.

The grouping of countries according to their geographical, political and cultural background and/or their educational systems has been a tentative one. For some of the predictors clear patterns can be shown for groups of countries. For other predictors there is a great deal of homogeneity within these groups of countries. Nevertheless, the presentation of cross-country analyses in this fashion does certainly have advantages over an alphabetical ordering of countries.

For analysis of educational data multilevel regression analysis is generally superior to simple regression analysis because effects of variables which are related to the school type or to the educational track cannot be estimated adequately when ignoring the nested structure of the data. This also holds for the analysis of Civic Knowledge among students where school and classroom level variables do have a considerable effect on test performance.

References

Adams, R./Wu, M./Macaskill, G. (1997) *Scaling Methodology and Procedures for the Mathematics and Science Scales*, in: Martin, M./Kelly, D.L. (eds.): Third International Mathematics and Science Study. Technical Report. Vol. II: Implementation and Analysis. Primary and Middle School Years, Chestnut Hill, MA: TIMSS International Study Center, Boston College, 111-146.

Beaton, A. E., Mullis, I. V. S., Martin, M. O., Gonzalez, E. J., Kelly, D. L. and Smith, T. A. (1996) *Mathematics achievement in the middle school years: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: TIMSS International Study Center, Boston College.

Chall, J. H., D. (1991) Reading and civic literacy: Are we literate enough to meet our civic responsibilities. In: S. Stotsky (Ed.), *Connecting civic education and language education.* New York: Teachers College Press.

Doig, B., Piper, K., Mellor, S. and Masters, G. (1993–94) *Conceptual understanding in social education.* Melbourne, Australia: Australian Council for Educational Research.

Finkel, S.E. (2000) *Can Tolerance Be Taught? Adult Civic Education and the Development of Democratic Values.* Paper presented at the Annual Meetings of the American Political Science Association, Washington D.C.

Goldstein, H. (1995) Multilevel Statistical Models. London: Arnold.

Hambleton, R. K., Swaminathan, H. and Rogers, H. J. (1991) *Fundamentals of item response theory.* Newbury Park, London, New Delhi: SAGE Publications.

Littell, R.C./Milliken, G.A./Stroup, W.W./Wolfinger, R.D. (1996) SAS System for Mixed Models. Cary (NC): SAS publications.

Mislevy, R.J. (1991) Randomization-based Inference about Latent Variables from Complex Samples, in: Psychometrika - Vol.56, No. 2, 177-196.

Mosher, R./Kenny, R.A./Garrod, A. (1994) *Preparing for Citizenship. Teaching Youth Live Democratically.* Westport/London: Praeger.

Niemi, R. and Junn, J. (1998) *Civic education: What makes students learn?* New Haven: Yale University Press.

Bryk, A.S./Raudenbush, S.W. (1991) Hierarchical Linear Models. Newbury Park: SAGE publications.

Torney, J. V., Oppenheim, A. N. and Farnen, R. F. (1975) *Civic education in ten countries: An empirical study.* New York: John Wiley and Sons.

Torney-Purta, J./Lehmann, R./Oswald, H./Schulz, W. (2001) *Citizenship and Education in Twenty-eight Countries: The Civic Knowledge and Engagement of Adolescents*, Amsterdam: IEA.

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