A Cross-National Study of Civic Knowledge Test Scores

Christopher R. Gregory

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Educational Research and Evaluation

Yasuo Miyazaki Chair
Gary Skaggs
Kusum Singh
David Hicks

September 17, 2015
Blacksburg, VA

Keywords: Civics Knowledge, Multi-Level Analysis, Student Perception

A Cross-National Study of Civic Knowledge Test Scores

Christopher R. Gregory

ABSTRACT

The purpose of this study is to examine the relationship among student civic knowledge scores and several different variables each at the student, classroom/school, and national levels using the IEA CIVED study international data set collected in 1999 from 27 countries. The student level predictors included two elements of socioeconomic status (a student's parental education, their home literacy level measured by the number of books at home), student's perception of an open classroom climate, student aspiration of obtaining higher education, and other variables that were identified as relevant to the dependent variable in the literature. The classroom/school level predictors included teacher's degree in civics, in-service training, teaching confidence, and school safety in addition to the compositional variable created as the classroom/school averages by aggregating the student level variables. Then I investigated whether instructional methods focusing on the student activities the teacher employed in the classroom and an open classroom climate were associated after accounting for the above student and school level background variables. National level variables such as GNP, GINI index, democratic system, public education expenditure, and etc. as well as compositional variables obtained by aggregating the classroom/school variables were also added to the model to investigate if they were associated with students' civic knowledge scores and whether they could explain between nations variability. The study used a three-level hierarchical linear model to analyze the data, with number of students, N=56,579, number of classrooms/schools, J=3443, and number of countries, K=27. Some of the key findings was that there were significant variations of civics knowledge among nations, and significant variations of civic knowledge

scores between school and within nations, no statistically significant association between teacher's practice and civics knowledge scores, however the student perception of an open classroom climate was significant at all 3 levels. These findings were interpreted in terms of policies and practices that could be implemented to improve students' civic knowledge.

Acknowledgements

There are many people who I would like to acknowledge as I close out my career as a graduate student. First, I would like to thank my committee chair, Dr. Yasuo Miyazaki. I appreciate all of the input and suggestions that he had for improving the quality of my research. I would also like to thank the other members of my committee, Drs. Gary Skaggs, Kusum Singh and David Hicks for their time and help with the research.

I would like thank the faculty and staff at West Virginia University's Department of Political Science and College of Education Human Services. It is with the faculty and staff that I found my love for education. I would also like to thank all of my students that I have taught at Danville Public Schools and Montgomery County Schools, VA. It is because of them that I pushed to become a better teacher and life-long learner.

I want to thank all of my family members who have been there to support me through my education career and help to push me to reach my goals. I am thankful for the support of my parents, Debbie and Duke Ebert, my father Mike Gregory, my in-laws, Teresa and Kenneth Curran, Julie and Terry Kelly, and my brother and family, Matt, Melanie, Eli, and Jude Gregory. They all listened to me vent and explain things even if they didn't understand and showed interest.

This work is also for my children, Henry, William, and Caroline. They have been patient with me and have understood when I was tired from working late or when I had to run to campus to meet with "Dr. Me-Ya-Hockey." They are a big reason why I have pushed to complete this project. I can mark the progress of my doctoral program with each of my children.

Last, I want to thank my wife, Traci, for everything that she has done. She has been my rock and my moral support throughout this entire project. She has helped me to reach goals that I never expected that I could meet. I truly could not have done this without her.

TABLE OF CONTENTS

LIST OF EQUATIONS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: Introduction

Countries around the world strive to have a population that have a high level of civic knowledge and it is an important goal for any democratic society. Now more than ever, it is important that citizens have an understanding of what governments are, what they do, and what the effect that citizens can have on policy. As one reads the news, we see headlines of turmoil within countries with groups vying for power. We see countries trying to regain territory they have held in the past, citizens wanting to be part of new governments, rebel groups creating chaos within countries, and some areas where the population wants creation of a new state where they have rights as citizens. The citizens of these countries are sometimes left to fend for themselves and have no say in government affairs.

As members of the global community, it is important to be aware of issues in other countries and to conduct cross-national studies. Events that occur in other parts of the world can have a large impact on policy within the United States. Researchers and policy makers need to be aware of where we are lagging behind, and to see what other countries are doing that could possibly have a positive impact in the United States. For this reason, this study will examine cross-national data to explore any similarities between countries and to gauge whether or not there are policy implications for the United States.

For citizens to have the ability to make rational decisions, they must have a basic knowledge of how a democracy operates (Dewey, 1966). Most research has shown that formal education plays a large role in providing civic knowledge to citizens. As Galston (2001) points out, good citizens are not born, but are made. Research has started to explore how schooling provides that positive connection in creating a population with high civic knowledge (Torney-Purta, 1997). Political scientists have started to question how much political knowledge is necessary for the citizens to be competent. These questions have led to the development of new

political thesis, such as the low-information-rationality thesis developed by Popkin & Dimock (2000). They argue that citizens who have low levels of information will not be able to follow public discussion and not understand issues that are being faced. These citizens are then more likely to vote based on politicians character rather than important issues and are significantly less likely to even participate in political activities.

The issue of creating good democratic citizens has policy implications. This has been a key issue for the United States government and the U.S. Department of Education. For example, during the Clinton administration the *Goals 2000* initiative was implemented whose goal was to improve the effectiveness of civic education curriculum in the United States and to support local communities develop standards and improve the quality of schools (Rentner, 1999). Millions of dollars have been spent in grants in an effort to improve civic education, such as the We the People Program (Paige, 2003). By 2006 however, it was found that scores on civics tests had remained constant since 1998 for U.S. students that were in the eighth and twelfth grades (Lutkus & Weiss, 2007). Therefore, there is a high demand to develop a more effective way to teach and learn civics.

In order to develop an effective method, we first have to understand the current status of students' civic learning and how the family background, method of teacher's practice, and classroom/school contexts such as classroom/school climate are associated with it. The literature suggests that the conditions and experiences of a students' home background has a significant impact on their academic achievement. According to Allington (1990), an indication of a student's performance is related to family poverty. These differences are particularly noticeable in the areas of reading and literacy. The literature also suggests that the parents of students who

are poor will have had less experience with schools and those that completed high school have reported that school was a difficult experience (Natriello, McDill and Pallas 1990).

The environment of the school has been shown to have an impact on student achievement. Research has shown that students are often not engaged in learning in schools that have a high concentration of students from lower socioeconomic backgrounds (Lee and Croninger, 1994). Schools that have shown to be safe and have an orderly environment have seen higher levels of achievement, and this achievement gap has been most noticeable in students from lower socioeconomic backgrounds. As seen above, students learning takes place in multiple layers of individual and environmental factors surrounding students, thus the present study is framed from three different levels of individual and social environment in which a student resides and how each characteristic of different social level is associated with civics knowledge. A single level approach has the possibility of not being able to capture the distinct phenomena that occur at different levels of social hierarchy such as students, classrooms, schools and countries (Torney-Purta, Lehmann, Oswald & Schulz, 2001, p.149). By conducting a multi-level analysis, more beneficial information can be gained (Bray & Thomas, 1995).

The CIVED study is an interesting data set to use when comparing across nations, as we typically see studies that measure students in math, science or reading achievement. Studies have shown the differences in achievement in those subjects, but researchers have not spent as much time in other subjects such as government/civics. Many nations do not spend as much time in areas of civics as they do other subjects such as mathematics. Governments and school systems are missing vital time that they could be engaging students in how to be proper citizens and for orderly conduct within society.

Defining Civic Knowledge

The idea of civic knowledge varies from among the research, and is usually constructed around the research goals. For example, the Civics Framework for the 1998 National Assessment of Educational Progress (NAEP, 1998) defined civic knowledge in terms that related to American students. Important aspects of civic knowledge in that study focused on five important questions related to our political system, the Constitution, our role in foreign affairs, and what role do citizens perform in our version of democracy. One of the problems that we face in measuring civic knowledge is that most school systems do not have a prescribed course for government or a time period in which it should be taught.

When considering the idea of civic knowledge, the International Association for the Evaluation of Educational Achievement (IEA) turned to political scientists and sociologists to create a theoretical framework that would help in the overall research (Lehmann, 2004). The IEA created a framework, which included two circles, which were tested during the two phases of data collection. For the purpose of this study, the inner circle of framework is the focus, which is centered on the idea of examining what influences individuals to carry goals into action.

The IEA in creating an instrument that would measure civic knowledge focused around students' content knowledge as well as the ability to understand civic information. In looking at these different areas, they were able to create an instrument that looked at various components of what they tested and called civic knowledge. The scale that was created by the IEA focused on the following ideas and concepts: the importance of citizenship in both a conventional form and the idea of a social-movement related, the responsibility of the government in the economy and society related issues, the idea of trust in the institutions of government and the impact that understanding of those institutions, the trust that citizens place in their nation, the role of

women's rights in political and economic affairs, and the attitudes held towards immigrants (Schulz & Sibberns, 2004).

Background of the problem

A basic understanding of civic knowledge is important aspect of democratic citizenship. Political scientists are finding that there are links between an understanding of basic civic knowledge and a functioning government. Without having this basic civic knowledge, we run the risk of having corrupt governments and ineffective leadership.

With civic knowledge, citizens will have a better understanding of what they want as individuals and as potential members of interest groups. If we have more civic knowledge, then we will understand how policies can affect our interests and our everyday lives, which will then allow us to better serve our interests in the political process (Galston, 2001). This raises the citizens' level of political efficacy, the idea that they can have an impact in government and in the process of governing. This can also be described with the theory of instrumental rationality, which states that individuals will be able to identify a problem and work towards solutions that directly address the issue (Zaller, 1992).

An increase in civic knowledge will also allow for countries' citizens to consistently view issues across time (Galston, 2001). This consistency is important for creating stability in a country and the government. If citizens are constantly changing their political views, government officials are not likely to respond to the changing attitudes, and have no input on which direction to take policy.

Citizens need to understand basic political processes and institutions in order to make sense of events that are occurring around them. Galston (2001) describes this as needing an existing framework to place new political events within. Popkin & Dimock (2000) state that

citizens with low-information will not be able to truly assess what leaders are doing within the institutions, and are again more likely to look at personal characteristics and make voting decisions based upon these character traits.

The global world requires that citizens are more tolerant and understanding of other cultures. With a greater sense of civic knowledge, citizens can have a clearer understanding of issues that have a global impact. Citizens will be able to view issues, such as immigration and the impact it has on their country in a more favorable light if they have a higher understanding of civic knowledge (Popkin & Dimock, 2000). Again, in this global community where borders are becoming increasingly nonexistent, this civic knowledge can lead to a less fearful population and create fewer issues for government institutions.

Citizens that have low levels of civic knowledge are less likely to view debates as a positive form of government. These citizens tend to see debates as an argument with no gains, which can greatly affect the character issues of the individuals involved in debate, compared to those with a higher understanding of civic knowledge who can see the positives of the back and forth discourse (Popkin & Dimock, 2000). This can have a large impact in the civics classroom. For teachers who open their classroom to debate to discuss issues, students who have lower civic knowledge will see this debate as a negative, and not gain from the discussion as much as students who have obtained a higher sense of civic knowledge. The teacher of the classroom will need to know their students' abilities and adjust the classroom to a proper environment to teach.

Without an understanding of civic knowledge, citizens are less likely to be a proponent of key democratic values. As Dee (2004) proposes that an increase in education can lead to a higher civic knowledge attainment, which in turn leads to "democratic enlightenment." This enlightenment will then lead to citizens more able to support major democratic principles.

Glaeser, Ponzetto & Shleifer (2007) propose that with more education, awareness of democratic principles will rise, allowing more support of governments that are democratic in nature as opposed to regimes that have dictator like qualities. Galston (2001) continues this thought even further in what he describes as the social learning hypothesis that this increase of civic knowledge and an understanding in democratic principles

In order for a democracy to work effectively, it must have citizens that are actively involved in the political process. Political scientists are finding the link between an increase in education and higher civic knowledge, leading to an increase in political participation. Carpinin (1996, p. 226-27) found that there was a significant effect between the probability that one would go to vote and political knowledge. Popkin & Dimock (1999) expanded upon this idea and found that the most important factor in whether or not a citizen votes and participates is not a lack of interest or distrust in the government, but a lack of civic knowledge.

Research Purpose and Questions

The study presented in the following pages is a cross-national comparison of civic knowledge scores. The advantages of a cross-country approach as defined by Hanushek and Woessmann (2010) are that we can examine any differences in institutional variation that would not exist within countries, there is the likelihood for more variation than what would be available within a country, we will be able to see if results are country-specific or if it is a general result, be able to examine if effects are systematically heterogeneous, avoid selection issues within a country, and uncover effects that might be missed in a single country study. There are several research questions that will be addressed in this study. The specific research questions that will be addressed are:

1. What countries are doing better in a comparison of mean civic knowledge scores, and how much variation is accounted for at the national level?
2. If there is a significant difference in the civic knowledge scores between countries, what are the national characteristics that can explain the variation among nations? Several factors that will be examined are the national averages of parents' education and the home literacy environment of the students, the national average of school safety and the environment of the schools, the national average of students perception of an open classroom climate, the national average of the individual teachers' practice, the gross national product (GNP) of each nation, the government system of the country in question, i.e. whether or not they are a new democracy or have been democratic for a period of time, and finally the status of women in each society, number of internet hosts, GINI coefficient, HDI, adult literacy rate and public expenditure in education.
3. At the school level, how much variation of civic knowledge scores exists between schools within nations? If there is significant variation between schools, what are the school level characteristics that can explain such variation and how much can they explain?
4. Is there any relationship between civics knowledge and teachers practice? Does this significantly vary across nations? If there is significant variation, what national characteristics are associated with it?
5. Is there any relationship between civics knowledge and open classroom climate for discussion (measured by the classroom average of student's perception)? Does it significantly vary across nations? If there is significant variation, what national characteristics are associated with it?

This study will use a multi-level analysis using hierarchical linear modeling to determine the characteristics of students, teachers, classrooms/schools, and nations that predict higher levels of civic knowledge in the 1999 IEA Civic Education Study (CIVED) data. I will examine whether or not characteristics listed above will predict higher levels of civic knowledge. This study is unique in using a multi-level analysis to examine classroom/school and national level variables that are associated with civic knowledge of 14-year old students.

This study is important in that it adds to existing literature on students' civic knowledge. There is a lack of studies regarding civics education and social studies, with more attention being placed in math and science. The United States chose not to participate in the International Civic and Citizenship Education Study 2009 (ICCS) due to lack of funding, but continues to participate in other international programs, such as Trends in International Mathematics and Science Study (TIMSS) and the progress for International Reading Literacy Study (PIRLS). National exams, such as the 2014 administration of NAEP Civics, have been reduced from testing the 4^{th}, 8^{th}, and 12^{th} grades to only 8^{th} (Campbell, 2014).

This study is unique in that it examines various characteristics of SES, such as home literacy environments, and explores the ways in which students perceive the classroom and the teacher's practice within the class. This dataset allows for a comparison of data from the United States to 27 other countries in the world. The data allows for between country comparisons as well as an examination of relationships at the individual and school levels. Other datasets available would not be able to provide this information. While there are more recent datasets for civics, such as NAEP Civics 2010 and IEA International Civic and Citizenship Education Study (ICCS) 2009, they do not include either an international comparison, or the U.S. did not

participate in the study. It is important to note that in many of the countries who participated in both CIVED and ICCS showed similar results on knowledge (Schulz, Ainley, Fralilon, Kerr & Losito, 2010). As Theisen, Achola and Boakari (1983) point out, cross-national studies are important because we can have a comparison of relative achievement status, we can examine policy from one nation to see what might be effective, and we can reexamine how countries prioritize their expenditures, which could lead to an increase in achievement scores. Tucker (2011) created a framework on how the U.S. could adapt some of the approaches of top-performing systems. Biddle (2012) states however, that although information gained from international assessments are important, we need to be aware that the U.S. system is unique and that there are other issues in society that prevent us from adapting policies of other top-performing nations.

The CIVED dataset attempts to fill in gaps that exist within NAEP indicators. The NAEP instrument is based on a content framework that covers the U.S. Civic Education Standards, while the IEA is focused more on principles of democracy and democratic institutions (Torney-Purta, 2000). The framework for the NAEP Civics test has gone unchanged since the 1998 administration. The National Research Council has warned about the interpretation of results and interpretations from the NAEP Civics test since the NAEP test creates three proficiency levels, basic, proficient and advanced which are arbitrary cut points (Mitchell, Jones & Pelligrino, 1999).

Gagnon (2003) argues that the U.S. standards that have been adopted are too broad, and focus mainly on the historical aspects, rather than on the importance that citizenship and the effect of civic participation is in students' lives. Torney-Purta and Wilkenfeld (2009) further this argument for a need for civics education that helps in the creation of attitudes that employers

seek in employees, these students who have higher attitudes are shown to be more tolerant of others and are willing to listen and think about viewpoints that differ from their own, while taking more responsibility in their actions and try to better their community. A student that has been exposed to effective civics instruction builds 21st Century Skills that are shown to be important in having success in citizenship, college and career (Torney-Purta & Wilkenfeld, 2009). This approach to teaching civics has been developed into a new framework that was created by various state agencies and leading social studies organizations and is called the C3 (College, Career and Civic Life)(Croddy & Levine, 2014). The C3 framework serves as a guide for states to voluntarily adopt and is aligned to Common Core State Standards (CCSS), focuses on students having a voice in their classroom, with the teacher acting as a facilitator who will help guide students through an inquiry process (Valbuena, 2014).

Previous studies using IEA data from 1971 found that one of the best predictors of achievement is whether or not the student feels that they have experienced a classroom that allowed for open discussion. The NAEP Civics data do not ask questions related to student perceptions of the classroom climate, only teacher reported variables for what their class practice included (Buckley, 2011). Previous versions of NAEP showed that achievement was highly tied to parents' education levels, but this could lead to misinterpretation as the schools that had civic programs that were highly engaging were located in neighborhoods that had higher parental education (Torney-Purta, 2000). Torney-Purta takes this even further in suggesting that while the IEA also has parental education as a confounding variable, there is a higher emphasis to separate the effects using statistical analysis by incorporating other SES type variables such as home literacy measure.

An examination of NAEP Civics data from 1998, 2006, and 2010 shows that there were no significant changes in students' performance at the eighth-grade level (Buckley, 2011). Again, we should exercise caution while interpreting the NAEP Civics test scores since NAEP Civics is based on factual content that is scored either correct or incorrect, and as Torney-Purta (2000) points out, there needs to be research to understand the extent to which we can tie civic knowledge to factual information. There is evidence that indicate that the U.S. eighth grade civics test scores and the surrounding educational environments did not change much during 1998 to 2010. For example, NAEP results showed that there had been no significant difference between male and female performance, and this has remained the same in the past three administrations of the test (Buckley, 2011). Further, higher levels of parental education were associated with higher scores, but there were no significant changes from 2006 to 2010 on the association, with data from 1998 not included because the wording of the question was different (Buckley, 2011).

The facts that the NAEP Civics mean as well as gender gap and its relationship with SES did not change much during 1998-2010 may indicate that the U.S. did not change much during that period even though new policies and may efforts and investments were made since 1998. It may be said that those new policies and programs efforts did not work well to increase the civics knowledge of the U.S. eighth graders. Thus, there needs to be investigation of why they did not work well. It may be that those policies and programs were not hitting the right areas or it might have been a problem with implementation.

One way to effectively conduct this investigation is to look at other nations and to compare with them since the variety of ways in which countries address the challenges of providing mass education offer a "natural experiment", which through close and careful study,

might help unravel the complexity of input-output relationships not readily detectable within a single educational system (Wagemaker, 2014). To address these issues, IEA CIVED 1999 data are considered to provide the best opportunity compared to other potential data such as NAEP Civics 2010 and IEA ICCS 2009 data. As mentioned earlier, NAEP Civics 2010 does not allow for an international comparison. IEA ICCS 2009 data are better in term of more recent, but it does not provide the point of comparison for the U.S. since the U.S. did not participate in the study. Further, since the IEA ICCS 2009 data do not provide the linkage file from which student and teachers who taught the students could be linked, it would not be possible to address one of the key research questions, i.e. the effects of teacher classroom practice and the open discussion classroom climate on civics knowledge. Zhang, Torney-Purta and Barber (2012) note that using CIVED allows for examination of teacher data that is not available in other studies. They point out that CIVED allow us to examine teacher and student level reports of teaching, which other data sets lack the ability. Thus, considering several reasons mentioned above it's not ideal, but IEA CIVED 1999 data should provide some hints on what the U.S. should do in order to improve its civics education.

Summary

A citizen population that has a high level of civic knowledge is an important and vital part for a democracy to be able to survive. Researchers, educators, and policy makers have attempted to find ways to make sure that their citizens have a high level of civic knowledge. Education has been shown to be one of the major contributing factors in increasing civic knowledge, but we are unsure as to what part of education is the most valuable in helping to raise that knowledge. Few studies have addressed what contributes to an increased civic knowledge using a hierarchical linear model. This study will help to fill the gap of existing knowledge of

what we can do as educators and policy makers when we try to close the gap between those who have a high level of civic knowledge and those who do not.

CHAPTER 2: Literature Review

The second chapter of this dissertation is an extensive review of the literature that is related to civic knowledge and the factors that contribute to students having and obtaining a high level of civic knowledge. The literature review will follow the hierarchical structure that is used for analyzing the data. First the literature review will focus on the student and the family factors that contribute to a student's civic knowledge. The second part will focus on the school/classroom teacher level factors. The literature reviewed focuses on what teachers do in the classroom and the environment, and characteristics of schools that can affect civic knowledge. The final section of the literature review examined national level factors.

Student level Characteristics

Individual and family background

The relationship between civic knowledge and socioeconomic status (SES) has been widely studied. One issue we have with a study using SES is that there are a variety of ways of defining SES, and any changes made to how we define SES can have an impact on results (Cowan, Hauser, Kominski, Levin, Lucas, Morgan, Spencer and Chapman, 2012). For example, we generally include family income, parental educational attainment, and parental occupational status as the indicators of SES as seen in U.S. Department of Education studies such as the National Education Longitudinal Study (NELS) and Early Childhood Longitudinal Study (ECLS-K), but Cowan et al. suggest that we could get a more reliable measurement if we were to expand our understanding of SES. They argue that measures should also include the home neighborhood and even the school SES to give a more reliable construct of SES. Research with SES has focused on the gap of civic knowledge that exists between high and low SES students (Niemi & Junn, 1998). Previous studies using the IEA have found that this gap exists in the

United States as well as internationally and that achievement scores showed a significant difference with students from higher socioeconomic backgrounds scoring better than those from lower backgrounds, and these differences were noticeably larger in the United States compared to other nations (Torney, Oppenheim and Farnen, 1975).

When information on family income, one of the "Big 3" components of typical SES, is not available in the survey data, home possessions could be used to measure family income (Cowan, Hauser, Kominski, Levin, Lucas, Morgan, Spencer and Chapman, 2012).. Home literacy environment that can partly be created by home possessions has been shown to be an important component in literacy skills. Mol and Bus (2011) have pointed out that the environment that a student grows up in is crucial to their vocabulary and comprehension skills. Not only is it important for children to have stories read to them, but the parents to read themselves and to own a large amount of books, has shown to be significant. Those children who grew up in poor home literacy environments where the parents did not read to their children, had fewer books in the home and did little reading themselves, had less advanced vocabulary and reading comprehension skills.

One of the dilemmas that we face when looking at the home literacy environment is that it is sometimes difficult to get an accurate depiction of the home literacy environment. Most research has focused on self-reporting how often books are read or how many books are available. Griffin and Morrison (1997) conducted a study of home literacy that included that amount of reading materials at home, the number of trips that the family made to the library, how often the parents read, and how often the parents are reading to their children. Their results showed that their measure of home literacy could reliably predict the variance in a child's literacy level at kindergarten and again at the second grade, even after removing the variability

that could be attributed to social background. Other studies have cautioned that these self-reporting surveys might not be reliable and that we can see the possibility of having social desirability bias, where parents know that reading benefits their child, so they report high numbers to give the impression that they are good parents (DeBaryshe, 1995).

Home literacy could also be used to describe the sociocultural factors that exist for students. Families that have a high number of books in the home could be thought of as having high cultural capital (Marks, 2005). Cultural capital can be explained as the ability of students to take in the values of society and the expectations of education (Bourdieu, 1984). Students gain cultural capital from the settings of their home, and have shown to have a higher achievement level (Sullivan, 2001).

Research has shown that there are certain parts of a student's home environment that impact on achievement and that can change the student's literacy level. Lee, Bryk and Smith (1993) stated that the expectations that parents place on their child's achievement and the importance that is placed on education will have a strong impact on academic performance. Students that have reading materials in their home have shown to have higher literacy development and reading comprehension, and the research has shown that the reading material could be owned or borrowed from places like friends and libraries (Lee and Croninger, 1994).

The CIVED data set includes student level variables that were found to be statistically significant predictors for civic test scores. One of these variables used that will be incorporated into this study is the expected years of further education. By including this variable in the study, it is possible to gauge a student's aspiration, and potentially give insight into the influences that peers and parents have on students (Torney-Purta, Lehmann, Oswald & Schulz, 2001). Previous

studies conducted by Niemi and Junn (1998) found that this variable was a significant predictor of knowledge.

Another school factor variable at the student level that is important is the participation in a school council or parliament. As Torney-Purta et al. (2001) state, this variable has been shown as a school level factor that can attribute to civic knowledge. This variable also shows whether or not an individual is willing to participate in civic activities and might indicate future participation in elections.

The activities that students engage in outside of the classroom could also have an impact on their civic knowledge. Because of this, the time that students spend outside of the home and the frequency in which they watch television news will be included in this study. The time spent outside of the home has been shown in previous studies to indicate whether or not an individual might engage in behavior that is deemed risky or potentially anti-social (Torney-Purta et al., 2001). The variable for watching TV news was included as a predictor as previous studies have shown that TV is the most used and trusted source of obtaining information for individuals in most countries.

Finally, studies have shown that student perceptions of the classroom environment play a key role in gaining civic knowledge (Zhang et al, 2012). When students perceive that they are free to have open debates and discussion of issues that could be seen as controversial, the development of civic knowledge has been shown to significantly increase. Torney-Purta and Wilkenfeld (2009) showed that a classroom in which students perceived that there were higher levels of teaching that was interactive, students gained higher civic skills.

School/Classroom/Teacher Level Characteristics

School characteristics, climate and contexts

There has been a recent growing trend in the research to examine the contextual effects in civic knowledge. These contextual effects involve factors that are located in schools and it was found that contextual effects for characteristics of the school are more influential than individual effects (Wilkenfeld, 2009a). The characteristics identified by Wilkenfeld included mean socioeconomic status of the school and the climate of the school, such as the ability to have open discussions. Wilkenfeld (2009b) further indicated that students who attend a school with an overall open climate, where discussion is encouraged, students will gain a positive effect above one's own personal experiences. He also claimed that overall mean socioeconomic status of a school has been found to create a significant difference in students' civic knowledge and explained that this difference could be attributed to differences in school facilities and materials as well as greater parent involvement in schools with higher SES and that there are more opportunities outside of the classroom that provide experiences that are valuable to students. Schools that have a lower SES on average have fewer opportunities for their students to be exposed to print. This could be in the form of books and reading materials in the classroom and in the school library, meaningful opportunities to engage in writing, and less opportunity in choosing what to read (Duke, 2000). These differences in materials present can affect the educational outcome for students from the different schools.

Schools have shown to play a main role in conveying what a students anticipated place in society will be (Kamens, 1981). Ichilov (2007) carries this idea further and says that a student's motivation for acquiring civic knowledge, the opportunities for students to be able to discuss with other interested peers are closely linked to the socioeconomic environment of the school.

Without having proper channels to engage in civic learning opportunities, students who attend schools and lived in neighborhoods that are disadvantaged are found to be ill prepared for citizenship (Atkins & Hart, 2003; Kahne & Middaugh, 2008).

The composition of the school has also shown to have an effect on student outcomes. Students tend to attend schools that are part of their neighborhoods. Research has shown that we typically see that poor students will attend schools with other poor students (Orland, 1990). Furthermore, students that are in these types of schools have been shown to have lower motivation and are more likely to join groups that go against academic progress because they are aware of the educational inequalities that exist between schools (Kozol, 1991).

Recent research has started placing an emphasis on the school climate and the effect that this has on student achievement. The research community has had a difficult time in defining what is meant when school climate is discussed. One of the issues in creating a school climate measure is deciding what needs to be measured and how to effectively capture valid data.

When measuring school climate, researchers have found that there are several factors that are involved. The push has been to develop a measure that will display the climate of school with a high level of reliability that will be able to be utilized by policy makers in order to create better schools (Brand, Felner, Seitsinger, Burns & Bolton, 2008). In the research by Brand, Felner, Seitsinger, Burns and Bolton, they found through a confirmatory factor analysis of teacher climate ratings six subscales. These scales were peer sensitivity, disruptiveness, teacher-pupil interactions, achievement orientation, support for cultural pluralism, and safety problems. School safety, which is one of the six subscales in school climate, had a significant impact on student outcomes. Brand et. al (2008) found that schools that report low levels of safety problems have shown to have higher academic aspirations, teachers have reported as having higher expectations

for students, and there is more of a sense that academics are important and that school will produce desired results. Furthermore, when students feel that the school that they are in is safe are more likely to be more academically adjusted, less likely to be involved in other behavior that is deemed inappropriate and aggressive behavior, and have reported having higher self-esteem (Bear, Gaskins, Blank & Chen, 2011). Other research has found that instead of the five historical subcategories of school climate, that there are actually 8 different factors. These factors include: a positive student-teacher relationship, school connectedness, academic support, order and discipline, school physical environment, school social environment, perceived exclusion/privilege, and academic satisfaction (Zullig, Koopman, Patton & Ubbes, 2010). These factors indicate that school climate is not just about the school building itself, but rather a place that includes people who go there and work there, and these all interact with one another and affect learning. (Zullig et al., 2010).

One of the big issues in examining civic knowledge in our students is that there is no agreement on a curriculum for civic education. Civics can be taught through various courses throughout a student's academic career, ranging from history, government, geography, and other social studies courses. Baldi (2001) states that there are school districts across the United States that do not require their students to take a course in civics or government and that we don't know much about the school or the context of the classroom where civic education occurs. There have been numerous studies showing that there is a relationship between school and classroom characteristics when it comes to math and science achievement (Arnold and Kaufman, 1992; Chaney, Burgdoff, & Atash, 1997), but there has not been as much research into school and classroom characteristics and the effect on civic achievement.

Classroom environment and teacher's practice on instruction

When we look at what the teacher does in the classroom, we have to examine the classroom environment and practices. An environment which encourages students to be able to share their own opinions has shown to be associated with positive attitudes towards politics and having lower instances of political alienation (Baldi, 2001, Angell, 1991; Ehman, 1980). Baldi goes on to note that the way a teacher approaches teaching civics related content will have an impact on how a student will feel and understand civics issues. This challenges what previous research had shown about the effect of the classroom on civic knowledge. More recent research has shown that what we do in the classroom can have an impact on a students' civic knowledge. Programs like "We the People" have shown to effectively increase civic knowledge in students at all grade levels (Galston, 2001).

There has been some debate over how civics is taught in classrooms around the world. Many have found that civic education courses and how they are taught make a difference in students' performance on civics knowledge tests (Torney, Oppenheim and Farnen, 1975). There has been evidence from the United States that there are problems in the way that social studies courses are taught in lower economic areas (Hahn, 1999). Research has shown that problem-based learning (PBL) has positive associations with student achievement (Thomas, 2000). Problem-based learning is a method that has been implemented in education that has students solving problems that are faced in the everyday world. The main purpose of PBL is to have the student work on a problem that is student driven and directed (Gallagher, 1997). Further research expanded the use of PBL in social studies classrooms and found that the achievement gap between low and high SES students was nullified after lessons using PBL (Halvorsen, Duke, Brugar, Block, Strachan, Berka, and Brown, 2012). Baldi (2001) also notes that students who

write essays on tests or assignments tend to score better in civics knowledge scales than those students who are not asked to write essays more than once a month. This suggests that teachers need to engage students and to teach proper writing skills in their classroom practices.

Teachers can create an effective environment in any clasroom. In order to create this type of environment, the teacher needs to create a situation in which students are able to freely create concepts and structures that relate to them. Students will need to be able to have real and meaningful concepts, which will then allow them to construct the personal meaning and will remain in their memory (Powell & Kalina, 2009). An important part of a civics classroom is that there is open discussion between the teacher and students where students will be able to discuss their ideas. In a civics classroom, this openness and fairness is important to achieve to allow all students to gain the ability to express ideas and to gain new insight from other students.

At the school level research has shown that schools can create policies and classroom practices that will have an effect on literacy and achievement. Lee and Croninger (1994) suggest that classes that assign more books other than the textbook have shown that students will have higher levels of reading comprehension. They go on to suggest that exposing students to more books in the classroom or at home, the students will read better. However, we must use caution when we examine these results, and see that it's not just books that are making the difference. When a classroom has more books, it is also important that the teachers have received professional development in using the books. Studies have compared classrooms where teachers were given a large number of books and received professional development to classes where books were given with no training, and results showed a significant difference in outcomes (McGill-Franzen and Allington, 1999). Jerit, Barabas and Bolsen (2006) point out that we must differentiate what type of literature that we expose to students. They found that literature does

increase a student's civic knowledge, however certain forms of material are better suited for different students. Newspapers have been shown to be effective for students that are already higher achieving, but would have a negative impact for students from lower achievement levels (Jerit, Barabas &Bolsen, 2006). By changing the literature that is available for our students, we have a better chance of increasing our student's civic knowledge.

The quality of the teacher has been a recent trend that has been explored by researchers. Schools are trying to find teachers that are highly qualified, and university systems are adapting their methods to ensure that the quality of teacher training is high. This trend is seen in the United States and at the international level. In a study using the 2003 Trends in International Mathematics and Science Study (TIMSS), it was found that there was a large gap in students from high SES and low SES with access to high quality teachers (Akiba, LeTendre & Scribner, 2007). This is not only true in the United States, but also at the international level. Teachers that are considered high quality are going to schools where there is a higher SES student and we see that they have higher scores on TIMSS (Akiba, et al, 2007).

While conducting cross-national studies, it is important to look at how the classrooms are divided and the differentiation between schools. Classrooms are divided in different countries for various different reasons, including religious schools, academic selection in determining what school the student will attend, schools that are single-sex, and some nations segregate depending on if the student is an immigrant or not. These classrooms may or may not have access to the same high quality teachers that are seen in other schools throughout the country. These differences in who is in each classroom also may have significant effects between social groups. Gorard and Smith (2004) conducted a cross-national analysis and found that nations that have a comprehensive system of schools will have smaller achievement gaps between their students.

Conversely, in systems where we see students tracked on ability or more segregation, there is an achievement gap between the students in reading. Students who attend a high-tier school in a system that is tiered are more likely to have an increase in achievement compared to students who are in a low-tier school (Schofield, 2010). For example, Germany which has a tiered system of education and segregation in their schools, had a lower reading score and a significant difference of reading between high and low achievers, while Finland which has a comprehensive system maintained a high reading score and a small gap between the high and low achiever (Gorard & Smith, 2004). These differences are expected when looking at civic knowledge, as students that are in segregated classrooms will have different ideas on what a political system should be.

National Level Characteristics

Inequality in Society

The status of women in society and the effects on education have been studies extensively in relation to reading and math. Studies are showing that the gender gap is decreasing, but there are still considerable gaps that exist for many aspects in many societies and there are several factors that contribute to this gap. Most studies have shown that females score lower than males in math, but perform better in reading. Marks (2008) found that nations that have a high gender gap in reading experience a lower gap in math, and the opposite was found to be true as well. Marks goes on to state that the reason that we see this difference in gender gaps is a reflection of the policies and implementation of those policies that has taken place within the nations. Where we see policies that are designed to help females decrease the gender gap in math, there is an increase in the gap that exists for reading, and where nations have not been successful or do not have policies in place to support women, we see the gender gap in math is

still wide with relatively small gaps existing for reading. I hypothesize that these results are expected to be the same for civic knowledge. Nations that do not have proper policies in place for females should see a large gap in civic knowledge.

Reducing inequality in society is one goal that we see in education. Reducing the inequalities that exist will create more democratic systems and students with a higher level of civic knowledge. There is debate on the role that school should play and what type of lessons they need to teach. Researchers have begun to suggest teaching an idea of social cohesion, which would in turn lead to outcomes in education becoming relatively equal (Green, Preston & Sabates, 2003). Questions for governments would hinge on reaching this idea of social cohesion, and not just an idea of inclusion of individuals. Social cohesion is defined as having the following 5 domains according to Forrest and Kearns (2001): a set of common values and civic culture, social order and control, social networks and capital, reduction in wealth inequality, and an attachment to place and identity. These ideas follow along the same line of thought as Galston (2001) in the importance of teaching civics to obtain a citizenry that is able to function and make government work properly. By focusing on inclusion, Green, Preston & Sabates (2003) argue that there will still be inequality amongst peoples, which in turn leads to differences in civic knowledge amongst citizens.

An issue that many countries have to deal with is the distribution of income throughout society. Many countries strive to create policies that would decrease the unequal distribution of income. Many proponents of reducing income inequality point to the relationship between a high level of income inequality and low economic growth (Persson & Tabellini, 1991). Research has explored and found that countries that experience higher levels of income inequality are more likely to have political instability (Alesina & Perotti, 1996).

The question that many researchers and policy makers must consider is how to reduce income inequality. Models have been created showing that countries that continue to support public education will see the level of income inequality decrease over time (Saint-Paul & Verdier, 1993; Eckstein & Zilcha, 1994). Sylwester (2002) used the Gini coefficient as a measurement of income distribution and found that countries that spend more resources on public education with see decreases in their level of income inequality, i.e., lower values of Gini coefficient. This shows that countries should continue to support public education to lower the income inequality, which could lead to a population base that has a higher level of civic knowledge with less political instability. However, some research has shown that in the short run there is the potential that income distribution may actually widen, but in the long run there is an adjustment and the income becomes more evenly distributed (Glomm & Ravikumar, 2003).

There are many factors that can contribute to the effect that spending on education can affect economic growth. Spending on education alone will not contribute to economic growth, but instead the amount of government spending, along with the tax structure can determine how much education will have an impact on growth (Blankenau & Simpson, 2004). It is hypothesized that countries that contribute a higher percentage of spending to education are more likely to see gains in education attainment.

Government Systems

The collapse of the Berlin Wall and the Soviet Union in the late 1980s and early 90s created a new world system. Gone were the days of the two super-powers and their political philosophies. The new world order created fledgling democracies with new issues and concerns. Countries had to be incorporated into the global market economy and to learn how to operate

under democratic principles (Youniss, Bales, Christmas-Best, Diversi, McLaughlin & Silbereisen, 2002).

Citizens that had been used to a communist system of government were now under a government that needed citizen commitment. Countries had to adapt and create a citizen class that could understand what being a citizen meant. In countries that had been communist, the older generation was on par with the younger generation in terms of understanding how to operate under the new political system (Flanagan & Faison, 2001). One country in particular, Germany, had the task of unification and bringing in a former communist state into a democratic state. Many people wondered if it would be possible to integrate the younger generations that had grown up in the eastern communist section into the democratic western section of the country. Under the old system the government used schools to teach students how to be a model socialist who was loyal to the party and the government. Once the Wall collapsed, Easterners had to relearn government systems in an attempt to catch up to their western brethren (Oswald, 1999).

With the collapse of authoritarian governments in Eastern Europe, a new era of globalization has emerged with new technologies tearing down walls of separation. Authoritarian regimes are finding it hard to keep information out of the hands of the youth. This has been especially true in Middle Eastern states, where the youth have been able to access technology and have been exposed to democratic ideals and the rights of citizen participation (Eickelman & Anderson, 2003).

Western democracies have not been immune to facing new pressures of socializing the young. The rise of globalization has led to a world in which people are increasingly more mobile. This has put pressures on Western governments to face the challenges that this moving population brings. Countries have seen major demographic and cultural shifts, as well as

bringing new economic challenges associated with jobs moving to new countries, and workers migrating between countries to find employment (Fussell & Greene, 2002). This movement of people and cultures can have a huge impact on human rights for individuals.

With the issues facing youth and the socialization process in the new world order, many point to schools as the area to train individuals to be model citizens in this new society. In order to do this, schools need to create a curriculum that is open to differences between cultures, and allows for students to be able to solve problems using critical thinking skills as well as being able to work cooperatively and without violence (Parker, Ninomiya & Cogan, 1999). There should also be an emphasis on teaching civics curriculum that includes human rights education, and this should be taught by qualified individuals and not left to poorly trained teachers (Youniss et al., 2002). The National Research Council (2000), suggest that schools will need to serve as an area to release tension between different ethnic and culture groups. With the movement of individuals being freer, there is the possibility of increased issues between groups, and school should be able to relieve this pressure by focusing on curriculum that will increase tolerance and the need to respect others.

Summary

This chapter presented a review of literature related to civic knowledge, and included a discussion of factors that are associated with achievement in schools and other variables of interest. The variables associated with achievement, and in particular civic knowledge were found and focused on classroom/school factors, demographic factors, student factors, and teacher's practice.

CHAPTER 3: Methods

Research Questions

Having a high level of civic knowledge has been shown to be a goal of a democratic nation. It is important for democracies to have citizens that are highly engaged and understand democratic principles in order to function properly. Education plays a large role in helping students obtain a higher level of civic knowledge. The main focus of this study is to investigate what characteristics of students, classrooms/schools, teachers, and nations lead to a higher level of civic knowledge and will be investigated through various research questions, as stated in Chapter 1:

1. What countries are doing better in a comparison of mean civic knowledge scores, and how much variation is accounted for at the national level?
2. If there is a significant difference in the civic knowledge scores between countries, what are the national characteristics that can explain the variation among nations? Several factors that will be examined are the national averages of parents' education and the home literacy environment of the students, the national average of school safety and the environment of the schools, the national average of students perception of an open classroom climate, the national average of the individual teachers' practice, the gross national product (GNP) of each nation, the government system of the country in question, i.e. whether or not they are a new democracy or have been democratic for a period of time, and finally the status of women in each society, number of internet hosts, GINI coefficient, HDI, adult literacy rate and public expenditure in education.
3. At the school level, how much variation of civic knowledge scores exists between schools within nations? If there is significant variation between schools, what are the

school level characteristics that can explain such variation and how much can they explain?

4. Is there any relationship between civics knowledge and teachers practice? Does this significantly vary across nations? If there is significant variation, what national characteristics are associated with it?
5. Is there any relationship between civics knowledge and open classroom climate for discussion (measured by the classroom average of student's perception)? Does it significantly vary across nations? If there is significant variation, what national characteristics are associated with it?

In this chapter, the data set, methodology, and analysis plan will be explained.

Data

In order to study the civic knowledge scores and the effects of the school environment, student characteristics, teachers practice, and national effects on students' civic knowledge scores, a three-level hierarchical linear model (HLM) was used. HLM was the most appropriate method to analyze this data due to the nested data structure of students within schools (Raudenbush & Bryk, 2002). When examining issues in educational studies, the use of hierarchical linear models are a particularly useful analysis tool (Kosko & Miyazaki, 2012). In the present study level 1 units were the students, level 2 units are the classrooms/school, and level 3 units are the nations. Note that in this study because the number of teachers and classrooms in a school sampled was one in most countries such as the U.S., in which teachers, classrooms, and schools are indistinguishable, and in some countries it was at most two or three. For this case, in order to align that analysis across nations, I used that average of those two or three teachers as the teacher characteristics so that student and teacher/classroom have the one-

to-one correspondence. Then, these variables were aggregated up to the school level using the sample weights. Thus, in the present study, teacher and classroom characteristics are the school level variables. Level 1 variables included gender, language used at home, home literacy, parent's education level, student's perception of open classroom climate, student's expected further education, participation in school parliament or council, the time spent outside of the house, and the frequency of watching TV news. The level 2 variables include the teachers' teaching methods or practice, whether or not the teacher's degree was in civics, school climate, and the mean of student level variables, i.e. mean home literacy, proportion female/male in the school, mean education level of parents, mean student's perception of open classroom climate for discussion, which is considered to be the open classroom climate for discussion (Marsh, Lüdtke, Nagengast, Trautwein, Morin, Abduljabbar, & Köller, 2002). The Level 3 include the variables of GNP, women's status, democratic system, and others such as the national average of the level 2 variables. All analyses were conducted using HLM7 software (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011).

For the current study, data from the International Association for the Evaluation of Educational Achievement Civic Education (CIVED) study conducted in 1999 were used (IEA, 2004). The CIVED was conducted in two phases; with the first a series of national case studies, and the second was a comparative empirical study, which consisted of a test of civic knowledge (Sibberns, 2004). Information for this study was used from the testing that occurred in 1999. Questionnaires were administered to students, teachers, and principals. The survey collected data from 93,882 14-year-olds who were in the 8^{th} or 9^{th} grade, from 28 different countries. See Table 1 for a list of participating countries. There were 9607 teachers and 4136 principals involved in

the study to gather data of the school environment. In the present study Colombia has been removed as there was no data available at the teacher level.

Table 3.1

Countries included in study

	GRADE			
Country	6	8	9	Total
Australia	0	0	3331	3331
Belgium	0	2076	0	2076
Bulgaria	0	2870	14	2884
Chile	0	5688	0	5688
Colombia*	0	4926	0	4926
Cyprus	0	0	3106	3106
Czech Republic	0	3607	0	3607
Denmark	0	3208	0	3208
England	0	0	3043	3043
Estonia	0	3434	0	3434
Finland	0	2782	0	2782
Germany	0	3700	0	3700
Greece	0	0	3460	3460
Hong Kong	0	0	4997	4997
Hungary	0	3167	0	3167
Italy	0	0	3808	3808
Latvia	0	2572	0	2572
Lithuania	0	3494	0	3494
Norway	0	0	3321	3321
Poland	0	3376	0	3376
Portugal	0	3261	0	3261
Romania	8	2984	1	2993
Russia	0	0	2129	2129
Slovakia	7	3453	3	3463
Slovenia	0	3068	0	3068
Sweden	0	3073	0	3073
Switzerland**				3104
United States	0	0	2811	2811
Total	15	60739	30024	93882

*****Colombia was dropped from final analysis because of missing teacher data
** Switzerland had missing data for grade level surveyed.

In creating an instrument that would measure students' civic knowledge, the IEA collected data in two phases. During the first phase, data was collected that included summaries from panels in 20 participating countries. The panels were asked to provide information related to what they thought a 14-year-old student should know about 18 different topics, ranging from elections, individual rights, national identity, political participation, the role of the police and the military, the role of economics in politics, organizations that would characterize civil society, and respect for diversity in ethnic and political arenas (Husfeldt & Torney-Purta, 2004). Once the panels finished collecting data, three domains were chosen for extensive study. These domains included: 1) the concept of democracy and what it means, and what are the institutions and practices, 2) national identity, regional and international relationships, and 3) social cohesion and diversity, with the greatest emphasis in the test placed on the domain dealing with democracy and democratic institutions (Husfeldt & Torney-Purta, 2004). The table of specification for the test can be found in Appendix A. A confirmatory factor analyses (CFA) was conducted which showed that there were two factors which were termed content knowledge and interpretive skills, that were similar, i.e. the correlation between the two factors was 0.925, but not identical measures of student performance. This CFA resulted in the instrument makers reporting content knowledge and interpretative skills scales, as well as creating an overall civic knowledge scale which combined the content and interpretative scales (Schulz & Sibberns, 2004).

At the next phase in creating the instrument, 140 knowledge and skills items that were judged as suitable for 14-year-olds in all of the participating countries were developed. This number was then decreased to 80, and was eventually piloted in 25 countries. Items were dropped that were deemed as unfair by more than one-fifth of the sampled countries. From this piloting, 38 items were selected with discrimination indices greater than .30 and alpha

reliabilities for the test exceeded 0.85 in all of the countries (Husfeldt & Torney-Purta, 2004). Scaling of the data was conducted by using an IRT 1 parameter model (i.e., Rasch model). By using IRT methods, items that were problems would be excluded in scaling for countries, which allowed for scores to be compared without creating any difficulties (Schulz & Sibberns, 2004). A sample of questions that were used and where released to the public (16 out of 38 items), can be found in Appendix B.

Analysis Plan

Sampling and Weighting

The CIVED study used a two-stage stratified cluster sampling design within each country, i.e., after stratification based on region, school type (e.g., public vs. private), track (e.g., academic vs. technical/vocational), school size, language of instruction, schools randomly selected from the population of the schools in each stratum (i.e., subgroup) in the nation. Then one class in the 8^{th} or 9^{th} grade was randomly chosen from the school, and all the students in the class were surveyed. In order to make sure that inferences from small subgroups have satisfactory precisions, those subgroups such as minority groups are oversampled (Sibberns & Foy, 2004). Therefore, researches in CIVED provided the students and school weights so that students and schools selected in the sample were representative of the student and school populations in 1999-2000 academic year (Thomas, Heck, & Bauer, 2005).

In this study, I aggregate students' data on mean home literacy, parental education, and student's perception of an open classroom climate to the school level. I first have to weight student data by calculating the relative weight before I could aggregate at the school level. In order to weight students' data, the weight of the students' had to be calculated by dividing the total student weight (TOTWGT) by the school weight (SCHWGT) so that we can

get the student weight within schools (i.e., conditional student weight), which indicates how many students this student represents in the school. The original weight variable (i.e., expansion weights) used to create the relative weights can be found in the CIVED data. To calculate the relative student weight, the student's weight was divided by the mean of students' weight. The next step was to aggregate the school level variables data to the nation level by applying relative school weight. The relative school weight could then be calculated by using the school weight variable (SCHWGT) provided in the CIVED data and dividing it by its mean in order to aggregate to the nation level.

Dependent Variable

In this study that uses the hierarchical linear models, the dependent variable that is used is the TOTCGMLE variable in the CIVED dataset. This variable represents the maximum likelihood estimate of the cognitive scale based on a Rasch model (Sibberns, 2004). The TOTCGMLE score was internationally scaled to a mean of 100 and a standard deviation 20. This variable combines the knowledge and skills scale that were part of the survey administered to students internationally.

Independent Variables

This study's main purpose is to examine civic knowledge scores using a hierarchical linear model. As part of this analysis, multilevel analysis using a three-level model will be conducted. The first level of this model is examining data at the student level and examining the effects of different variables on a student's civic knowledge score, the second level will include school level variables, and the third will include country level variables. The predictor variables were aggregated or measured at all three levels. As mentioned previously in this study, schools and classrooms are used interchangeably as the level 2 units since most of the schools in this data

set in every nation had only one classroom (for example, for the U.S., 124 out of 127 schools sampled (97.6%) only had one classroom, one school had two classrooms and one school had three classrooms).

Table 3.2

Summary of Independent Variables

Level	Variable name(Short name)	Description
Student	Open Climate (OC)	Student perception of classroom climate for discussion
	Gender (female) (FEM)	Female indicator of student's gender (0=Male, 1=Female)
	Home Language (LANG)	Indicator of whether main language of the nation spoken at student's home (0=No, 1=Yes)
	Parent Education (PARE)	Mean of mother's and father's education attainment
	Home Literacy (LIT)	Number of books at home
	School Council (SPAR)	Participation in school parliament or council (0=No, 1=Yes)
	Outside School (OUT)	Time spent outside the house
	TV News (TV)	How often TV news broadcasts watched
	Expected Education (EXE)	The years of education expected
School	Mean Open Climate (MOC)	Mean of student level open climate, which is considered to be open classroom climate for discussion
	Mean Parent Education (MPARE)	Mean of student level parent education

	Mean Home Literacy (MLIT)	Mean of student level home literacy
	Mean Home Language (MLANG)	Mean of student level language at home
	Proportion Female (MFEM)	Proportion of females in the school
	Mean Student Council (MSPAR)	Mean of student level parliament
	Mean Outside (MOUT)	Mean of student level time outside
	Mean TV News (MTV)	Mean of student level TV news watching
	Mean Expected Education (MEXE)	Mean of student level expected education
	School Safety Climate (SAFE)	School safety atmosphere of school
	Teacher's Degree (DEG)	Whether or not degree is in civics field (0=No, 1=Yes)
	Teacher's Practice (TPRA)	Composite of activities teacher uses in classroom
	Teacher's Confidence (TCON)	Teacher's reported confidence in civics items
	In-Service Training (INSER)	Professional development activities for teachers (0=No, 1=Yes)
Nation	National Mean Open Climate (NMOC)	Mean of the school level open climate
	National Mean Home Literacy (NMLIT)	Mean of the school level literacy variable
	National Mean Parent Education (NMPARE)	Mean of school level education attainment
	National Mean Home Language (NMLANG)	Mean of school level home language variable
	National Mean Female (NMFEM)	
	National Mean Council(NMSPAR)	Mean of school level parliament
	National Mean Outside (NMOUT)	Mean of school level time outside
	National Mean TV News (NMTV)	Mean of school level TV news

National Mean Expected Education (NMEXE)	Mean of school level expected education
National Mean Teacher's Degree (NMDEG)	Mean of school level teacher's degree
National Mean Teacher's Practice (NMMTPRA)	Mean of school level practice variable
National Mean Teacher's Confidence (NMTCON)	Mean of school level confidence variable
National Mean In-Service Training(NMINSER)	Mean of school level in-service training variable
National Mean School Safety Climate (NMSAFE)	Mean of school level climate variable
Gini index (GINI)	Income inequality in a country measured in 1998
Gross National Product (GNP)	GNP per capita in 1998 (in US $)
Human Development Index (HDI)	Composite index of longevity, knowledge and standard of living
Democratic System (DS)	Whether or not government is old or new democracy or developing (0-New democracy or developing before 1989, 1=old democracy before 1989)
Adult Literacy Rate (ALIT)	Percentage of adults in nation who are literate
Public Education Expenditure (PEXP)	Public education expenditure (as % of GNP) (1995-1997)
Internet Hosts (IH)	Number of Internet Hosts within a country per 1000 people in 1998

Level-1 Independent variables

In order to test the effects of the student level variables on civic knowledge, the following student-level predictor variables, which are measured at the student level and are self-reported by the student are used as the independent variables: the perception of an open climate, gender,

native language at home, parental education, home literacy, expected years of further education, participation in school parliament/council, evenings spent outside home, and the frequency of watching television news broadcasts. From the literature reviewed in the previous chapter, these are variables that have shown an effect on achievement and knowledge.

The student's perception of open classroom climate for discussion, which consisted of six items of 4-point likert scales (see Appendix C) that exhibited satisfactory unidimensionality based on a Confirmatory Factor Analysis (CFA) in the Structural Equation Model (SEM), was included as a level-1 independent variable. This variable was scaled by a Rasch partial credit model and its maximum likelihood estimates (MLEs) were used as the scale scores for this variable (Schulz & Sibberns, 2004). The average reliability across participating countries for this scale scores were 0.77, which is considered to be good.

The research presented previously has shown that the gender gap is closing slowly, but not in all subject areas. Countries have geared policies towards closing the gender gap in STEM fields, with other areas not getting the attention that they had received before, in particular civic education. In order to have an effective government, all participants within the system need to have a high degree of civic knowledge. Closing the gender gap that had existed in civic knowledge is essential for modern day governments. Thus, the gender as female indicator (1=female, 0=male) was included as a level-1 predictor.

The native language used in the house is a self-reported measure in response to the question of how often do you speak the language of the test. This variable was used as a measure of whether or not the student or student's family was native to the country in which they were living. The research from Marks (2005) showed that there has been an achievement difference between students who were immigrants and non-immigrants in math and reading. These

differences could mostly be attributed to socio-economic status, factors within the schools such as tracking, and cultural factors. These differences between immigrant and non-immigrant student remained even for 2nd generation immigrants. For this reason, native language was chosen as a predictor variable rather than born in the country of the test. The variable asked how often the student spoke the language of the test, coded 1=never, 2= sometimes, and 3=almost or almost always. The instrument was originally prepared in English and was later translated into 24 different languages spoken primarily in the countries that participated in the study. The tests were translated using guidelines for translations making sure that cultural and regional differences were taken into account during the translation. A dummy variable indicating that home language is different from the language of the test (1=different, 0=not different) was created by assigning 1 and 2 categories to 1, and the 3rd category to 0.

The parent education variable is an average of educational attainment of the mother and father. If one of them did not report it, then information from one parent was used. The CIVED instrument asked how far in school did your father/mother go coded into 7 different categories. The categories were: 1) no elementary school, 2) finished elementary school, 3)finished senior high school, 4) finished high school, 5) some technical education after high school, 6) some college/university, and 7) bachelor degree. The parent education variable was created by recoding the original value of 1-7 to 0-6. A socioeconomic status (SES) variable, frequently created as a composite of parent education, parent occupational status, and family income, was not available. Specifically, the parent education was available, but the occupational status and family income were not available.

The literature reviewed in the previous chapter showed that the literacy environment of students is a strong factor in determining a student's achievement. For the purpose of this study,

home literacy was selected as an independent variable in for understanding civic knowledge. As mentioned above, there was no occupational status or family income available in the data set, but a home literacy score as the number of books at home was available. Since the home literacy (i.e., the number of books at home) is often used as an index of SES (Cowan, Hauser, Kominski, Levin, Lucas, Morgan, Spencer and Chapman, 2012), this study includes this variable. From the way the variable was defined, the home literacy score can be interpreted as the proxy for the family income, but it may also tap into the family's interest on their intellectual and cultural activities (Cowan et.al, 2012). In order to avoid a jingle fallacy by naming SES by creating a composite based on incomplete information on the typical elements of SES, it was decided that the analysis would treat home literacy and the above mentioned parental education as separate variables. Also, since these two SES component variables may tap into different aspects of SES, it was of interest to tease out the unique effects of each SES component. Home literacy comes from students self-reporting how many books there were in their home and is coded as follows: 0=<11, 1=11-50, 2=51-100, 3=101-200, and 4=>200.

Other student factors that were included in the CIVED dataset have been included in this study. These variables include the expected years further of education, participation in a school council or parliament, how much time is spent outside of the house in the evenings, and getting new from the television. The research provided earlier indicated that a student's expected years of further education was a statistically significant predictor for civic test scores. The original data set included 6 values: 0=0, 1= 1-2 years, 2= 3-4 years, 3=5-6 years, 4= 7-8 years, 5= 9-10 years, and 6= 10+ years. In the original dataset, participation in a school parliament was coded as a dummy variable, with 0=no participation and 1=participation. For the time spent outside of school, the variable was originally coded as 0=never, 1= few times each month, 2=several days,

and 3=almost every day. The variable for how often do you watch TV news broadcasts was coded as 0=never, 1=rarely, 2=sometimes, and 3=often.

Table 3.3

Level-1 (Student Level) Descriptive Statistics (N=56579)

	Minimum	Maximum	Mean	Std. Deviation
Civic Score (CIV)	29.15	165.19	105.66	21.70
Open Climate (OC)	1.00	4.00	3.02	0.62
Parent Education (PARE)	0.50	7.00	4.46	1.68
Home Literacy (LIT)	0	4	2.44	1.30
Home Language (LANG)	0	1	0.07	0.25
Gender(female) (FEM)	0	1	0.52	0.50
School Council (SPAR)	0	1	0.31	0.46
Outside School (OUT)	0	3	1.87	0.98
TV News (TV)	0	3	2.36	0.80
Expected Education (EXE)	0	6	3.50	1.42

Level-2 Independent Variables

School and classroom level predictor variables include the means of the home literacy, parent education attainment, mean open climate, mean expected years of education, mean participation in school parliament/council, mean of the time spent outside of the house, and mean of watching TV news broadcasts predictor variables aggregated from the student level to the school and classroom level, and weighted by the student within schools weight. The proportion of females in a class and the number of students who spoke a language at home other than the language are used at level-2. Frequently, these aggregated means work as proxies that represent school compositions and contexts, and are found to be significant predictors. In addition, I included the school climate variable as a predictor at school level, and at the classroom level the degree the teacher obtained and teacher's practice were added. Only one class per school was

surveyed in most of the cases, and these classroom variables were used at the school level. If the school had two teachers/classrooms, the average was used instead.

The school climate variable was created as a composite of the principal's observations of the frequency of bullying, fighting, etc. in the schools and the higher the value, the worse the climate. In the original data set, the principals' observations included the amount of vandalism, drugs, truancy, alcohol, racism, religious intolerance, bullying, and general violence. In creating the school climate variable, a factor analysis was conducted to determine if there was more than one factor in the variables observed. A factor analysis was conducted and it was determined that there was more than one factor, and the racism, religious intolerance, and alcohol observations were not included in the final variable created in order to make sure that the composite scores created from the items are relatively pure indicators of a single construct (see Appendix C for items). This variable is in line with the school safety subscale created in the research of Brand et al. (2008) in their investigation of a school climate variable. The scale for the composite variable is 1-3 with a low value indicating that an event never happened and a high number indicating an event occurred very often. It is recoded to a 0-2 range variable so that a school reported 1=never for all 5 items have the value of 0 for this variable. One limitation of this variable is that it is self-reported by the school principals. Principals might be likely to give incorrect estimates of the amount of times that incidences have occurred in their school.

The variable for teacher's degree was added as control variables. The teacher's degree is coded as 0 for not having a degree in a civics related area and 1 for having a civics related degree. Social studies teachers can be placed in a civics or government classroom without having a degree in a civics content related area.

The teacher practice variable was created as a composite of the teacher's responses of the activity types that they used in their classroom. The original survey asked teachers to respond to how often the teacher chooses the issues on class, how often students worked on projects, studied from textbooks, worked on drill sheets, worked in groups, participated in role plays, how often the teacher asks questions, how often the teacher lectured and includes discussions, and how often students participate in events, with a low value meaning that the activity never occurred and a high value indicating very often. A factor analysis was performed to determine if there was more than one factor in the variables. It was determined that there was more than one factor, so variables were deleted until there was only one factor remaining mainly based on the scree test. The final teacher activity variable included how often students worked on projects, participated in group activities, participated in role plays, participated in events, and how often the teacher included discussions (see Appendix C for detail). The items that constitute this factor include participatory constructs. Doolittle and Hicks (2003) note that it is imperative that the learner must be active in the process of learning, and that they need to construct knowledge. The construct created in our data set included variables that relied more on the learner creating knowledge and experiences within the classroom environment, rather than the instructor presenting knowledge or having the student complete book activities. Again, the original items had the values of 1=never, 2=sometimes, 3=often, and 4=very often, and it was recoded so that the variable as the average of five items ranges from 0-3, where 0 indicates a teacher reported "never" for all the times.

In the original teacher data file, teachers were asked a series of 20 questions related to their confidence in teaching topics within civics. A factor analysis was conducted and was found that 45% of the variance was explained by 1 factor that included all of the questions. Once data

cleaning commenced, cases that had data for 9 of 20 questions were included in the analysis. This was done as teachers in Bulgaria were only asked about 9 of the 20 questions. The original file was coded 1-4 with 4 being confident in the material. For the purpose of this study, a composite was created and recoded with values of 0-3.

The teacher data set also included whether or not teacher's had access to some type of professional development. This variable was originally coded as 1-2 with 2 representing that professional development activities occurred. This variable was recoded as 0-1, with 1 representing participation in professional development activities.

Finally, the open climate variable from level-1 will be aggregated to level-2 models. This variable will be used as the classroom climate measure, and will be used to compare with the teacher reported practice variable. According to Marsh et al. (2002), the school average of student's perception of open classroom climate for discussion is considered to be a school climate variable (level 2) and it needs to be clearly distinguished from the level 1 perception variable. This variable represents the maximum likelihood estimates (MLEs) for a partial credit Rasch model. In using the aggregate open climate variable, it will be possible to compare whether or not what a student perceives is significant, or the teacher's own perception of the way they teach.

Table 3.4

Level-2 (Classroom/School) Descriptive Statistics (J=3443)

	Minimum	Maximum	Mean	Std. Deviation
Mean Civic Test Score (MCIV)	67.62	144.07	99.57	13.60
Mean Open Climate (MOC)	1.66	3.89	2.97	0.31
Mean Parent Education (MPARE)	0.75	6.81	3.78	1.14
Mean Home Literacy (MLIT)	0.00	3.89	2.09	0.83
Mean Home Language (MLANG)	0.00	1.00	0.07	0.15
Proportion Female (MFEM)	0.00	1.00	0.51	0.19
Mean Student Council (MSPAR)	0.00	1.00	0.32	0.24
Mean Outside (MOUT)	0.16	3.00	1.88	0.50
Mean TV News (MTV)	0.00	3.00	2.35	0.36
Mean Expected Education (MEXE)	1.00	5.75	3.09	0.82
Teacher's Degree (DEG)	0.00	1.00	0.71	0.42
In-Service Training (INSER)	0.00	1.00	0.46	0.46
Teacher's Confidence (TCON)	0.00	3.00	1.86	0.36
Teacher's Practice (TPRA)	0.00	3.00	1.38	0.51
School Safety Climate (SAFE)	0.00	2.00	0.65	0.33

Level-3 Independent Variables

At the national level, some of the variables from level-2 will be aggregated and their national averages weighted by the school weights will be added to the level-3 models. These variables include the mean education, mean home literacy, mean open classroom climate, and mean home language, and represent the national means that can represent characteristics of each nation. Other level 2 variables will also be aggregated from the school and classroom level to the national level. In addition to the variables listed above, the Gini index measured in 1998, the Gross National Product (GNP) per capita in 1998 (U.S. $), adult literacy percentage, public expenditure on education, and number of internet hosts. A variable based on democratic system will be created using information from the CIA World Factbook (2010) and the United Nations (United Nations Development Programme, 2000) reports.

According to the World Bank, the Gini index is a measure of income distribution within an economy. The Gini index is based on a Lorenz curve, with ranges from 0-100. A Gini index with a value of 0 would mean that there is perfect income equality within the country, which means that all persons in the nation have the same income, and a score of 100 would indicate that there is perfect income inequality, meaning that one person within the country would have all of the income with nobody else having any income. When a country has a Gini index that is a low score, there is less income inequality in that country. Nations that have higher income inequality would be expected to see lower civic knowledge scores. Sylwester (2002) used the Gini index as a level of income distribution and showed that countries that spend more on public education will have a lower value of the Gini coefficient, which indicates a higher level of income distribution.

The public expenditure spent on education is a percentage of the Gross National Product (GNP) per capita (1998), which will allow for a cross-national comparison. Countries that have a higher GNP per capita are more likely to have higher levels of civic knowledge, as they are traditionally more stable governments and are already developed societies. This was selected as a variable after reviewing the literature on economic growth. According to Blankenau and Simpson (2004), the level of spending in education will have an impact on overall growth. As countries spend more, the country will be able to expand and be more politically stable. This political stability can in turn lead to a greater understanding of civics and a higher civic knowledge test score for students.

The Human Development Index (HDI) in 1998 is a composite measure that was developed by the United Nations Human Development Report. The composite measures 3 dimensions: life expectancy at birth, the mean years of education, and a standard of living

dimension which was created using gross national income (United Nations Human Development Report, 2000). According to the UN, the HDI is a better indicator of how a country is doing because it places an emphasis on what people are doing within a country, not just the economic growth that is occurring.

Another variable at the national level is the democratic system variable. This variable measures whether or not a country is an emerging democracy or not. As mentioned previously in the literature review, the changing world has created a challenge for teaching civics. The democratic system variable (DS) takes on an value of 0 if the country is an emerging democracy or developing, i.e., the country was not a democracy before 1989, and a value of 1 if the country is an old democracy, i.e., the government system was a democracy before 1989. Older populations have to learn about new forms and styles of government with the collapse of the Soviet Union in the early 1990s and with countries gaining independence or with new governments through coups. In creating the government style variable, I will research whether or not a government is an older democracy or an emerging government or other system. An older democracy will be classified as a system that was a democracy before 1989. This year was selected because it saw the fall of the Berlin Wall and Eastern European nations began to stage revolutions overthrowing their communist regimes. It is important to note that this study includes Germany, which presents issues in classification. For the sake of this study, Germany will be categorized as a new democratic system as they have had to deal with issues of reunification with the collapse of the communist government in East Germany. As described in the literature review, questions arose as to whether or not the East German population would be able to assimilate into West German society. The East Germans were behind their democratic counterparts and had to relearn how to be a citizen in a government, which now was a unified

democracy (Oswald, 1999). For the purpose of this study, Germany is classified as one country, and it is not possible to tell whether or not the student is from the former East Germany or West Germany. Because of this, Germany will be included in the analysis as a newer democratic system.

As a measure of the population that was literate at the national level, a variable of the adult literacy rate was added at the national level. This measure serves as a guide to understanding the characteristics of the nation.

The final level 3 variable for the models is the number of internet hosts per 1000 people. This variable is used as a measure of how readily access to information through the internet was in 1998. This variable can show whether or not there was widespread access within the nation to internet and information.

In addition to the variables listed above, two more variables, seats in parliament held by women and voter-turn out, were included at the national level, but were not included in the HLM models. These variables were not included in the original analysis as they had missing data for Hong Kong. Because of this, all information related to Hong Kong would be deleted from all levels of the model. A sensitivity analysis using these two variables was conducted, and the univariate descriptive analysis can be found in Appendix D. The percent of women that held seats in parliament is a good indicator of the status of women and gender equality in a country, and the voter-turn out can be a good representation of how active people are in their government system.

Table 3.5

Level-3 (Nation) Descriptive Statistics (K=27)

	Minimum	Maximum	Mean	Std. Deviation
National Mean Civic Score (NMCIV)	88.31	109.23	99.83	5.90
National Mean Open Climate (NMOC)	2.66	3.11	2.92	0.14
National Mean Parent Education (NMPARE)	2.48	4.42	3.60	0.57
National Mean Home Literacy (NMLIT)	1.25	3.06	2.23	0.49
National Mean Home Language (NMLANG)	0.01	0.25	0.08	0.06
National Mean Female (NMFEM)	0.47	0.53	0.51	0.01
National Mean School Council (NMSPAR)	0.03	0.60	0.27	0.04
National Mean Outside (NMOUT)	0.69	2.27	1.62	0.38
National Mean TV News (NMTV)	2.02	2.61	2.34	0.17
National Mean Expected Education (NMEXE)	2.43	3.75	3.11	0.39
National Mean Teacher's Degree (NMDEG)	0.07	1.00	0.56	0.29
National Mean In-Service Training (NMINSER)	0.01	1.00	0.38	0.26
National Mean Teacher's Confidence (NMTCON)	1.29	2.12	1.79	0.20
National Mean Teacher's Practice (NMTPRA)	1.12	1.96	1.35	0.21
National Mean School Safety Climate (NMSAFE)	0.32	1.07	0.72	0.18
GINI (GINI)	23.00	53.70	32.69	8.50
GNP per capita (GNP)	1220.00	39980.00	14952.22	12009.28
Human Development Index (HDI)	0.77	0.93	0.86	0.06
Democratic System (DS)	0.00	1.00	0.56	0.51
Adult Literacy Rate (in %) (ALIT)	91.40	99.80	98.22	2.02
Public Education Expenditure (PEXP)	2.90	8.30	5.13	1.56
Internet Hosts (IH)	1.10	112.80	22.79	29.04

From the description of the variables presented above, the independent variables were categorized into 3 different levels, the student level, school/classroom level, and the nation level predictors. The independent variables that were used in this study are summarized in Table 2 at each level.

Methodology

The data from the CIVED study have a nested structure, with students nested within schools, which in turn nested within nations. When data is nested as is that case for the CIVED dataset, hierarchical linear modeling (HLM) is the most effective way to analyze the data. This type of modeling will be able to investigate the effects of the student level, school/ classroom level, and national level variables listed earlier in this chapter on a student's civic knowledge score appropriately. Three-level HLM were specified in answering the 5 research questions that are presented in this study. In order to find the best fitting HLM model for the research questions addressed by this study, models will be developed step by step in the following way: First, in determining whether HLM is necessary for the data, a fully unconditional model will be fitted. The unconditional model is a model with no level-1, level-2 or level-3 predictors. This analysis will check whether significant variability exists at the school level (L-2) and the nation level (L-3) to proceed to the next step. If the variance in school level and nation level variability is significant, use of HLM over linear regression is justified. Intra class correlations (ICCs) that will be obtained from the unconditional model, will inform us about how much variance exists at each level and the extent to which data clustering occurs at each school and national level respectively. Results for the intraclass correlations (ICC) will be included in Chapter 4.

After finding the variability between schools and nations, student level predictors will be added to the model. Analysis will be performed to identify the significant level-1 predictors. Once the significant level-1 predictors have been identified, level-2 predictors will then be included. Finally, the level-3 predictors will be added to find the best fit model. Results for all key models are presented in Chapter 4.

Summary

In this chapter, the variables to analyze the relationship between student level, school/classroom level, nation level variables and civic knowledge scores were described at each level including the classroom/school and nation variables that will be created as the aggregated weighted averages from the respective lower levels. These variables, in addition to the inherent variables at each level, would capture the composition, and contexts, as the characteristics of each higher level units. The plan for analysis, which included the sampling method, weighting, the variables used, and the methodology were presented.

Chapter 4: Results

This study was conducted to investigate the relationship among student civic knowledge scores and several different variables each at the student level, classroom level/school levels, and national level. In order to accomplish this task, the independent variables of interest at each level were examined via multilevel model. That is student level (level 1) predictors such as, two elements of socioeconomic status (a student's parental education level, their home literacy, student's perception of an open classroom climate, gender, the language spoken at home, participation in school parliament/council, time spent outside the house when not in school, TV news viewing, and years further of expected education, were entered to the level-1 model via group mean centering first. Second, several teacher/school level variables, such as the mean open climate, school mean parent education level, mean home literacy, mean language spoken at home, proportion female, proportion of students participating in school parliament, mean time spent outside, mean TV new viewership, mean years further of expected education, school safety climate, teacher's degree in a civics related field, teacher's confidence in material, teacher's practice, and amount of in-service training, were entered to the model on top of the above student level variables. Third, national level variables were added to the model to investigate what countries are doing and if it is associated with students' civic knowledge scores and whether it can explain between nations variation. The national level variables include: national mean open climate, national mean home literacy, national mean parent education, national mean home language, national mean school parliament participation, nation mean time outside, national mean TV news, national mean years further of expected education, national mean teacher's practice, national mean teacher's confidence, national mean in-service training, national mean school safety climate, Gini index, Gross National Product (GNP), Human Development Index

(HDI), democratic system, adult literacy rate, expenditure rate on education, and number of internet hosts. These variables were all described in Chapter 3 and their univariate descriptive analyses were presented. This chapter begins with bivariate descriptive analyses in terms of correlation coefficients were then conducted to explore the associations between predictors of civics knowledge test scores, which was established from a review of literature. Hierarchical Linear Models (HLM) were then fitted to explain the relationships between student-level, school-level, and nation-level predictors and civics knowledge scores. In this chapter, the descriptive analyses are presented first, followed by the results of the HLM models, in an effort to address the research questions that were originally raised in Chapter 1:

1. What countries are doing better in a comparison of mean civic knowledge scores, and how much variation is accounted for at the national level?
2. If there is a significant difference in the civic knowledge scores between countries, what are the national characteristics that can explain the variation among nations? Several factors that will be examined are the national averages of parents' education and the home literacy environment of the students, the national average of school safety environment of the schools, the national average of students perception of an open classroom climate, the national average of the individual teachers' practice, the gross national product (GNP) of each nation, the government system of the country in question, i.e. whether or not they are a new democracy or have been democratic for a period of time, and finally the status of women in each society, number of internet hosts, GINI coefficient, HDI, adult literacy rate, and public expenditure in education.
3. At the school level, how much variation of civic knowledge scores exists between schools within nations? If there is significant variation between schools, what are the

school level characteristics that can explain such variation and how much can they explain?

4. Is there any relationship between civics knowledge and teachers practice? Does this significantly vary across nations? If there is significant variation, what national characteristics are associated with it?
5. Is there any relationship between civics knowledge and open classroom climate for discussion (measured by the classroom average of student's perception)? Does it significantly vary across nations? If there is significant variation, what national characteristics are associated with it?

These research questions will be addressed by fitting 7 different HLM models that were built to investigate the effects of student-, classroom/school-, and nation-level predictors on civic knowledge scores. This chapter will be presented in two parts, (a) Part 1 will provide bivariate descriptive analyses of the variables, and (b) Part 2 will build the HLM models that are needed to answer the research questions.

Descriptive Analyses

As described in Chapter 3, there are 3 levels of units for analysis in this study, students, classrooms/schools, and the nations. The previous chapter described the variables that would be used at each level and gave univariate descriptive statistics for the variables at each level.

Level-1 (student level) predictors.

The student level variables included in this analysis were student's perception of an open classroom climate (*OC*), home literacy (*LIT*), parents education (PARE), gender(female) (*FEM*), home language (*LANG*), school council (*SPAR*), TV news (*TV*), the amount of time spent outside

(*OUT*), and expected education (*EXE*). These variables appeared in the literature to have had associations with student's education attainment, specifically with civics knowledge.

In order to gain some insights on the relationship between our level-1 predictors and civics knowledge scores that may appear as significant in more rigorous, but complex multilevel model, simpler bivariate descriptive analyses were conducted. Table 4.1 shows the correlation matrix among the level-1 predictors with the dependent variable (*CIV*).

Table 4.1

Level-1 Correlation Matrix (N=56,570

	CIV	OC	PARE	LIT	LANG	FEM	SPAR	OUT	TV	EXE
CIV	1									
OC	.205**	1								
PARE	.306**	.091**	1							
LIT	.309**	.084**	.401**	1						
LANG	-.109**	-.051**	-.121**	-.143**	1					
FEM	.018**	.146**	-.009*	.028**	-.037**	1				
SPAR	.107**	.087**	.122**	.068**	-.009*	.121**	1			
OUT	-.143**	-.012**	.047**	-.013**	-.013**	-.087**	.054**	1		
TV	.105**	.157**	.032**	.044**	-.014**	-.009*	.068**	-.043**	1	
EXE	.358**	.121**	.319**	.298**	-.069**	.080**	.115**	-.086**	.077**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key:

CIV- score on civic's knowledge instrument

OC- student perception of an open classroom climate

PARE- parent's education

LIT- home literacy

LANG- home language spoken

FEM- gender

SPAR- school parliament participation

OUT- time spent outside the house

TV- TV news viewing

EXE- expected education

Table 4.1 shows that all of the level-1 predictors had a significant correlation at the 0.01 level with the dependent variable, civic test score (*CIV*). As shown in the table, there were several variables that are shown to have a high positive correlation with civics knowledge score (*CIV).* The expected education (*EXE*) has the strongest correlation at 0.358, which is somewhat to be expected. Students who are highly motivated to continue on with their education are more likely to be more motivated and achieve higher scores.

The variables that can often be considered as SES components, the parent's education (*PARE*) attainment and the home literacy environment (*LIT*), were both shown to have a strong positive correlation with civics knowledge scores. This is in line with previous research that shows SES components are strongly correlated with a student's education attainment. The home literacy environment has a positive correlation of 0.309 and the parent's education attainment is positively related at 0.306.

One of my major variables of interest is the student's perception of an open classroom climate (*OC*). As was seen in the case with the parent's education level and the home literacy environment, the variable for the perception of an open classroom climate was found to be positively correlated to the civics knowledge score at 0.205.

Level-2 (Classroom/School) Predictors.

Many of the variables at level-2 were weighted aggregates from level-1. Those were mean student perception of an open classroom climate (*MOC*), mean parent education (*MPARE*), mean home literacy (*MLIT*), mean home language (*MLAN*), mean female (*MFEM*), mean school parliament participation (*MSPAR*), mean time spent outside (*MOUT*), mean TV news (*MTV*), and mean years further of expected education (*MEXE*). Additional variables were added to the classroom/school level, mainly from the teacher data provided by IEA. These variables that

teachers provided were the teacher's practice (*TPRA*) , which was self-reported, teacher's confidence (*TCON*), whether or not the teacher had a degree in a civics related field (*DEG*), in-service training (*ISER*), and school safety climate (*SAFE*), taken from the principal file, a variable based on school safety. Table 4.2 shows the correlation matrix of level-2 variables. In Table 4.2, classroom/school civics score (*MCIV*) was included first so that we can get some ideas about how each level-2 independent variable was associated with the dependent variable.

Table 4.2

Level-2 Correlation Matrix (J=3443)

	MCIV	MOC	MPARE	MLIT	MLAN	MFEM	MSPAR	MOUT	MTV	MEXE	DEG	INSER	TCON	TPRA	SAFE
MCIV	1														
MOC	.470**	1													
MPAR	.452**	.218**	1												
MLIT	.444**	.292**	.578**	1											
MLAN	-.085**	-.013	-.129**	-.209**	1										
MFEM	.152**	.140**	-.027	-.021	-.086**	1									
MSPAR	.071**	-.005	.078**	-.204**	.069**	.186**	1								
MOUT	-.243**	-.041*	-.020	-.116**	-.072**	.006	.243**	1							
MTV	.097**	.166**	.016	-.116**	-.006	.199**	.171**	.069**	1						
MEXE	.483**	.295**	.565**	.499**	-.131**	.122**	-.016	-.160**	.120**	1					
DEG	.112**	.099**	.075**	.123**	-.047**	.022	.007	.095**	.060**	.123**	1				
ISER	.191**	.130**	.138**	.158**	-.034*	.032	-.135**	-.094**	.039*	.250**	.403**	1			
TCON	.113**	.172**	.162**	.157**	.031	-.055**	.037*	.001	-.049**	.163**	.139**	.134**	1		
TPRA	.123**	.228**	.087**	.063**	-.049**	-.029	-.141**	-.086**	.158**	.340**	.225**	.381**	.189**	1	
SAFE	.027	.035*	.124**	.277**	-.014	-.098**	-.186**	.050**	-.123**	.174**	-.012	.028	.072**	.015	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key:

MCIV- mean civics scores

MOC- mean student perception of an open classroom climate

MPARE- mean parent education level

MLIT- mean home literacy environment

MLAN- mean home language

MFEM- proportion of females in the school

MSPAR- mean school parliament participation

MOUT- mean time spent outside the house
MTV- mean TV news viewing
MEXE- mean years further of expected education
DEG- teacher's degree in a civics field
ISER- participation in in-service training
TCON- teacher's confidence in civics related topics
TPRA- teacher's practice
SAFE- school safety

Table 4.2 shows that most of the variables at level-2 have a statistically significant correlation with school mean civic test score (*MCIV*) at the 0.01 level. It is important to note that the variable for school safety (*SAFE*) was not significantly correlated to the mean civic knowledge score (*MCIV*) for the classroom/school.

As was shown in the level-1 matrix the mean expected education (*MEXE*) had the strongest positive correlation to the mean civic test score (0.483). Again the student's mean perception of an open classroom climate (*MOC*) had the second strongest positive correlation (0.470), followed by mean parent education (*MPARE*) (0.452) and mean home literacy (*MLIT*) (0.444*)*. As discussed in the literature, the student's mean perception of open classroom climate of what is going on in the classroom might be more indicative of results, rather than the teacher's reported variable of the practice (*TPRA*) (0.123), though it is also statistically significant ($p \leq 0.01$) positively correlated with mean civics test scores.

There were two variables present that had a negative correlation to the mean civics knowledge score. The time spent outside of the home (*MOUT*) (-0.243) showed that as students spent more time outside of the home, mean civics knowledge scores decreased. The IEA technical report indicated that this variable represented students might engage in dangerous behavior, however this time spent outside could be related to other activities such as sports which could take away from time needed to focus on class material. Data provided by the IEA did not indicate how this time was spent outside, only just the amount of time outside of the home. The other variable with a negative correlation was the mean home language of the school (*MLAN*) (-0.085). This was be expected as the number of homes that did not speak the language of the test increased, the mean civics knowledge score on the instrument decreased.

Level-3 (Nation) Predictors

The variables presented in the level-2 model were aggregated to level-3, and several nation level variables were added to the analysis. The variables aggregated from level-2 to level-3 were national mean perception of an open classroom climate (*NMOC*), national mean parent education level (*NMPARE*), national mean home literacy (*NMLIT*), national mean home language (*NMLANG*), national mean proportion female (*NMFEM*), national mean school council participation (*NMPAR*), national mean time spent outside (*NMOUT*), national mean TV news viewing (*NMTV*), national mean years further of expected education (*NMEXE*), national mean teacher's degree (*NMDEG*), national mean in-service (*NMINSER*), national mean teacher's confidence (*NMTCON*), national mean teacher's practice (*NMTPRA*), and national mean school safety (*NMSAFE*). These inherent nation level variables included the GINI coefficient in 1998(*GINI*), which serves as a measure of inequality within a country, the HDI in 1998 created by the United Nations, which is a composite index that reflects three basic dimensions, such as longevity, knowledge, and standard of living (*HDI*), the GNP per capita in 1998 US $ (*GNP*), democratic system that was present (*DS*), adult literacy rate (*ALIT*), expenditure on public education as % of GNP (*PEXP*), and number of internet hosts per 1000 people in 1998 (*IH*). The results for the correlation matrix are shown in Table 4.3. In Table 4.3, national mean civics score (*NMCIV*) was included first so that we can get some ideas about how each level-3 independent variable was associated with the dependent variable.

Table 4.3

Level-3 Correlation Matrix (K=27)

	NMCIV	NMOC	NMPARE	NMLIT	NMLAN	NMFEM	NMSPAR	NMOUT	NMTV	NMEXE	NMDEG	NMINSER	NMTCON	NMTPRA	NMSAFE	GINI	GNP	HDI	DS	ALIT	PEXE	IH
NMCIV	1																					
NMOC	.42*	1																				
NMPARE	.10	-.02	1																			
NMLIT	.09	.06	.41*	1																		
NMLAN	-.12	.03	.08	-.20	1																	
NMFEM	.33	.19	.18	.28	.05	1																
NMSPAR	.28	.25	-.01	-.12	-.21	-.11	1															
NMOUT	-.07	.47*	.15	.25	-.09	-.16	.26	1														
NMTV	.12	.06	-.10	-.14	-.33	.28	.09	-.09	1													
NMEXE	.24	-.05	.30	.06	-.14	.13	-.01	-.29	.19	1												
NMDEG	.49**	.25	.22	.23	-.10	.09	.13	.36	-.14	-.06	1											
NMINSER	.25	-.01	.25	.24	-.14	-.05	-.09	.06	-.14	.23	.47*	1										
NMTCON	.31	.67**	.07	.10	-.04	-.07	.37	.46*	.08	-.20	.46*	.17	1									
NMTPRA	-.06	.09	.05	-.24	-.23	-.27	.05	-.14	-.01	.49**	-.12	.29	-.10	1								
NMSAFE	.20	.06	.07	.51**	.02	.40*	-.29	-.17	-.42*	.13	-.02	.07	-.18	-.13	1							
GINI	-.16	.05	.00	-.54**	.12	-.190	.09	-.10	-.10	.31	-.32	-.05	-.21	.41*	-.21	1						
GNP	.36	.38	-.37	.19	.14	.03	.09	.10	-.44*	-.21	.17	.02	.17	-.16	.57**	-.21	1					
HDI	.49**	.39*	-.26	.19	.05	.17	.12	-.01	-.37	-.10	.22	-.05	.22	-.17	.66**	-.29	.89**	1				
DS	.31	.41*	-.32	-.18	.10	.10	.34	.02	-.24	-.03	.04	-.13	.16	-.01	.40*	.14	.71**	.79**	1			
ALIT	-.01	.03	.53**	.70**	.06	.03	-.22	.46*	-.15	-.03	.43*	.37	.23	-.11	.17	-.55**	.02	-.02	-.41*	1		
PEXE	.07	.18	-.09	.56**	-.13	.05	-.04	.28	-.14	-.12	.05	.26	.18	-.14	.35	-.53**	.36	.31	.12	.30	1	
IH	.38*	.31	-.01	.39*	-.14	-.04	.15	.31	-.43*	.07	.33	.33	.32	-.11	.51**	-.14	.70**	.65**	.50**	.22	.54**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Key:

NMCIV- national mean civics score

NMOC- national mean student perception of an open classroom climate

NMPARE- national mean parent education level

NMLIT- national mean home literacy

NMLAN- national mean language at home

NMFEM- national mean proportion of female

NMSPAR- national mean school parliament participation

NMOUT- national mean time spent outside

NMTV- national mean TV news viewing
NMEXE- national mean years further of expected education
NMDEG- national mean teacher's degree
NMINSER- national mean in-service
NMTCON- national mean teacher's confidence
NMTPRA- national mean teacher's practice
NMSAFE- national mean school safety
GINI- GINI coefficient
GNP- GNP per capita in 1998 (U.S. $)
HDI- Human Development Index
DS- democratic system
ALIT- adult literacy rate
PEXE- expenditure percentage on education (as % of GNP)
IH- number of internet hosts per 1000 people in 1998

The results from Table 4.3 show that at the nation level, there are only four variables that show a statistically significant correlation to the national mean civics knowledge score (*NMCIV*). The national mean open climate (*NMOC*) (0.42, $p \leq 0.05$), national mean teacher's degree *(NMDEG*) (0.49, $p \leq 0.01$), the Human Development Index (*HDI*) (0.49, $p \leq 0.001$), and the number of internet hosts per 1000 people (*IH*) (0.38, $p \leq 0.05$). Variables such as national mean proportion female (*NMFEM*) (0.33), national mean teacher's confidence (*NMTCON*) (0.31), democratic system (*DS*) (0.31), national mean school council participation (*NMSPAR*) (0.28), and national mean expected education (*NMEXE*) (0.24) had noticeable size or correlation, but they were not statistically significant at the 0.5 level (two-tailed) because of the small sample size ($K = 27$) at the national level.

The variables that were found to have statistically significant correlation at levels-1 and-2 are no longer significant when aggregated to the national level. For example, the national mean home literacy (*NMLIT*) (0.09), national mean of parent's education (*NMPARE*) (0.10) have almost correlations with the nation mean civics knowledge score (*NMCIV*), and national mean expected education (*NMEXE*) (0.24), whose corresponding variables had the highest correlations, are shown to have much lower correlation with our national mean civics knowledge score, with no statistical significance, although this could be because of the small sample size at the national level ($K = 27$).

As mentioned in the Chapter 3, a sensitivity analysis was conducted by ($K = 26$) by excluding Hong Kong (HK) since there was information not available for Hong Kong, that included the percent of seats held by women in parliament and the voter turn-out at the last elections prior to 2000, in addition to the national level variables used for ($K = 27$) countries/regions. The correlation matrix for this analysis can be found in Appendix E. It was

found that neither of the two variables added, % of women in parliament and the voter turn-out at the last election had a statistically significant correlation with the national mean civics knowledge score.

Hierarchical Linear Models (HLM)

As mentioned in the beginning of this chapter, in order to answer the research questions posed for the present study, a set of three-level hierarchical linear models (HLMs), which were suitable since the data were doubly nested, i.e., students were nested within classrooms/schools, which in turn were nested within nations, and the dependent variable, civics test scores, was continuous. The notion of a taxonomy of statistical models, (page 105 in Singer and Willett, 2003), a systematic path for addressing the research questions, were utilized to build the models. Particularly, after examining the variability existed at each level by unconditional model (Raudenbush & Bryck, 2002), HLMs were built from the lowest level (in this study, students) one at a time, and within each level, the key predictors of interest, the ones that were relevant to the present study, were included in the model, and then a set of covariates were added to the model for control purposes. Once the model for the level of focus was completed, then the next level was constructed (in this study, classrooms/schools) and performed the same procedure that was done at the lower level. Then, the nation level (level-3) was constructed using the same procedure, and reached the final model. The detailed modeling procedure and the results are presented in the following.

Model A- Unconditional Model

To build a hierarchical linear model for student's civic knowledge score, an unconditional model was fitted to the data. First, the unconditional model (Model A) was run to determine how much of the variance was explained at each level of the model. The equation for the unconditional model is represented as follows:

Equation 1. *Equations for Unconditional Model (Model A)*

Level-1 Model:

$$CIV_{ijk} = \pi_{0jk} + e_{ijk}.$$

Level-2 Model:

$$\pi_{0jk} = \beta_{00k} + r_{0jk}.$$

Level-3 Model:

$$\beta_{00k} = \gamma_{000} + u_{00k}.$$

In this unconditional model, CIV_{ijk} represents the civics knowledge score of student *i* in a classroom/school *j* in county *k.* The intercept for classroom/school *j* in country *k,* which is the true mean civics knowledge score for classroom/school *j* in country *k,* is represented by π_{0jk}. The level-1 random error is represented by e_{ijk}, with the assumption that e_{ijk} are independent, and identically distributed (i.i.d.) with normal distribution that has mean of 0 and variance σ^2, which can be denoted $e_{ijk} \sim N(0,\sigma^2)$. At level-2, β_{00k} is the intercept for country *k,* with r_{0jk} representing level-2 random effect. The assumption at level-2 is that the r_{0jk} in general have a multivariate normal distribution and with a mean vector of 0 and a covariance matrix τ_π, that has a maximum dimension of $(P+1)*(P+1)$ when *P* predictors added at level-1 later, but in the unconditional model above, it is r_{0jk} i.i.d. $N(0, \tau_{\pi 00})$. At level-3, γ_{000} is the intercept term in the country-level model for β_{00k}, which represents the true national mean civics knowledge score for country *k.* In this model, u_{00k} represents the level-3 random effect, and assumes that the *u*'s have a multivariate normal distribution and with a mean vector of 0 and a covariance matrix τ_β, in general, but again in the unconditional model above, the assumption is $u_{00k,}$ i.i.d. $N(0, \tau_{\beta 00})$.

This model found that 61.7% of the variability in civics knowledge scores was over measurements within students, 29.9% of the variability in civics knowledge scores was over

measurements within classrooms/schools, and 8.4% of the variability in civics scores was at the nation level, because σ^2=283.06, $\tau_{\pi 00}$=137.25, and $\tau_{\beta 00}$=38.53 (see Table 4.5).

Later models will build on this unconditional model by adding predictors at each of the levels. These predictors will be added starting at the student level and working towards completing a model that includes level-3 predictors. At each level, all variables from the level being built are added. Variables are then dropped if they are found to not be statistically significant by deviance test.

The results are presented for each model created in Table 4.4. This table shows the coefficients for each of the predictors in the model, and denotes whether or not the variable was statistically significant. Note that variables at level-1 are considered significant at level 0.001, level-2 at 0.05, and 0.1 at level-3 because of the different sample sizes for the levels. In addition, Table 4.5 presents the pseudo-R^2 for each level of all of the models. The pseudo-R^2 is used to examine the proportion of explained variance by including independent variables compared to Model A, the unconditional growth model, or the appropriate reference models that had the same model structure in other parts of the models.

Model B- Level-1 Predictors Model

After completing the unconditional model, level-1 predictors, all of which were group-mean centered to in order to ensure that the regression coefficients represent the unbiased relationship between the predictors and the dependent variable at the level of interest, were fitted to the model. Also, whether or not each level-1 coefficient should be kept as random or fixed was examined and determined by deviance test. As mentioned above, the predictor variables that were found significant at the 0.001 level will be discussed because of the extremely large sample size of students (N = 56,579). All results for the model can be found in column 3 of Table 4.4.

The model described is the final Level-1 predictors model. The equations for the model is represented as follows:

Equation 2. *Equations for Level-1 Predictors Model (Model B)*

Level-1 Model:

$CIV_{ijk} = \pi_{0jk} + \pi_{1jk}*(OC_{ijk}) + \pi_{2jk}*(PARE_{ijk}) + \pi_{3jk}*(LIT_{ijk}) + \pi_{4jk}*(LANG_{ijk}) + \pi_{5jk}*(FEM_{ijk}) + \pi_{6jk}*(SPAR_{ijk}) + \pi_{7jk}*(OUT_{ijk}) + \pi_{8jk}*(TV_{ijk}) + \pi_{9jk}*(EXE_{ijk}) + e_{ijk}.$

Level-2 Model:

$\pi_{0jk} = \beta_{00k} + r_{0jk}$
$\pi_{1jk} = \beta_{10k} + r_{1jk}$
$\pi_{2jk} = \beta_{20k} + r_{2jk}$
$\pi_{3jk} = \beta_{30k} + r_{3jk}$
$\pi_{4jk} = \beta_{40k} + r_{4jk}$
$\pi_{5jk} = \beta_{50k} + r_{5jk}$
$\pi_{6jk} = \beta_{60k} + r_{6jk}$
$\pi_{7jk} = \beta_{70k} + r_{7jk}$
$\pi_{8jk} = \beta_{80k} + r_{8jk}$
$\pi_{9jk} = \beta_{90k} + r_{9jk}.$

Level-3 Model:

$\beta_{00k} = \gamma_{000} + u_{00k}$
$\beta_{10k} = \gamma_{100}$
$\beta_{20k} = \gamma_{200} + u_{20k}$
$\beta_{30k} = \gamma_{300} + u_{30k}$
$\beta_{40k} = \gamma_{400} + u_{40k}$
$\beta_{50k} = \gamma_{500} + u_{50k}$
$\beta_{60k} = \gamma_{600} + u_{60k}$
$\beta_{70k} = \gamma_{700} + u_{70k}$
$\beta_{80k} = \gamma_{800} + u_{80k}$
$\beta_{90k} = \gamma_{900} + u_{90k}.$

The model found several variables were significant at level-1. The variable created for student perception for an open classroom climate (OC) was found to have a statistically significant positive association with civics knowledge scores (*CIV*) (γ_{100}=2.44, $p \leq 0.001$). This shows that, on average, for every unit increase that students felt there was an open classroom climate for discussion, there was a positive increase in civics knowledge scores of 2.44 points.

The model also shows that the variance of student perception of classroom climate was also statistically significant (var(r_{1jk})=20.82). This shows that it is likely to find schools that would exhibit statistically significant positive and negative effects of student perception of an open classroom climate on civics knowledge scores because a 95% plausible interval is (-6.50, 11.38), which can be obtained by $2.44 \pm 1.96\sqrt{20.82}$.

The model also found other level-1 variables statistically significant. In the model, home literacy (*LIT*) ($\gamma_{300} = 2.20$, $p \leq 0.001$), home language (*LAN*) ($\gamma_{400} = -6.92$, $p \leq 0.001$), and expected education (*EXE*) ($\gamma_{900} = 2.66$, $p \leq 0.001$) to be statistically significant. The variable for home literacy and years further of expected education both have a statistically significant positive effect on students' civic scores, while home language was shown to have a negative association with scores. These results were expected. Other level-1 variables were found to be significant at the levels of $p \leq 0.1$ or lower, but did not meet the threshold of our level-1 of $p \leq 0.001$. Interesting to note is that parent education was found to be not statistically significant at any level (*PARE*, $\gamma_{200} = 0.57$, se = 0.54, p-value (two-tailed) = 0.301).

In terms of variance component parameters, in Model B, it was found that many of the level-1 variables had slopes that were found to have statistically significant random slopes. The slopes for home language (var(r_{4jk}) = 21.54), gender (female) (var(r_{5jk}) = 40.59), school council participation (var(r_{6jk}) = 56.19), time spent outside of school (var(r_{7jk}) = 11.40), TV news viewing (var(r_{8jk}) = 7.94), and years further of expected education (var(r_{9jk}) = 12.33) all showed statistically significant variation between schools. Once again, this fact, combine with its respective point estimate of the fixed effects, shows that it is possible to see that it would be possible to see either positive or negative differences in civics knowledge scores between classrooms/schools.

While the variable for parent education was found not to be statistically significant, it did have a statistically significant random slope (var(r_{2jk}) = 5.73, $p \leq 0.001$). This means that while the model did not find that the education level of students' parents did not have statistically significant higher civics scores, it is possible to find that there are schools that would show statistically significant either positive or negative associations between the education level of parents and civics knowledge scores.

Results for Model B show that there is also variation between nations with our level-1 variables. Parent education (var(u_{20k}) = 1.54), home literacy (var(u_{30k}) = 1.32), home language (var(u_{40k}) = 6.89), gender (female) (var(u_{50k}) =5.05), school council participation (var(u_{60k}) = 1.83), time spent outside (var(u_{70k}) = 2.59) TV news viewing (var(u_{80k}) = 0.33), and years further of expected education (var(u_{90k}) = 1.82) all showed statistically significant variation between nations. Again, these results show that it is possible to see significant variation between nations for the regression coefficient for each L-1 predictors accounted for.

In Table 4.5, the results for the amount of variance explained at each level is presented. As can be seen in the table, the level-1 pseudo R^2 (R^2_{L-1}) for Model B was 46.31%. This value means that 46.31% of the original student level variance for civics knowledge test score was explained by the student characteristics of the perception of an open classroom climate, parent education, home literacy, language spoken at home, whether or not the student was female, participation in student council, time spent outside of home, watching TV news broadcasts, and years further of expected education[1].

[1] For level-2 and level-3 variance, computing similar pseudo R^2 does not make sense for Model B because the variance –covariance structures are different between Model A and Model B.

Model C- Level-2 Predictors Model

Once the Level-1 model was complete, as shown in Model B, the level-2 predictors were fitted to the data to develop Model C. Modeling was performed only for the level- 1 intercept, π_{0jk}, since for the teacher/school level knowing what predictors can explain between schools civics test score variation was only the research question of interest in the present study. After the level-2 predictors were included for the model, the variability of the slopes for these predictors at level-3 were examined via deviance test. It was found that 5 out of 13 slopes needed to be random. These random slopes were the slopes for mean student perception of open classroom climate (*MOC*), mean home language (*MLAN)*, mean TV news (*MTV*), mean expected education (*MEXE*), and school safety (*SAFE*). The results for Model C can be found in the fourth column of Table 4.4. For this model, variables at level-2 were considered significant at the $p \leq 0.05$ level. The model described below is the final Level-2 predictors model, which is referred to as Model C. The equations for the model are as follows:

Equation 3. *Equations for Level-2 Predictors Model (Model C)*

Level-1 Model:

$$CIV_{ijk} = \pi_{0jk} + \pi_{1jk}*(OC_{ijk}) + \pi_{2jk}*(PARE_{ijk}) + \pi_{3jk}*(LIT_{ijk}) + \pi_{4jk}*(LAN_{ijk}) + \pi_{5jk}*(FEM_{ijk}) + \pi_{6jk}*(SPAR_{ijk}) + \pi_{7jk}*(OUT_{ijk}) + \pi_{8jk}*(TV_{ijk}) + \pi_{9jk}*(EXE_{ijk}) + e_{ijk}.$$

Level-2 Model:

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}*(MOC_{jk}) + \beta_{02k}*(MPARE_{jk}) + \beta_{03k}*(MLIT_{jk}) + \beta_{04k}*(MLAN_{jk}) + \beta_{05k}*(MFEM_{jk}) + \beta_{06k}*(MSPAR_{jk}) + \beta_{07k}*(MOUT_{jk}) + \beta_{08k}*(MTV_{jk}) + \beta_{09k}*(MEXE_{jk}) + \beta_{010k}*(DEG_{jk}) + \beta_{011k}*(INSER_{jk}) + \beta_{012k}*(TCON_{jk}) + \beta_{013k}*(TPRA_{jk}) + \beta_{014k}*(SAFE_{jk}) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + r_{1jk}$$
$$\pi_{2jk} = \beta_{20k} + r_{2jk}$$
$$\pi_{3jk} = \beta_{30k} + r_{3jk}$$
$$\pi_{4jk} = \beta_{40k} + r_{4jk}$$
$$\pi_{5jk} = \beta_{50k} + r_{5jk}$$
$$\pi_{6jk} = \beta_{60k} + r_{6jk}$$
$$\pi_{7jk} = \beta_{70k} + r_{7jk}$$

$\pi_{8jk} = \beta_{80k} + r_{8jk}$
$\pi_{9jk} = \beta_{90k} + r_{9jk}$.

Level-3 Model:

$\beta_{00k} = \gamma_{000} + u_{00k}$
$\beta_{01k} = \gamma_{010} + u_{01k}$
$\beta_{02k} = \gamma_{020}$
$\beta_{03k} = \gamma_{030}$
$\beta_{04k} = \gamma_{040} + u_{04k}$
$\beta_{05k} = \gamma_{050}$
$\beta_{06k} = \gamma_{060}$
$\beta_{07k} = \gamma_{070}$
$\beta_{08k} = \gamma_{080} + u_{08k}$
$\beta_{09k} = \gamma_{090} + u_{09k}$
$\beta_{010k} = \gamma_{0100}$
$\beta_{011k} = \gamma_{0110}$
$\beta_{012k} = \gamma_{0120}$
$\beta_{013k} = \gamma_{0130}$
$\beta_{014k} = \gamma_{0140} + u_{014k}$
$\beta_{10k} = \gamma_{100}$
$\beta_{20k} = \gamma_{200} + u_{20k}$
$\beta_{30k} = \gamma_{300} + u_{30k}$
$\beta_{40k} = \gamma_{400} + u_{40k}$
$\beta_{50k} = \gamma_{500} + u_{50k}$
$\beta_{60k} = \gamma_{600} + u_{60k}$
$\beta_{70k} = \gamma_{700} + u_{70k}$
$\beta_{80k} = \gamma_{800} + u_{80k}$
$\beta_{90k} = \gamma_{900} + u_{90k}$.

At level-2, there were several variables that were found to have a statistically significant association with school mean civic knowledge scores. The aggregated level-1 variable of student perception for an open classroom climate (*MOC*) (γ_{010}=10.85, $p \leq 0.001$) was found to have a statistically significant positive association with civic knowledge scores. As mentioned in Chapter 3 this aggregated variable is considered to be the classroom climate indicator. Then, it can be interpreted as for every unit increase in the classroom perception of an open climate, civic knowledge scores increased 10.85 points. The result of the model also shows that the mean expected education (*MEXE*) had a statistically significant positive association with civic

knowledge scores ($\gamma_{090} = 4.75$, $p \leq 0.01$). The mean time spent outside when away from school (*MOUT*) was found to have a statistically significant association with civics knowledge scores ($\gamma_{070} = -3.35$, $p \leq 0.05$). Interestingly this model found that the mean parent education ($\gamma_{020} = 3.08$, $p \leq 0.01$) had a statistically significant positive association with civics knowledge scores, while at the student level this variable was found not to be statistically significant.

As for the five random slopes for the coefficient for the level-2 predictors mentioned above, the mean open climate (*MOC*) ($\text{var}(u_{01k}) = 14.66$, $p \leq 0.001$) can see as having variation between nations. Combined with the average large effects ($\gamma_{010} = 10.85$), this implies that more than 99% of the schools had the positive relationship (a 99% plausible range= (0.991, 20.709). Other variables that had statistically significant slopes in Model C are as follows: mean home language (*MLAN*) ($\text{var}(u_{04k}) = 92.45$, $p \leq 0.001$), mean TV news (*MTV*) ($\text{var}(u_{08k}) = 13.40$, $p \leq 0.001$), mean expected education (*MEXE*) ($\text{var}(u_{09k}) = 9.46$, $p \leq 0.001$), and school safety (*SAFE*) ($\text{var}(u_{013k}) = 30.64$, $p \leq 0.001$) all showed to have statistically significant variation between nations for the slope.

The proportion of variance explained by Model C can be found in Table 4.5. The model explains 46.20% of the variation at the student level and 51.48% at the classroom/school level. The proportion of variance explained at each level was computed based on the value obtained from the model that has exactly the same model up to the level that is being constructed, thus the proportion of variance explained at L-2 for Model C is based on Model B.

Model D- Level-3 Predictors Model

The final model developed added level-3 predictors to our previously generated models. Level-3 predictors were added to the Model C, and those variables that were not significant were removed from the final model. At this level variables that were significant at the $p \leq 0.1$ level

were kept in the final model because of the small sample size for this level ($K = 27$). It is also important to note that there were collinearity issues between several variables that were described in Chapter 3, and the variables that exhibited high collinearity (VIF ≥ 10) (HDI, adult literacy rate, and GNP) were not included in the model from the beginning of the model building. The results for the final model can be found in the final column of Table 4.4. The final model can be seen in the following equations:

Equation 4. *Equations for Level-3 Predictors Model (Model D)*

Level-1 Model:

$$CIV_{ijk} = \pi_{0jk} + \pi_{1jk}*(OC_{ijk}) + \pi_{2jk}*(PARE_{ijk}) + \pi_{3jk}*(LIT_{ijk}) + \pi_{4jk}*(LAN_{ijk}) + \pi_{5jk}*(FEM_{ijk}) + \pi_{6jk}*(SPAR_{ijk}) + \pi_{7jk}*(OUT_{ijk}) + \pi_{8jk}*(TV_{ijk}) + \pi_{9jk}*(EXE_{ijk}) + e_{ijk}.$$

Level-2 Model:

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}*(MOC_{jk}) + \beta_{02k}*(MPARE_{jk}) + \beta_{03k}*(MLIT_{jk}) + \beta_{04k}*(MLAN_{jk}) + \beta_{05k}*(MFEM_{jk}) + \beta_{06k}*(MSPAR_{jk}) + \beta_{07k}*(MOUT_{jk}) + \beta_{08k}*(MTV_{jk}) + \beta_{09k}*(MEXE_{jk}) + \beta_{010k}*(MDEG_{jk}) + \beta_{011k}*(INSER_{jk}) + \beta_{012k}*(TCON_{jk}) + \beta_{013k}*(TPRA_{jk}) + \beta_{014k}*(SAFE_{jk}) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + r_{1jk}$$
$$\pi_{2jk} = \beta_{20k} + r_{2jk}$$
$$\pi_{3jk} = \beta_{30k} + r_{3jk}$$
$$\pi_{4jk} = \beta_{40k} + r_{4jk}$$
$$\pi_{5jk} = \beta_{50k} + r_{5jk}$$
$$\pi_{6jk} = \beta_{60k} + r_{6jk}$$
$$\pi_{7jk} = \beta_{70k} + r_{7jk}$$
$$\pi_{8jk} = \beta_{80k} + r_{8jk}$$
$$\pi_{9jk} = \beta_{90k} + r_{9jk}.$$

Level-3 Model:

$$\beta_{00k} = \gamma_{000} + \gamma_{001}(NMOC_k) + \gamma_{002}(NMLIT_k) + \gamma_{003}(NMOUT_k) + \gamma_{004}(NMTV_k) + \gamma_{005}(NMDEG_k) + \gamma_{006}(NMINSER_k) + \gamma_{007}(NMTCON_k) + \gamma_{008}(NMTPRA_k) + \gamma_{009}(DS_k) + \gamma_{0010}(PEXP_k) + \gamma_{0011}(IH_k) + u_{00k}$$

$$\beta_{01k} = \gamma_{010} + \gamma_{011}(NMOC_k) + \gamma_{012}(NMTV_k) + \gamma_{013}(NMDEG_k) + \gamma_{014}(DS_k) + u_{01k}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040} + u_{04k}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$

$\beta_{07k} = \gamma_{070}$
$\beta_{08k} = \gamma_{080} + u_{08k}$
$\beta_{09k} = \gamma_{090} + u_{09k}$
$\beta_{010k} = \gamma_{0100}$
$\beta_{011k} = \gamma_{0110}$
$\beta_{012k} = \gamma_{0120}$
$\beta_{013k} = \gamma_{0130}$
$\beta_{014k} = \gamma_{0140} + u_{014k}$
$\beta_{10k} = \gamma_{100}$
$\beta_{20k} = \gamma_{200} + u_{20k}$
$\beta_{30k} = \gamma_{300} + u_{30k}$
$\beta_{40k} = \gamma_{400} + u_{40k}$
$\beta_{50k} = \gamma_{500} + u_{50k}$
$\beta_{60k} = \gamma_{600} + u_{60k}$
$\beta_{70k} = \gamma_{700} + u_{70k}$
$\beta_{80k} = \gamma_{800} + u_{80k}$
$\beta_{90k} = \gamma_{900} + u_{90k}$.

At the nation level, there were nine variables that were found to have a statistically significant association with civics knowledge scores at 0.10 level. Again we find that the national mean student perception for open classroom climate (*NMOC*) ($\gamma_{001} = 26.03$, $p \leq 0.001$) to have a statistically significant positive association with civics knowledge scores. This result indicates that on average, for every increase in the national perception of an open classroom climate, there is an increase of 26.03 points in civic knowledge scores. The national mean watching TV news (*NMTV*) ($\gamma_{004} = 5.47$, $p \leq 0.10$), national mean teacher degree (*NMDEG*) ($\gamma_{005} = 10.68$, $p \leq 0.001$), national mean in-service training (*NMINSER*) ($\gamma_{006} = 5.46$, $p \leq 0.05$), the percent of public education expenditure (*PEXP*) ($\gamma_{0010} = -0.91$, $p \leq 0.10$), and the number of internet hosts (*IH*) ($\gamma_{0011} = 0.09$, $p \leq 0.01$) all were seen to have a statistically significant positive association with civics knowledge scores. Interestingly the results showed that the national mean teacher practice (*NMTPRA*) ($\gamma_{008} = -8.29$, $p \leq 0.01$) had a statistically significant negative association with civics scores, meaning that as there was one unit increase in the national mean of teachers'

practice and in teachers' confidence in civics material, there was a decline in civics knowledge scores after controlling for other predictors in the model.

The results of the final model indicated that there were several variables that had a statistically significant negative association with civics knowledge scores. The national mean time spent outside (*NMOUT*) (γ_{003} = -6.86, $p \leq 0.01$) and public expenditure in education (*PEXP*) (γ_{0010} = -0.91, $p \leq 0.01$) both had a negative association. This means that as there was a unit increase in these variables, there was a decline in civics knowledge scores, after controlling for other predictors in the model.

In the final model, the teacher confidence variable was shown to be statistically significant, however the association was reversed of what is believed. The final model results indicate that national mean teacher confidence (*NMTCON*) (γ_{007} = -15.62, $p \leq 0.01$) had a statistically significant negative association with civics knowledge scores, after controlling for other predictors in the model.. This would indicate that when all other predictors were held constant, for every increase of one unit in these variables, there is a decrease in civics scores. This fact is counter-intuitive to what is believed, and as Agresti & Finlay (1997) mentions, it can be referred to as Simpson's paradox. Pearl (2014) states, the Simpson's paradox is when the association between a pair of variables can change signs because of the possibility of a confounding variable. In order to investigate the issue, a simple regression was run to see which variable could cause the signs to shift as an exploratory analysis. It indicated that when the national mean teachers' degree and national mean perception of an open classroom climate were added to the simple regression where the national mean teacher's confidence was the sole predictor, the coefficient for national mean teacher confidence went from positive to negative.

The more detailed analysis and interpretation of the counter-intuitive results will be given in Chapter 5.

When interpreting these results, it must be noted that the values are dependent on the scales of the independent and dependent variables. The coefficients presented only represent the expected change in the dependent variable, civics test scores, for a unit change in the independent variable. In order to make a scale free within- and between-level comparison, the raw regression coefficients were converted to completely and half standardized coefficients (Gordon, 2015; Monk, Walberg & Wang, 2001) using the relevant standard deviations. The conversion formulas and results can be seen in Table 4.6, and this table will be used for interpreting results in more detail in Chapter 5.

As can be seen in Table 4.5, the level-3 pseudo R^2 ($R^2_{L\text{-}3}$) for the final model (Model D) was 88.06%. This means that 88.06% of the original variance for the country mean civic test score was explained by the aggregated means (national mean student perception of an open climate, national mean home literacy, national mean time spent outside, national mean years TV news viewing, national mean teacher's degree, national mean for in-service training, national mean teacher's confidence, and national mean teacher's practice) and nation level characteristic (democratic system, public expenditure on education, and he number of internet hosts).

Table 4.4

Results of HLM Analysis

	Model A Unconditional Model	Model B L-1 Predictors Model	Model C L-2 Predictors Model	Model D L-3 Predictors Model
Fixed Effects				
Model for Nation mean				
Intercept, γ_{000}	101.57***	100.94***	101.61***	99.81***
Nation Mean Student Perception for Open Classroom Climate, γ_{001}				26.03***
National Mean Home Literacy, γ_{002}				-1.93
National Mean Outside School, γ_{003}				-6.82**
National Mean TV News, γ_{004}				5.47~
National Mean Degree, γ_{005}				10.68***
National Mean In-Service Training, γ_{006}				5.46*
National Mean Teacher Confidence, γ_{007}				-15.63***
National Mean Teacher Practice, γ_{008}				-8.29**
Democratic System, γ_{009}				-0.54
Public Education Expenditure, γ_{0010}				-0.91~
Internet Hosts, γ_{0011}				0.09**
Model for Mean Student Perception for Open Classroom Climate slope				
Intercept, γ_{010}			10.85***	9.23***
National Mean Open Climate, γ_{011}				22.56~
National Mean TV News, γ_{012}				-15.49
National Mean Degree, γ_{013}				-6.76
Democratic System, γ_{014}				-7.08
Mean Parent Education, γ_{020}			3.08**	3.08**
Mean Home Literacy, γ_{030}			2.05	2.06
Mean Home Language, γ_{040}			-6.46	-6.40
Proportion Female, γ_{050}			2.58	2.91
Mean School Council, γ_{060}			5.29	5.32
Mean Outside School, γ_{070}			-3.35*	-3.42*
Mean TV News, γ_{080}			-0.20	-0.12
Mean Expected Education, γ_{090}			4.75**	4.75**
Teacher Degree, γ_{0100}			-0.91	-1.01
In-Service Training, γ_{0110}			0.07	0.09
Teacher's Confidence, γ_{0120}			-0.03	-0.04
Teacher's Practice, γ_{0130}			-0.45	-0.36
School Safety, γ_{0140}			-2.57	-2.55
Student Perception for Open Classroom Climate, γ_{100}		2.44***	2.51***	2.50***
Parent Education, γ_{200}		0.57	0.76	0.76
Home Literacy, γ_{300}		2.20***	2.20***	2.19***

Home Language, γ_{400}		-6.92***	-7.10***	-7.09***
Female, γ_{500}		-3.07**	-3.17**	-3.15**
School Council, γ_{600}		2.61*	2.61*	2.59*
Outside School, γ_{700}		-2.12**	-2.15**	-2.15**
TV News, γ_{800}		0.87~	0.73	0.73
Expected Education, γ_{900}		2.66***	2.63***	2.63***
Random Effects				
Level 3 Nation mean, u_{00k}	38.53***	29.92***	29.64***	3.54***
Mean Open Climate, u_{01k}			14.66***	7.95*
Mean Home Language, u_{04k}			92.45***	87.07***
Mean TV News, u_{08k}			13.40**	12.85**
Mean Expected Education, u_{09k}			9.46***	9.23***
School Safety, u_{013k}			30.64***	30.11***
Parent Education, u_{20k}		1.54***	1.35***	1.34***
Home Literacy, u_{30k}		1.32***	1.27***	1.27***
Home Language, u_{40k}		6.89***	8.11***	8.45***
Female, u_{50k}		5.05***	4.90***	5.04***
School Council, u_{60k}		1.83***	1.66***	1.87***
Outside School, u_{70k}		2.59***	2.62***	2.61***
TV News, u_{80k}		0.33**	0.56***	0.59***
Expected Education, u_{90k}		1.82***	1.98***	1.98***
Level 2 School mean, r_{0jk}	137.25***	142.10***	68.95***	68.67***
Student Perception for Open Classroom Climate, r_{1jk}		20.82***	20.58***	20.48***
Parent Education, r_{2jk}		5.73***	5.62***	5.61***
Home Literacy, r_{3jk}		7.69*	7.66*	7.70*
Home Language, r_{4jk}		21.54***	21.82***	22.03***
Female, r_{5jk}		40.59***	41.28***	41.22***
School Council, r_{6jk}		56.19***	54.73***	54.77***
Outside School, r_{7jk}		11.40***	11.69***	11.71***
TV News, r_{8jk}		7.94***	8.61***	8.55***
Expected Education, r_{9jk}		12.33***	11.57***	11.57***
Level 1 error, e_{ijk}	283.06***	151.98***	152.28***	152.29***

Note 1. ~$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

Note 2. In Model D column, no sign of statistical significance sign by t tests was attached to the coefficients for National Mean TV News (γ_{012}), National Mean Degree (γ_{013}), and Democratic System (γ_{014}) as a predictor for the slope for mean student perception for open classroom climate, they were kept in the model and were treated as statistically significant predictors since the deviance tests indicated below the threshold, i.e., 0.10 or lower.

Table 4.5

Proportion of Variance Explained

Model	*Student Level Variance*		*School Level Variance*		*Nation Level Variance*		*Mean of Student Perception of Open Classroom Climate*	
	Intercept Variance	R^2	Intercept Variance	R^2	Intercept Variance	R^2	Slope Variance	R^2
Model A	283.06***	(Base)	137.25***		38.53***			
Model B	151.98***	46.31%	142.10***	(Base)	29.92***			
Model C	152.28***	46.20%	68.95***	51.48%	29.64***	(Base)	14.66***	(Base)
Model D	152.29***	46.20%	68.67***	51.67%	3.54***	88.06%	7.95*	45.77%

Note. ~$p \leq .10$; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

R^2 indicates the pseudo-R^2, or the proportion of explained variance by including independent variables compared to Model A, the unconditional growth model for the level-1 variance, Model B for the level-2 variance, and Model C for the level-3 variance. The values used for the comparison base is represented as (Base).

Table 4.6

Half-standardized and completely standardized regression coefficients of final model

Level-1 predictor (X_{ijk})	Raw coefficient (π)	SD_{Xijk}	SD_Y	Completely standardized coefficient $\beta^* = \pi(SD_{X_{ijk}} / SD_Y)$	Half-standardized coefficient $\beta^{**} = \pi(SD_{X_{ijk}})$
Open Climate	2.50	0.62	21.70	0.07	1.55
Parent Education	0.76	1.68	21.70	0.06	1.28
Home Literacy	2.19	1.30	21.70	0.13	2.85
Home Language	-7.09	0.25	21.70	-0.08	-1.77
Female	-3.15	0.50	21.70	-0.07	-1.58
School Council	2.60	0.46	21.70	0.06	1.20
Outside School	-2.15	0.98	21.70	-0.10	-2.11
TV News	0.73	0.80	21.70	0.03	0.58
Expected Education	2.63	1.42	21.70	0.17	3.73

Level-2 predictor ($\bar{X}_{\bullet jk}$)	Raw coefficient (β)	$SD_{\bar{X}_{\bullet jk}\bar{X}}$	$SD_{\pi_{jk}} = (\sqrt{\hat{\tau}_{\pi,00}})$	Completely standardized coefficient $\beta^{*} = \beta(SD_{\bar{X}_{\bullet jk}} / \sqrt{\hat{\tau}_{\pi,00}})$	Half-standardized coefficient $\beta^{**} = \beta(SD_{\bar{X}_{\bullet jk}})$
Mean Open Climate	9.23	0.31	11.72	0.24	2.86
Mean Parent Education	3.08	1.14	11.72	0.30	3.51
Mean Home Literacy	2.06	0.83	11.72	0.15	1.71
Mean Home Language	-6.4	0.15	11.72	-0.08	-0.96
Mean Female	2.91	0.19	11.72	0.05	0.55
Mean School Council	5.32	0.24	11.72	0.11	1.28
Mean Outside School	-3.42	0.5	11.72	-0.15	-1.71
Mean TV News	-0.12	0.36	11.72	0.00	-0.04
Mean Expected Education	4.75	0.82	11.72	0.33	3.90
Teacher Degree	-1.01	0.42	11.72	-0.04	-0.42
In-Service Training	0.09	0.46	11.72	0.00	0.04
Teacher's Confidence	-0.04	0.36	11.72	0.00	-0.01
Teacher's Practice	-0.45	0.51	11.72	-0.02	-0.23
School Safety	-2.57	0.33	11.72	-0.07	-0.85

Level-3 predictor ($\bar{X}_{\bullet\bullet k}$)	Raw coefficient (γ)	$SD_{\bar{X}_{\bullet\bullet k}}$	$SD_{\beta_{0j}} = (\sqrt{\hat{\tau}_{\beta,00}})$	Completely standardized coefficient $\beta^{*} = \gamma(SD_{\bar{X}_{\bullet\bullet k}} / \sqrt{\hat{\tau}_{\beta,00}}$	Half-standardized coefficient $\beta^{**} = \gamma(SD_{\bar{X}_{\bullet\bullet k}})$
National Open Climate	26.03	0.14	6.21	0.59	3.64
National Home Literacy	-1.93	0.49	6.21	-0.15	-0.95
National Outside School	-6.82	0.38	6.21	-0.42	-2.59
National TV News	5.47	0.39	6.21	0.34	2.13
National Teacher Degree	10.68	0.29	6.21	0.50	3.10
National In-Service Training	5.46	0.26	6.21	0.23	1.42

National Teacher Confidence	-15.63	0.2	6.21	-0.50	-3.13
National Teacher Practice	-8.29	0.21	6.21	-0.28	-1.74
Democratic System	-0.54	0.51	6.21	-0.04	-0.28
Public Education Expenditure	-0.91	1.54	6.21	-0.23	-1.40
Internet Hosts	0.09	29.04	6.21	0.42	2.61

A sensitivity analysis was conducted that included two more variables at level-3, the percent of women in parliament (*WOMEN*) and voter turn-out at the last election before the year 2000 (*VOTE*). This analysis was conducted without the inclusion of data that included students, schools, or the nation itself of Hong Kong. This was done as information on these two variables was missing for Hong Kong, and therefore all data for Hong Kong had to be deleted from the models. This analysis showed that there were no changes in which variables were found to be statistically significant, but the new variables added were found to be statistically significant. The percent of seats held by women was found to be negatively association with civics scores ($\gamma_{009} = -0.11$, $p \leq 0.10$) as well as the voter turnout ($\gamma_{0010} = 0.07$, $p = 0.009$). The results for the final sensitivity analysis model can be found in Appendix F. It was decided to keep data with Hong Kong included in the final models, as the number of countries included in the sample is already relatively small.

Summary

This chapter provided detailed bivariate descriptive statistics and HLM analyses were presented to answer the 5 research questions that were addressed in this study. Following the notion of the taxonomy of statistical models, 4 models were used to address the research questions presented, with Model D being the final model.

From the results obtained, it was found that there were several predictors that had an association that was statistically significant with civics knowledge scores. The student-level predictors that were observed to have statistical significance at the $p \leq 0.01$ level were: student perception of an open classroom climate, home literacy, home language, gender (female), student council participation, time spent outside, and years further of expected education. School-level predictors that were observed to have statistical significance at the $p \leq 0.05$ level were: mean student perception of an open classroom climate, mean parent education, mean time spent outside, and mean years further of expected education. At the nation-level, it was found that the following predictors were significant at the $p \leq 0.10$ level: national student perception of an open classroom climate, national mean time spent outside, national mean teacher's degree, national mean teacher in-service training, national mean teachers' confidence, national mean teacher's practice, public expenditure in education, and the number of internet hosts. Generally, the findings agree with the previous literature that was presented in earlier chapters, but we need to pay careful attention the variations of the slopes across schools and nations, since the above results only apply as the overall average. Implications of the results are discussed in Chapter 5.

Chapter 5: Discussions and Conclusions

This study utilized the IEA Civic Education Study (CIVED) dataset, available from the International Association for the Evaluation of Educational Achievement, and used hierarchical linear modeling methodology to build models that explain the significance of student-, classroom/school-, and nation-level variables on civic knowledge scores. The study presented is unique in that it uses a multi-level analysis to examine the student, classroom/school, and nation-level effects on students' civic knowledge scores from the data from 27 countries. As the research discussed earlier showed, a democracy needs a citizenry that understands how it works in order to function properly. The major purpose of this study was to examine the association of predictors with student's civic knowledge scores.

Answers to the Research Questions

RQ 1. What countries are doing better in a comparison of mean civic knowledge scores, and how much variation is accounted for at the national level?

To answer the first research question about which countries are doing better in mean civics knowledge scores, several issues regarding the international comparison need to be considered. It is possible to simply rank order the weighted national means, which are the observed unadjusted means or the ordinary least squares (OLS) unadjusted means. It is also possible to compare an Empirical Bayes (EB) estimate from the Model A, which also represents unadjusted means, and they were also the unbiased estimates of the true unadjusted means, though it should be noted that it is known that the EB estimates are better than the OLS estimates in a sense that the EB estimates have smaller mean square error (MSE) (Raudenbush & Bryk, 2002). The final method that was used for a comparison of which countries are doing better was to compare an Empirical Bayes (EB) estimates from the final model, Model D, which are

adjusted means adjusted by all the L-3 covariates in the model, such as the national mean open climate, national mean home literacy, national mean time spent outside, national mean TV news viewing, national mean teacher's degree, national mean in-service training, national mean teacher confidence, national mean teacher practice, democratic system, public education expenditure, and the number of internet hosts. The results from the 3 methods can be found in Table 5.1

National Civics Test Score Comparison

Country	Weighted National Mean Civics Score	Country	Empirical Bayes Estimate (Model A)	Country	Empirical Bayes Estimate (Model D)
Finland	109.23	USA	120.55	Poland	109.21
Cyprus	108.07	Poland	112.39	USA	109.16
Poland	107.77	Finland	104.78	Finland	108.76
Hong Kong	106.57	Greece	104.56	Greece	104.85
USA	106.28	Italy	104.46	Hong Kong	104.34
Greece	106.05	Norway	104.31	Slovakia	104.16
Slovakia	105.03	Hong Kong	103.50	Italy	103.99
Italy	104.08	Denmark	103.45	Australia	103.79
Czech Rep.	102.79	Slovakia	103.26	Czech Rep.	101.89
Norway	102.48	Australia	102.88	Norway	101.36
Australia	101.99	Czech Rep.	102.82	Hungary	101.29
Hungary	100.70	Cyprus	102.64	Denmark	100.56
Denmark	100.28	Sweden	101.87	Belgium	100.42
Slovenia	100.04	England	101.51	England	100.28
Switzerland	99.29	Slovenia	101.04	Switzerland	99.75
Sweden	99.23	Hungary	100.48	Portugal	99.59
England	99.10	Switzerland	100.00	Germany	99.18
Germany	98.99	Belgium	99.78	Russia	99.06
Russia	98.20	Portugal	99.26	Cyprus	97.71
Portugal	96.48	Estonia	98.89	Sweden	96.91
Bulgaria	94.36	Lithuania	98.09	Bulgaria	95.78
Belgium	94.17	Germany	97.63	Lithuania	94.19
Estonia	92.93	Latvia	96.92	Estonia	94.09
Lithuania	92.09	Bulgaria	96.43	Slovenia	93.45
Romania	90.77	Romania	90.54	Romania	91.74
Latvia	90.09	Chile	90.52	Latvia	90.51
Chile	88.31	Russia	89.88	Chile	89.44

The results from Table 5.1 show that the answer to research question 1 depends on the method of comparison and the method of estimation to some extent. The table shows that there are some minor differences in which countries are doing better than others. To examine these results, it is interesting to examine the top 5 countries for each method, and the bottom 5.

When examining the results in Table 5.1 there are several countries that remain in the top 5, but their order changes depending on the method of comparison and estimation. The United States, Poland, and Finland are in the top 5 for each method of comparison and estimation that is used. It is probably not surprising to see the Finland make the top 5 for each list since Finland is known to be a country that is consistently ranked high in other international educational achievement studies such as TIMMSS and PISA (Sahlberg, 2007), however it is interesting that Poland is in the top 5 for each method. One of the considerations in previous chapters was that the democratic system could play a factor in determining civics test scores. Poland was a former communist country that was still in the process of democratization in 1999 and was still able to have higher civics scores than many other countries. An examination of the Polish education system and their methods for teaching civics could be of further research interest. It is interesting to note that the United States was doing quite well in civics in 1999 since the U.S. is known to be behind other nations, such as Asian nations in math and science (Provasnik, Kastberg, Ferraro, Lemanski, Roey, & Jenkins, 2012).

The countries that are at the bottom of the list show some similarities as well. In all 3 methods used for comparison, it was found that Chile and Romania are in the bottom grouping. In fact, Chile was ranked 27th in two of the three methods used, and 26th in one method. Romania was consistently ranked low across all three methods, and scored 25th best out of the countries involved in the sample. The results for the countries at the bottom are not as surprising as the

results for the top 5. All countries at the bottom of the list either come from Eastern Europe and were under communist rule before 1989, or in the case of Chile, in South America and can be seen as a developing country.

The amount of variance that existed at the nation level can be seen from the variance component parameter estimates from the unconditional model (Model A). The equation to calculate the proportion of variance over level-3 units is: $\tau_\beta/(\sigma^2+\tau_\pi+\tau_\beta)$. The result showed that 8.4% of the total variance (38.53/(283.06+137.25+38.53) =38.53/458.84=0.08397) existed at the level-3 (i.e. country level) where the values of the variance estimates were obtained from Table 4.5.

RQ 2. What are the national characteristics that can explain the variation among nations?

The final model fitted to the data (i.e., Model D) included variables that were added to level-3 that help explain some of the variation among nations. The model found several variables accounted for the variation among nations, they, as a set accounted for the majority of the variance of the national mean civics knowledge score (88.06%)(see Table 4.5).

In level-3, it was found that there were 9 variables that accounted for the variation among nations. Among them, national mean student perception for open classroom climate, national mean time outside of school, national mean TV news viewing, national mean teacher's degree, national mean in-service training, and the number of internet hosts were positively associated, and national mean teacher confidence, national mean teacher practice, and national mean public education expenditure were negatively associated, when all other factors in the model were controlled for.

RQ 3.At the classroom/school level, how much variation of civic knowledge scores exists between classroom/schools within nations? If there is significant variation between schools,

what are the school level characteristics that created such variation and how much can they explain?

From the unconditional model, it was possible to find the amount of variation of civics knowledge scores that exist between classroom/schools within nations. The following equation was used to find the amount of variation that was explained at the classroom/school level, using values from the unconditional model: $\tau_\pi /(\sigma^2+\tau_\pi+ \tau_\beta)$. The result from the equation showed that 29.9% (137.25/458.84=0.2991, where the values were obtained from Table 4.5) of the total variation in civics knowledge scores existed between classrooms/schools. Note that the between schools variance (T_π) was shown to be statistically significant at the $p\leq0.001$ level.

At the classroom/school level, it was found that the mean student perception of an open climate, mean parent education, mean time outside of school, and mean years further of expected education were statistically significant predictors at 0.05 level. These variables accounted for 51.48% of the total between schools variation of the school mean civics knowledge score in Model C, or 51.67% in the final model (Model D)(see Table 4.5).

RQ 4. Is there any relationship between civics knowledge and teachers practice? Does this significantly vary across nations? If there is significant variation, what national characteristics are associated with it?

When looking at teacher practice for promoting student participation activities, this research found that there was not a statistically significant association between what teacher's practice in the classroom and students' civic knowledge scores (γ_{0130} = -0.36, p = 0.787) (from Model D column in Table 4.4), nor no statistically significant variation existed across nations at 0.05 level. This result was not in line with the previous research. The literature presented in earlier chapters showed that what teachers did in their classroom did matter. For example,

Halvorsen, Duke, Brugar, Block, Strachan, Berka & Brown (2012) found that the use of PBL in a social studies classroom would have a positive effect. One possible reason why no positive effect was found is that the items from which the composite variable for teacher practice may not have reflected the actual use of PBL type activities, although activities that were similar to PBL in the dataset to create the composite.

RQ 5. Is there any relationship between civics knowledge and open classroom climate for discussion (measured by the classroom average of student's perception)? Does it significantly vary across nations?

Recall that the classroom/school mean student perception for open classroom climate for discussion can be considered to represent the classroom/school climate (Marsh et al., 2012). The results showed that there was a positive association between civics knowledge and an open classroom climate for discussion, measured at level-2, the classroom/school level. The results showed that for every one unit increase in the open classroom climate for discussion, there was a 9.23 point increase in classroom/school civics knowledge scores on average. Comparison of this result to that of teacher practice which exhibited no statistically significant association, may be of interest, which will be performed in the Discussion section. Furthermore, the results showed that there was a statistically significant variation of this association and it was found that four national level variables such as national mean open climate, nation mean TV news, national mean teacher degree, and democratic system were statistically significant predictors (see column Model D in Table 4.4), which explained 45.77% of the slope variance among nations as a set (see Table 4.5).

Discussion

The results from the HLM models showed that there are many factors from each level that were associated with students' civic test scores. Among statistically significant predictors, in this discussion section, the variables that have some relevance to policies and practices, are examined.

Student Level (Level-1) Predictors

At the student level, it was found that most of the level-1 variables considered in this study were statistically significant, except for parent education, school council participation, and TV news viewing. In order to facilitate the interpretation about which variable had the stronger association, comparison of standardized coefficients is useful. Among the variables, two variables had the largest standardized coefficients. That is the completely standardized coefficient for expected education was 0.17 and home literacy was 0.13 (see Table 4.6), which indicated a moderate effect according to the rule of thumb expressed by Keith (page 62, 2006) for educational achievement outcomes. Since home literacy was actually the number of books at home and represents elements of SES, it is quite difficult, though not impossible, to change the value of this variable by policies and practice.

The largest completely standardized coefficient among student level predictors was found in expected education, which was 0.17. This result was in line with previous research in showing that years further of expected education had a statistically significant positive association with civics scores, as shown in previous civics studies conducted by Niemi and Junn (1998). This variable implies the level of a student's aspiration, where higher aspiration can typically be seen in higher achieving students. The result should give some insight into the influences that parents and peers have on students (Torney-Purta, Lehmann, Oswald & Schulz, 2001)

The results confirmed earlier research that showed that the perception that students have of the classroom environment can play a key role in the attainment of civic knowledge (Zhang et al., 2012). The estimated coefficient for the student perception for open classroom climate variable was 2.50 (see Model D column of Table 4.4) which was highly statistically significant ($p \leq 0.001$) and also was practically meaningful, by having the completely standardized coefficient of 0.07 (see Table 4.6), which is considered to be small but meaningful effect size (Keith, 2006). The result indicates that if a student perceives that a civics classroom that is open to more debates and discussion of issues, the student is more likely to have students that are engaged in the material, and will score higher on civic knowledge tests. As Torney-Purta and Wilkenfeld (2009) showed, a classroom where the students perceive that there were higher levels of teaching that was interactive, the more engaged the students became and they scored higher on civics knowledge skills.

The results showed that there is a statistically significant negative association between being female and civics scores on average across the nations studied ($\gamma_{500} = -3.16$, $p \leq 0.01$, see Model D column in Table 4.4). As Marks (2008) showed most of our gender gap related policy is focused in Science, Technology, Engineering, and Math (STEM), and the focus has been on increasing female participation in those areas. At times, that focus on STEM has led to other areas being neglected and females falling behind males. This trend is somewhat concerning, as Marks (2008) mentioned, most gender gap studies have shown that females score higher in classes where reading is the focus. One area of consideration for further research would be to include more gender related items to investigate this issue. In this study, measures of the HDI and other gender related indexes such as the percent of women in parliament either had collinearity or missing data problems, and therefore, they were dropped from the study.

The measure of home language was also shown to have a statistically significant negative association with civics scores (γ_{400} = -7.09, $p \leq 0.001$, see Model D column in Table 4.4). This variable asked students whether or not they mainly spoke the language of the test at their home. While the instrument makers piloted the instrument and made sure that there were no translation issues across countries, it did not account for language differences that were spoken at home. This variable could have some policy implications. Students are able to travel more freely around the world now with increased immigration and might find themselves in areas and schools where the language is different than their native language. Policy needs to be geared towards these students to make sure students who speak other languages are not falling behind. Related to this issue of having strong in national language is the issue of social cohesion and how the nation can create such a national cohesion. As Green, Preston & Sabates (2003) noted, it is important to bring about social cohesion and to make sure that all individuals have a sense of belonging to where they are. Forrest and Kearns (2001) defined that cohesion as having a set of common values and civic culture, social order and control, and an attachment to place and identity. In order for governments to continue to have citizens that can make decisions and function properly, it must make sure that all students have that connection to society. Popkin and Dimock (2000) pointed out that citizens who view issues such as immigration and the impact it has on their country in a more favorable light will have a higher understanding of civic knowledge.

The final variable that was found significant at the student level was time spent outside when not in school. The variable had a statistically negative association with civics scores (γ_{700} = -2.15, $p \leq 0.01$, see Model D column in Table 4.4). This result however needs to be taken with some caution. Torney-Purta et al. (2001) indicated that time spent outside of the home was an indicator of whether or not an individual might engage in behavior that is considered risky or

anti-social. Taking this approach leaves out the possibility that students were involved in other extra-curricular activities or activities within the community that take them away from home.

Classroom/School Level (Level-2)

When examining the results at the classroom/school level, it was found that four variables, i.e., mean student perception for open classroom climate, mean parent education, mean outside school, and mean expected education, were the statistically significant predictors.

As for the mean perception of an open classroom climate, it had a highly statistically significant positive association with civics scores ($\gamma_{010} = 9.23$, $p \leq 0.001$). This is again in agreement with previous research by Zhang et al., 2012 and Torney-Purta and Wilkenfeld, 2009. At the school level, it was previously noted that the mean perception of an open classroom climate can be considered the classroom climate variable. Then, the result suggests that teachers who teach civics need to make sure that their classroom is open for discussion of issues, and for both sides of issues to be heard from students' perspectives. Popkin and Dimock (2000) noted that citizens who view debates as arguments where there are no gains typically have lower civic knowledge, and that we need to be able to understand and appreciate the positives of a back and forth discourse. Wilkenfeld (2009b) argues that students who attend a school that has an overall open climate that encourages discussion will gain a positive effect about their own personal experiences.

The results also showed that the association between civics knowledge and the mean student perception of an open classroom climate in a country depends on the level of the national open climate ($\gamma_{011} = 22.56$, $p \leq 0.10$, see Model D column in Table 4.4). The results indicate that countries that are more open and foster an environment of discussion in the classroom will see a stronger association between the classroom mean open climate and civics knowledge scores. In this same light, the results indicate that in a country that is formerly socialist, there is a stronger

association between civics knowledge and an open classroom climate (γ_{014} = -7.08)[2], because the variable of the democratic system was defined as the indicator for the old democracy. This might be indicative that, in societies that used to not allow for freedom of speech the open classroom climate plays a more important role for students to acquire civic knowledge. There is still the possibility that people fear some type of repercussion for speaking out. In this regard, further research that involves observation is recommended. The results also indicated a weaker relationship between an open climate and civics scores in a society with more TV news viewing (γ_{012} = -15.49) (see footnote 2). This result again, could indicate that when the people have access to this type of information, it is not as important for there to be an open classroom climate. Further, a country that has more teacher's with civics degrees also showed a weaker association between an open classroom climate and civics knowledge scores (γ_{013} = -6.76) (see footnote 2). This negative sign again may indicate that once the nation has more civics teachers who have degrees in civics and thus more knowledgeable about civics around the world, may naturally cultivate students more open-minded thinking, the association gets weaker. The importance implication of the above four predictors should be understood. They indicates that the more the nation has a higher average open classroom climate, has a longer history of being a democracy, has more students access to TV news media, and has more teachers having degrees in civics, the association between open classroom climate and civics knowledge score gets weaker, which may imply that once the democratic ideas are institutionalized in a nation society which allows more free speech, the association does not need to be strong.

Wilkenfeld (2009a) examined the role that contextual effects have with civic knowledge where the contextual effects involve factors that are located in school. He found that contextual

[2] The p-value for the estimated coefficient was statistically significant at least at 0.10 level by deviance test, though the p value by the t-test shown in Table 4.4 was not.

variables could be more influential than individual effects. The study presented here also supports early research showing that the neighborhoods and schools that students attend have an impact (Atkins & Hart 2003; Kahne & Middaugh, 2008). In the present study, the mean parent education regression coefficients were much higher than those at the individual level variable. The coefficient for the mean parent education was about 4 times higher than the individual student level parent education (3.08 for mean parent education vs. 0.76 for parent education, see Model D column in Table 4.4). To have a better idea of the impact, we examined the half-standardized coefficients which probably could be fairer and have more meaningful cross-level comparison than the raw coefficients comparison. The half-standardized coefficient at the student level was 1.28 compared to the classroom/school level of 3.51 (see Table 4.6). Once again, there was a noticeable difference, this time more than doubling the student level coefficient.

The effect of the mean expected education also reflects what Wilkenfeld (2009a) mentioned in terms of the contextual effects having an impact on civic scores greater than those of individual effects. The coefficient for mean expected years further of education was 4.75 compared to the individual level of 2.63 (see raw coefficient column in Table 4.6). This difference was close to double what was seen at the individual level. However, just as the case for parent education, it might be more meaningful to use the half-standardized coefficients for a better cross-level comparison. The half-standardized coefficients for the mean expected education was 3.90, compared to the individual level of expected education at 3.73 (see half-standardized coefficient column in Table 4.6). This shows that the school level effects is equal to or slightly larger than what is seen at the individual level. These results indicate that once again it might make a difference what school individuals attend.

The contextual effects of classrooms/schools presented in this study are in line with previous research cited in Chapter 2. As Kamens (1981) showed, our schools play a major role in conveying what a students' anticipated place in society will be. The schools that our children attend are important and the environment present has an impact on the achievement of the student. Ichilov (2007) expanded upon this and found that a student's motivation for acquiring civic knowledge and the opportunities to be able to discuss with other interested peers is linked to the environment of the school. As Kozol (1991) explained, students are aware of educational inequalities that exist between schools, and students who attend a lower performing school are more likely to have less motivation and join groups that go against academic progress.

The results were not in line with previous research in regards to the association between teachers practice ($\gamma_{0130} = -0.36$, $p > 0.10$) and school safety ($\gamma_{0140} = -2.55$, $p > 0.10$). Previous research by Halvorsen et al. showed that what teachers did in their classrooms had a positive effect on civic achievement. The literature by Cohen et al. (2009) and Brand et al. (2008) in regards to school safety consistently stated that a safer school climate creates a better environment for student learning.

From Chapter 4, it was shown that teaching practice did not have a statistically significant association with civics knowledge scores while controlling for other predictors in the model ($\gamma_{0130} = -0.36$, $p = 0.787$). This fact contradicts previous literature by Halvorsen, Duke, Brugar, Block, Strachan, Berka & Brown (2012), who found that the use of PBL in a classroom would nullify gaps in students and increase civics scores. The results of the study produced the different results because of the differences in the constructs that the variables indicated. The items used to create the composite variable may not have accurately reflected PBL type activities (see Appendix C). In anyways, it interesting to compare the different effects between the

teacher's perception of what they are doing in the classroom and the student perceptions of an open classroom environment.

One important issue to note is the fact that while teacher's practice was not a statistically significant predictor, the mean student perception for open classroom climate was highly significant ($\gamma_{010} = 9.23$, $p \leq 0.001$). This result seems to show a subtle but important difference between students' and teachers' perceptions on classes and to indicate that a student's perception of an open classroom climate is more important than what a teacher is reporting of their classroom practices in terms of students' learning on civics. The mean student perception of an open classroom climate had a large positive association, 9.23, which was statistically significant, compared to the mean teacher practice variable, -0.36, which was not statistically significant. When the half-standardized coefficients are compared, we see that the student perception of an open classroom climate had a much larger effect than the teacher practice composite, 2.86 to -0.23. This results might suggest that teacher preparation programs should focus on making sure that the classroom is an open area where students, not teachers, feel that they can express their opinions and viewpoints. This idea may be relevant to the research by Bandura (2001) in using the social cognitive perspective, stating that the more a group feels that they have an opportunity for change and to create differences, the group will have more motivation and aspiration in what they are doing, and would therefore have higher morale and would be less likely to succumb to stress, and would therefore have better performance.

Nation Level (Level-3)

First, it should be noted that, at the nation level, it is hard to recommend curriculum policy when we see no set curriculum in civics across countries. In some countries, students might not have a true civics curriculum and are subject to getting civics lessons throughout other

social studies courses. In addition, not all countries have the same requirements for how teachers are placed in the classroom. Therefore, the recommendations presented here should be viewed as suggestions for country policy makers, as well as local education policy makers.

There were several national level variables that were statistically significantly associated with student's civic knowledge scores. They were: national mean student perception for open classroom climate, national mean outside school, national mean TV news, national mean teacher's degree, national mean teacher's confidence, national mean teacher's practice, public education expenditure, and number of internet hosts.

The national mean student perception for open classroom climate showed a large positive association with civics knowledge scores ($\gamma_{001} = 26.03$, $p \leq 0.001$). However, again we must take this result with caution when comparing it to lower levels. In order to have a more meaningful comparison, the half-standardized coefficients were calculated. At the national level, the perception for an open classroom climate was 3.64, compared to the classroom/school of 2.86 (see Table 4.6). This shows that while the model seemed to have a much larger association at the national level, the half-standardized coefficient shows that the association is almost the same as what is seen at the classroom level. This result can have policy implications. That is, we could say that teacher education programs throughout the country should place an emphasis on creating that classroom environment where students, not the teachers, feel safe to be able to openly discuss issues that could be seen as controversial. Opposing viewpoints need to be allowed to be discussed and not discouraged. Creating an environment where people and students are able to freely have open discussion is an important aspect of creating democratic citizens.

The national level found that the time spent outside of school had a negative association with civics scores. As in the case at the lower levels, this variable was not well defined in the

dataset and did not indicate what type of activity was marked. The activity outside of school could lead to anti-social behavior, but it could also be for community type events. It was found that the half-standardized coefficient for time spent outside of school was slightly larger in absolute value at the national level, -2.59, as compared to the classroom/school level of -1.71, and the student level -2.11. This would suggest that the country that one was in had the same or more effect than what was seen at the lower levels. Further studies should be done using observational techniques in qualitative research methods and by refining the survey questions. More details about the type of activity outside of school needs to be examined. Policy decisions could differ depending on if the activity that individuals were engaged in were deemed as anti-social compared to activities that were either extra-curricular, religious or work related.

The results showed the national mean TV news viewing had a statistically significant positive association with civic knowledge scores ($\gamma_{004} = 5.47$, $p \leq 0.10$). This indicates that on average a unit increase in national mean TV news viewing, scores will increase by 5.47 points, ceteris paribus ("other factors being equal"). This result showed that as nations' students watch more TV news, students are likely to acquire more civics knowledge.

One variable of interest at the national level and policy relevant was the national mean teacher degree. The results showed a large statistically significant positive association of teacher degree with civics scores ($\gamma_{005} = 10.68$, $p \leq 0.001$). At the classroom/school level no statistical significant association was found for the teacher degree variable ($\gamma_{0100} = -1.01$, $p = 0.582$, see Model D column in Table 4.4). At the nation level, however, there was a large positive association more than three time the size half-standardized coefficient, 3.10 compared to -0.42 (see Table 4.6). This would suggest that at the nation level it is important that there are teachers that have a civics background teaching the courses. Many times we see any type of social studies

teacher can teach a civics course and is assigned the class. If our goal is to create a society where we have citizens with high civics knowledge, the results from this study suggest that we should create policies that place teachers with a civics degree background in classes that teach civics. Akiba, LeTendre & Scribner (2007) stated that there was a gap in students from different economic backgrounds and their access to high quality teachers. School systems need to adapt policies to make sure that all students have access to high quality teachers, meaning teachers who have degrees in the subject areas that they are teaching, rather than placing a body that has a degree in a relative field in the classroom to oversee what's occurring. While it is known that this is not always possible to achieve and school systems need to hire individuals who are available, all attempts should be made at hiring individuals who have a degree in a civics field and make sure that these teachers are in charge of the civics program throughout the school.

The results from the current study also suggested that the mean amount of in-service training that teachers receive can increase civics scores ($\gamma_{006} = 5.46$, $p \leq 0.05$). As suggested in the literature chapter, the type of training that teachers receive can make a large impact on student achievement. For example, McGill-Franzen and Allington (1999) found that we can increase student literacy and achievement by making sure that we are providing our teachers with the proper amount of professional development. Giving teachers the books without any training has no effect. Providing resources without any training on those resources will have little to no effect. Instead, we need to make sure that our teachers are receiving proper training in the subject matters that they teach and to use the resources that area available to them. Opportunities need to exist for teachers to be able to experience and get involved with the subject matter that they are teaching. For example, the United States ran a grant program for Teaching American History in the 2000s ((Archived: Teaching American History, website). This federal grant allowed for local

school systems to apply for funding in order to increase student achievement in U.S. History. These grants gave funds to local districts to work in partnership with higher education institutions to increase teacher's knowledge and appreciation of U.S. History. The grant typically ended with awardees visiting historical areas to gain a better understanding of the training that they had received.

The number of internet hosts within a country was found to have a small, but positive statistically significant association with civics knowledge scores ($\gamma_{0011} = 0.009$, $p \leq 0.01$). In comparing the half-standardized coefficients, the results indicate a stronger effect (2.61) than national in-service training (1.42). These results must be taken with some hesitation as the data is from 1999, and the number of internet hosts within a country has greatly expanded since that time. It is important to note, though, that the importance of having access to information that is not blocked. Countries that provide numerous outlets for its citizens to access information show the importance of providing information that is not blocked and filtered. Further research on this variable would be valuable as more countries and people throughout the world have access to information.

Explanation of Simpson's Paradox

As mentioned in Chapter 4, there were several variables that had an unexpected statistically significant negative association with civics knowledge scores. These variables included national mean teacher confidence, national mean teacher practice, national mean home literacy, and the public expenditure on education. The results were counterintuitive to what is believed in that it should be expected that, for example, as a teacher has more confidence in the material, scores should increase. Since these are partial coefficient, i.e. the association between the independent variable and the dependent variable controlling for other variables in the model,

not simple regression coefficients, it is possible to have negative signs. However, since it is counterintuitive, we wanted to understand why and how this happened. Here a preliminary exploration was conducted about this Simpson's paradox using the national teacher's confidence because the procedure used for this variable applies to the other three variables.

More examination of this issue was performed by conducting a simple regression analyses as an exploratory analysis to understand how this could happen. The results from a simple regression of mean civics knowledge score on mean teacher confidence showed that the mean teacher confidence had a close to statistically significant positive coefficient, 8.89, $p = 0.121$ (two-tailed). When either national mean teacher degree or national mean student perception of open classroom climate were added to the regression, the coefficient for the teacher's confidence significantly decreased and became totally non statistically significant with p's > 0.50. When both national mean teacher degree and national mean student perception of open classroom climate were added to the regression model, the association between teacher's confidence and civics knowledge scores went from positive to negative. In order to simplify the analysis seeking for the explanation, a principal component on these two variables was extracted through principal component analysis. The first principal component extracted explained 62.3% of the total variance in the national mean teacher degree and national mean student perception of open classroom climate. Since the weights for each variable are the same, with the values of 0.789, the principal component variable basically represented a sum or an average of the two variables.

In order to simplify the illustration, the principal component variable was dichotomized by median split and called "high" group and "low" group on the principal component variable. Then, a simple scatter plot was first created (Figure 5.1) and the plot clearly indicated the

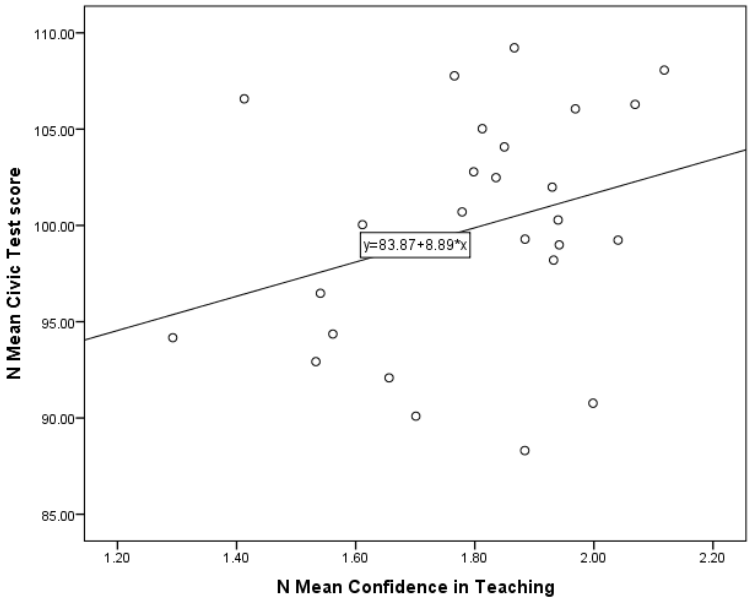
positive association by the regression line. Next, marks were added on each point of the scatter diagram to indicate which group of the principal component variable each point belonged to (Figure 5.2). From the figure, it can be seen that two groups were rather clearly separated by the "high" and "low" value of the principal component variable and within each group, the relationship between national mean civics score and national mean teacher's confidence are negative. This means that in nations that are similar in nation mean of teacher degree and student perception, higher mean teacher confidence is associated with lower mean civics scores, though the marginal association is positive partially because it's confounding with these two variables. This was how the slope changed its sign for mean teacher confidence.

The similar procedure can be used to explore why and how the negative partial coefficient appeared. For example, for home literacy, simply adding national mean teacher degree changed the sign. In the case of public education expenditure, simply adding national mean open climate changed the sign. For national mean teacher practice, the sign was already negative in a bivariate association, however, it was still counter-intuitive because the absolute value increased quite a lot.

The above phenomena could be interpreted in several different ways substantively. For example, having a degree in civics should make a teacher more confident about teaching the course, at least in terms of the content, as well as increasing the students' civic knowledge. But once the degree is controlled, then there is the possibility that over-confidence can make the teacher less prepared for class. This can then lead to a decrease in student scores. A stronger effect of the national mean perception of an open classroom climate might indicate that this variable is more determinant in civics knowledge scores. The ability for students to freely

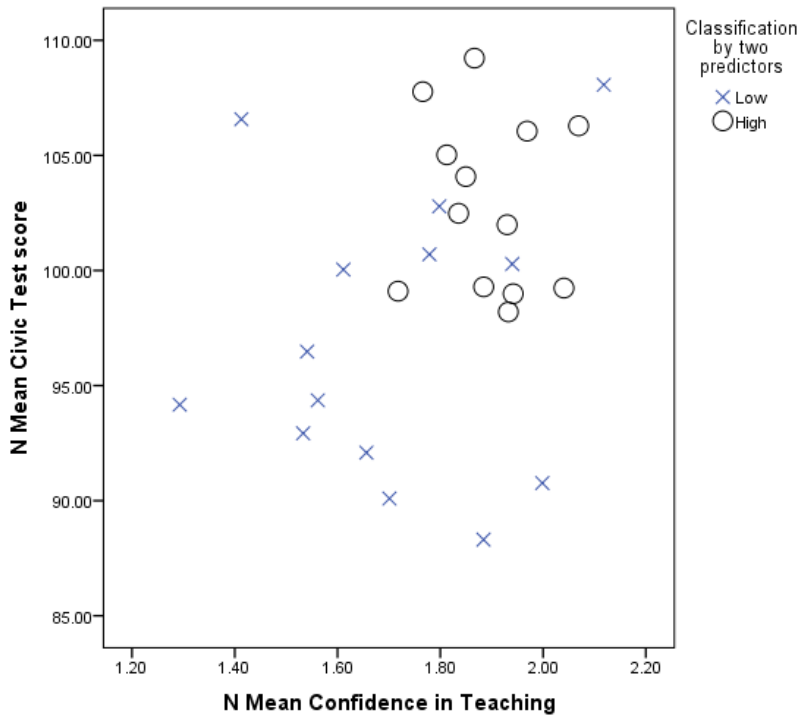
discuss ideas between each other and the teacher makes the teacher's confidence in the material not as important and the over confidence works negatively.

Figure 5.1



Teacher's Confidence on National Mean Civics Scores Scatter Plot

Figure 5.2



Teacher's Confidence on National Mean Civics Scores Scatter Plot with Dichotomized Principal Component Variable

Limitations of the Study

The CIVED data set is a large cross-national dataset that was administered to students around the world and therefore the measures that were used in this study to measure SES were indirect and not comprehensive because of the difficulty in standardizing income and occupational prestige. Probably because of this, there were no data on parent's income level and parent's occupational prestige in the CIVED data, and thus number of books at home were used instead.

Another limitation of this study is in the use of the number of books at home used as the home literacy variable, although previous studies conducted by the IEA as well as the 1999 CIVED study used for the present study with this data used the number of books at home to indicate the home literacy environment. In this study we further extended this use to the higher levels and used the mean home literacy and the national mean home literacy as indicators of school literacy and national literacy, which could create some arguments in interpretation among researchers. Previous studies cited in the literature review showed that there could be some association between literacy and civic knowledge, which gives some justification for this interpretation. Conducting more studies that would have a better and direct measure of student, school, and national literacy, however, are recommended.

As mentioned previously, the fact that the variable for time outside the school is not clearly defined is another limitation. The variable gave no indication whether or not the time outside of school could be deemed as anti-social behavior, or if the time spent was related to community activities and extra-curricular events. Further studies that indicate how the time is spend outside of school is needed.

Finally, there is a limitation of the data used in that it is not current, as mentioned in Chapter 1, the dataset used in this study is from 1999. In order to gain a better understanding of what is going on in civics education currently, more recent data should be studied. However, gathering large scale international data for civics that includes the United States has not been possible to obtain, and it appears that it will not be likely to happen in the near future, as even funding for national civics studies has been decreased in the U.S.

Implications

In the present study, the associations between civic knowledge test scores and student, classroom/school, and national level variables were investigated. The results indicated that there were factors at all three levels that had an association with student achievement in civics knowledge.

In the analyses of the student level variables, it was found that the student perception of an open classroom climate, home literacy environment, home language, gender, time spent outside of school, and years further of expected education had statistically significant associations with civics knowledge test scores. The results found were supported by previous research.

In the analyses of the classroom/school level variables, the results indicated that there were several variables that had a statistically significant association with civics scores. These were the mean student perception of an open classroom climate, mean parent education, mean time spent outside, and mean years further of education. Interestingly the results did not indicate any of the classroom/school specific variables such as teacher practice and school safety as statistically significant, however this could also be a result of how the composite variables were created. Various policies were indicated in this chapter to address the issues at the classroom/school level.

The national level indicated that the national mean student perception of an open classroom climate, national mean home literacy, national mean time outside of school, national mean years further of expected education, national mean teacher's degree, national mean in-service, national mean teacher confidence, national mean teacher practice, and the number of internet hosts within a country were statistically significant.

The results showed that there was no association between self-reported teacher's practice and student civic knowledge scores. That is, on average there was no association between what a teacher said that they did in their classroom and how well students performed on the CIVED instrument. It is important to note that not only was there on average no association, but there was also no variability between nations. This means that there was no association found in any of the nations that were studied.

While the results showed no association between what a teacher reports their classroom practice and student civic knowledge scores, there was a strong association with student perception of an open classroom that was statistically significant across all three levels. As mentioned previously, this can have policy implications. Schools of education need to teach their students how to create an environment where students feel that they can have an open and safe discussion about issues, even if they could be controversial. It is also important that civics teachers continue to get training through in-service trainings on how to create an environment that students would perceive as open. When teachers receive in-service training, the training needs to be targeted and specific, and find ways that can help teachers to create an environment that is conducive to increasing civics knowledge.

While not only did the results show that the student perceptions of an open classroom climate have an association on average, but there also was significant variation between nations.

This indicates that association between the students' perception of an open classroom climate and civic knowledge scores varies depending on the access to information within a nation. Nations that have access to more information and are more open see a stronger association between the students perceptions and their civic knowledge scores.

The research presented here is important because it is one of few cross-national studies that use multi-level linear analysis to examine civics knowledge scores and student, classroom/school, and national factors. Future research on civics knowledge that has nested data should use multilevel analysis in order to have a greater understanding of the impact of each level and to be in a better position to make educational policies

The findings for this study show that there are multiple factors at multiple levels that have an association with civics knowledge scores. The summary of the major findings are as follows:

1. There is significant variation of civics knowledge scores among nations. There are various factors, some, such as student's perception of open classroom climate, gender gap, and home language, which can be addressed by policy that have an impact on civics knowledge scores, which can have a positive impact on society by increasing the number of citizens that have a high civic knowledge background.
2. Significant variation of civics knowledge scores exist between schools and within nations. Again, some of these factors, such as open classroom climate, can be addressed by policy issues that could increase scores.
3. There was no statistically significant and practically important association between the teacher's practice variable that was created and civics knowledge scores, and no variability of this association among the nations was found.

4. An open classroom climate has been found to have a statistically significant and practically important association with civics knowledge scores. It implies that the way that we decide to teach civics and present the material can make an impact on student achievement.

References

Agresti, A., & Finlay, B. (1997). *Statistical methods for the social sciences* (3rd ed.). Upper Saddle River, N.J.: Prentice Hall.

Allington, R. (1990). Effective literacy instruction for at-risk children. *Better schooling for the children of poverty: Alternatives to conventional wisdom*, *2*.

Akiba, M., LeTendre, G. K., & Scribner, J. P. (2007). Teacher quality, opportunity gap, and national achievement in 46 countries. *Educational Researcher*, *36*(7), 369-387.

Alesina, A., & Perotti, R. (1996). Income distribution, political instability, and investment. *European Economic Review*, *40*(6), 1203-1228.

Archived: Teaching American History. (n.d.) Retrieved July 21, 2015.

Atkins, R., & Hart, D. (2003). Neighborhoods, adults, and the development of civic identity in urban youth. *Applied Developmental Science, 7*(3), 156-164.

Angell, A. (1991). "Democratic climates in elementary classrooms: A review of theory and research." *Theory and Research in Social Education* 19:241–266.

Arnold, C. and Kaufman, P (1992). *School Effects on Educational Achievement inMathematics and Science: 1985–86*. Berkeley, CA: MPR Associates.

Baldi, Stephane (2001). *What democracy means to ninth-graders US results from the international IEA civic education study*. DIANE Publishing.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology*, *52*(1), 1-26.

Bear, G. G., Gaskins, C., Blank, J., & Chen, F. F. (2011). Delaware School Climate Survey—Student: Its factor structure, concurrent validity, and reliability. *Journal of School Psychology*, *49*(2), 157-174.

Biddle, B. J. (2012). Splendid contributions and flawed conclusions. *Educational Researcher, 41*(4), 179–181.

Blankenau, W. F., & Simpson, N. B. (2004). Public education expenditures and growth. *Journal of Development Economics*, *73*(2), 583-605.

Brand, S., Felner, R. D., Seitsinger, A., Burns, A., & Bolton, N. (2008). A large scale study of the assessment of the social environment of middle and secondary schools: The validity and utility of teachers' ratings of school climate, cultural pluralism, and safety problems for understanding school effects and school improvement. *Journal of School Psychology*, *46*(5), 507-535.

Bray, M., & Thomas, R. M. (1995). Levels of comparison in educational studies: Different insights from different literatures and the value of multilevel analyses. *Harvard Educational Review*, *65*(3), 472-491.

Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*. Harvard University Press.

Buckley, J. (2011). National Assessment of Educational Progress: The Nation's Report Card: Civics 2010. *Retrieved December 15, 2014*.

Campbell, D. E. (2014). Getting civics right: What it would take to learn what works and what doesn't in citizenship education.

Carpini, M. X. D. (1996). *What Americans know about politics and why it matters*. Yale University Press.

Chaney, B., Burgdorf, K., and Atash, N. (1997). "Influencing achievement through high school graduation requirements." *Educational Evaluation and Policy Analysis* 19:229–244.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. (1966). Equality of educational opportunity. *Washington, DC*.

Cowan, C., Hauser, R., Kominski, R., Levin, H., Lucas, S., Morgan, S., Spencer, M., & Chapman, C. (2012). "Improving the measurement of socioeconomic status for the National Association of Educational Progress: A theoretical foundation." Recommendations to the National Center for Education Statistics.

Croddy, M., & Levine, P. (2014). The C3 Framework: A Powerful Tool for Preparing Future Generations for Informed and Engaged Civic Life. *Social Education*, *78*(6), 282-285.

Cuccinelli, K. (2013). Ken Cuccinelli's K-12 education plan: Putting our kids first. Retrieved August 9, 2013, from http://www.cuccinelli.com/apples/.

DeBaryshe, B. D. (1995). Maternal belief systems: Linchpin in the home reading process. *Journal of Applied Developmental Psychology*, *16*(1), 1-20.

Dee, T. S. (2004). Are there civic returns to education?. *Journal of Public Economics*, *88*(9), 1697-1720.

Dewey, J. (1966). *Democracy and education*. New York: Macmillan.

Doolittle, P. E., & Hicks, D. (2003). Constructivism as a theoretical foundation for the use of technology in social studies. *Theory & Research in Social Education*, *31*(1), 72-104.

Duke, N. K. (2000). For the rich it's richer: Print experiences and environments offered to children in very low-and very high-socioeconomic status first-grade classrooms. *American Educational Research Journal*, *37*(2), 441-478.

Eckstein, Z., & Zilcha, I. (1994). The effects of compulsory schooling on growth, income distribution and welfare. *Journal of Public Economics*, *54*(3), 339-359.

Ehman, L. H. (1980). Change in high school students' political attitudes as a function of social studies classroom climate. *American Educational Research Journal*, *17*(2), 253-265.

Eickelman, D. F., & Anderson, J. W. (Eds.). (2003). *New media in the Muslim world: The emerging public sphere*. Indiana University Press.

Factbook, C. I. A. (2010). The world factbook. *See also: https://www.cia. gov/library/publications/the-world-factbook.*

Flanagan, C. A., & Faison, N. (2001). *Youth civic development: Implications of research for social policy and programs*. Ann Arbor, MI: Society for Research in Child Development.

Forrest, R., & Kearns, A. (2001). Social cohesion, social capital and the neighbourhood. *Urban studies*, *38*(12), 2125-2143.

Fussell, E., & Greene, M. E. (2002). Demographic trends affecting youth around the world. *The world's youth: Adolescence in eight regions of the globe*, 1-20.

Gallagher, S. A. (1997). Problem-based learning. *Journal for the Education of the Gifted*, *20*(4), 332-62.

Gagnon, P. (2003). Educating Democracy--State Standards To Ensure a Civic Core.

Galston, W. A. (2001). Political knowledge, political engagement, and civic education. *Annual review of political science*, *4*(1), 217-234.

Ghosh, J. (2009). Migration and gender empowerment: Recent trends and emerging issues.

Glaeser, E. L., Ponzetto, G. A., & Shleifer, A. (2007). Why does democracy need education?. *Journal of economic growth*, *12*(2), 77-99.

Glomm, G., & Ravikumar, B. (2003). Public education and income inequality. *European Journal of Political Economy*, *19*(2), 289-300.

Gorard, S., & Smith, E. (2004). An international comparison of equity in education systems. *Comparative education*, *40*(1), 15-28.

Gordon, R. A. (2015). *Regression analysis for the social sciences*. Routledge.

Green, A., Preston, J., & Sabates, R. (2003). Education, Equality and Social Cohesion: a distributional approach. *Compare*, *33*(4), 453-470.

Griffin, E. A., & Morrison, F. J. (1997). The unique contribution of home literacy environment to differences in early literacy skills 1. *Early Child Development and Care*, *127*(1), 233-243.

Hahn, C. L. (1999). "Challenges to civic education in the United States." In Civic Education across Countries: Twenty-Four National Case Studies from the IEA Civic Education Project, Amsterdam:IEA

Halvorsen, A., Duke N., Brugar, K., Block, M., Strachan, S., Berka, M.& Brown, J. (2012). "Narrowing the achievement gap in second-grade social studies and content area literacy: The promise of a project-based approach." *Theory & Research in Social Education*, 40:3,198-229.

Hanushek, E. A., & Woessmann, L. (2010). *The economics of international differences in educational achievement* (No. w15949). National Bureau of Economic Research.

Husfeldt, V., & Torney-Purta, J. (2004). Development of the CIVED Instruments. *IEA Civic Education Study Technical Report*, 17.

Ichilov, O. , 2007-07-04 "Civic Knowledge of High-School Students in Israel: Personal and Contextual Determinants" *Paper presented at the annual meeting of the International Society of Political Psychology, Classical Chinese Garden, Portland, Oregon, USA.*

Jerit, J., Barabas, J., & Bolsen, T. (2006). Citizens, knowledge, and the information environment. *American Journal of Political Science*, *50*(2), 266-282.

Kahne, J., & Middaugh, E. (2008, February). *Democracy for some: The civic opportunity gap in high school* (Working Paper No. 59). College Park, MD: The Center for Information and Research on Civic Learning and Engagement.

Kamens, D. H. (1981). Organizational and institutional socialization in education. *Research in Sociology of Education and Socialization, 2*: 208-19.

Keith, T. Z. (2006). *Multiple regression and beyond.* Boston, MA: Pearson.

Kosko, K. W., & Miyazaki, Y. (2012). The effect of student discussion frequency on fifth-grade students' mathematics achievement in U.S. schools. *The Journal of Experimental Education*, *802*(2), 173-195.

Kozol, J. "Savage Inequalities: Children in America's Schools." *New York: Crown* (1991).

Lee, V. E., and Bryk, A.S.. "A multilevel model of the social distribution of high school achievement." *Sociology of education* (1989): 172-192.

Lee, V. E., and Croninger, R.G. "The relative importance of home and school in the development of literacy skills for middle-grade students." *American Journal of Education* (1994): 286-329.

Lee, V.E., Bryk, A.S., and Smith, J. B. "The organization of effective secondary schools." *Review of research in education* (1993): 171-267.

Lehmann, R. (2004). Overview of the IEA Civic Education study. *IEA Civic Education Study Technical Report. Amsterdam: IEA*.

Lutkus, A., & Weiss, A. (2007) The nation's report card: Civics 2006. U.S. Department of Education, National Center for Education Statistics. Washington, D.C.:U.S. Government Printing Office.

Lutkus, A. D., Weiss, A. R., Campbell, J. R., Mazzeo, J., & Lazer, S. (1999). NAEP 1998 civics report card for the nation.

Marks, G. N. (2005). Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and racial studies*, *28*(5), 925-946.

Marks, G. N. (2008). Accounting for the gender gaps in student performance in reading and mathematics: evidence from 31 countries. *Oxford Review of Education*, *34*(1), 89-109.

Marsh, H. W., Lüdtke, O., Nagengast, B., Trautwein, U., Morin, A. J., Abduljabbar, A. S., & Köller, O. (2012). Classroom climate and contextual effects: conceptual and methodological issues in the evaluation of group-level effects. *Educational Psychologist*, *47*(2), 106-124.

McGill-Franzen, A., Allington, R. L., Yokoi, L., & Brooks, G. (1999). Putting books in the classroom seems necessary but not sufficient. *The Journal of Educational research*, *93*(2), 67-74.

Mitchell, K. J., Jones, L. R., & Pellegrino, J. W. (Eds.). (1998). *Grading the Nation's Report Card:: Evaluating NAEP and Transforming the Assessment of Educational Progress*. National Academies Press.

Mol, S. E., & Bus, A. G. (2011). To read or not to read: a meta-analysis of print exposure from infancy to early adulthood. *Psychological bulletin*, *137*(2), 267.

Monk, D. H., Walberg, H. J., & Wang, M. C. (Eds.). (2001). *Improving educational productivity* (Vol. 1). IAP.

National Research Council. (2000). *Improving intergroup relations among youth: Summary of a research workshop.* Washington, DC: National Academy Press.

Natriello, G., McDill, E. L., and Pallas, A. M.. *Schooling disadvantaged children: Racing against catastrophe*. Teachers College Press, 1990.

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

Orland, M.E. "Demographics of disadvantage: Intensity of childhood poverty and its relationship to educational achievement." *Access to knowledge: An agenda for our nation's schools* (1990): 43-58.

Oswald, H. (1999). Political socialization in the new states of Germany. *Roots of civic identity: International perspectives on community service and activism in youth*, 97-113.

Paige, R. (2003). Civics education in America. Phi Delta Kappan. 85, 59.

Parker, W. C., Ninomiya, A., & Cogan, J. (1999). Educating world citizens: Toward multinational curriculum development. *American Educational Research Journal*, *36*(2), 117-145.

Pearl, J. (2014). Comment: Understanding Simpson's Paradox. *The American Statistician*, *68*(1), 8-13.

Persson, T., & Tabellini, G. (1991). *Is inequality harmful for growth? Theory and evidence* (No. w3599). National Bureau of Economic Research.

Popkin, S. L., & Dimock, M. A. (1999). Political knowledge and citizen competence. *Citizen competence and democratic institutions*, 117-146.

Popkin, S. L., & Dimock, M. A. (2000). Knowledge, trust, and international reasoning. *Elements of reason: Cognition, choice, and the bounds of rationality*, 214-238.

Powell, K. C., & Kalina, C. J. (2009). Cognitive and social constructivism: Developing tools for an effective classroom. *Education*, *130*(2), 241-250.

Provasnik, S., Kastberg, D., Ferraro, D., Lemanski, N., Roey, S., & Jenkins, F. (2012). Highlights from TIMSS 2011: Mathematics and Science Achievement of US Fourth-and Eighth-Grade Students in an International Context. NCES 2013-009. *National Center for Education Statistics*.

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Application and data analysis methods. Thousand Oaks, CA: Sage.

Raudenbush, S. W., Bryk, A. S, Cheong, Y. F., Congdon, R., & du Toit, M. (2011). HLM 7 for Windows [Computer software]. Skokie, IL: Scientific Software International, Inc.

Rentner, D. S. (1999). A brief history of the federal role in education: Why it began and why it's still needed. Center on Education Policy.

Saint-Paul, G., & Verdier, T. (1993). Education, democracy and growth. *Journal of Development Economics*, *42*(2), 399-407.

Sahlberg, P. (2007). Education policies for raising student learning: The Finnish approach. *Journal of Education Policy*, *22*(2), 147-171.

Schofield, J. (2010). International evidence on ability grouping with curriculum differentiation and the achievement gap in secondary schools. *The Teachers College Record*, *112*(5), 8-9.

Schulz, W., Ainley, J., Fraillon, J., Kerr, D., & Losito, B. (2010). *Initial Findings from the IEA International Civic and Citizenship Education Study*. International Association for the Evaluation of Educational Achievement. Herengracht 487, Amsterdam, 1017 BT, The Netherlands.

Schulz, W., & Sibberns, H. (2004). IEA civic education study: Technical report.

Sibberns, H. (2004). IEA civic education study user guide for the international database. *Amsterdam: International Association for Educational Assessment*.

Sibberns, H., & Foy, P. (2004). The CivEd weighting procedures. *IEA Civic Education Study Technical Report*, 61.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford university press.

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis*. Thousand Oaks, CA: Sage.

Sullivan, A. (2001). Cultural capital and educational attainment. *Sociology*, *35*(04), 893-912.

Sylwester, K. (2002). Can education expenditures reduce income inequality? *Economics of Education Review*, *21*(1), 43-52.

Theisen, G. L., Achola, P. P., & Boakari, F. M. (1983). The underachievement of crossnational studies of achievement. *Comparative Education Review*, *27*(1), 46–68.

Thomas, J. W. (2000). A review of research on project-based learning. San Rafael, CA: The Autodesk Foundation.

Thomas, S. L., Heck, R. H., & Bauer, K. W. (2005). Weighting and adjusting for design effects in secondary data analyses. *New Directions for Institutional Research*, 127, 51-72.

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. (1997). Links and Missing Links between Education, Political Knowledge, and Citizenship. *American Journal of Education, 105*(4), 446-457.

Torney-Purta, J. (2000). An international perspective on the NAEP Civics Report Card. *The Social Studies, 91*(4), 148-150.

Torney-Purta, J., Lehmann, R., Oswald, H., & Schulz, W. (2001). *Citizenship and education in twenty-eight countries: Civic knowledge and engagement at age fourteen*. IEA Secretariat, Herengracht 487, 1017 BT, Amsterdam, The Netherlands.

Torney-Purta, J., & Wilkenfeld, B. S. (2009). *Paths to 21st century competencies through civic education classrooms: An analysis of survey results from ninth-graders*. American Bar Association, Division for Public Education.

Tucker, M. (Ed.). (2011). *Surpassing Shanghai: An agenda for American education built on the world's leading systems*. Cambridge, MA: Harvard Educational Press.

United Nations Development Programme. (2000). *Human Development Report: Human rights and human development. Summary. 2000*. Oxford University Press.

United Nations Development Programme. *Human development report 2010: the real wealth of nations: pathways to human development*. Palgrave Macmillan, 2010.

United Nations Development Programme. *Human development report 2014: Sustaining human progress: Reducing vulnerabilities and building resilience*. Palgrave Macmillan, 2014.

Valbuena, R. (2014). The College, Career and Civic Life (C3) Framework: An Inquiry Approach to Social Studies. *The Social Studies*, *3*(1).

Wagemaker, H. (2014). International large-scale assessments: From research to policy. In L. Rutkowski, M. von Davier, D. Rutkowski (Eds.), *A Handbook of International Large-Scale Assessment: Background, Technical Issues, and Methods of Data Analysis*, London: Chapman Hall/CRC Press.

White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin, 91*(3), 461.

Wilkenfeld, B. (2009a). *Does context matter? How the family, peer, school, and neighborhood contexts relate to adolescents civic engagement* (CIRCLE Working Paper 64). Medford, MA: The Center For Information & Research on Civic Learning and Engagement.

Wilkenfeld, B. (2009b). *A multilevel analysis of context effects on adolescent civic engagement: The role of family, peers, school, and neighborhood.* Retrieved from ProQuest Digital Dissertations. (AAT 3359321).

Youniss, J., Bales, S., Christmas-Best, V., Diversi, M., McLaughlin, M., & Silbereisen, R. (2002). Youth civic engagement in the twenty-first century. *Journal of research on adolescence*, *12*(1), 121-148.

Zaller, J. (Ed.). (1992). *The nature and origins of mass opinion*. Cambridge university press.

Zhang, T., Torney-Purta, J., & Barber, C. (2012). Students' Conceptual Knowledge and Process Skills in Civic Education: Identifying Cognitive Profiles and Classroom Correlates. *Theory & Research in Social Education*, *40*(1), 1-34.

Zullig, K. J., Koopman, T. M., Patton, J. M., & Ubbes, V. A. (2010). School climate: Historical review, instrument development, and school assessment. *Journal of Psychoeducational Assessment*, *28*(2), 139-152.

Appendix A- Table of Specification of IEA 1999 Civic Test

	Knowledge of Content	Skills in Interpretation
Domain I		
Democracy and Characteristic	9,12,17,19,29	14
Institutions and Practices	2, 11,13,22,27,28,30	23,24,25,33,38
Citizenship Rights and Duties	1,3,4,6,7,8,10,15,18,20	34,35
Domain II		
National Identity		32,36
International Relations	16,21	31
Domain III		
Social Cohesion and Diversity	5	26,37

Note: Numbers in each cross-classification cell indicates the item number in the test and the actual items released from IEA are explicitly presented in Appendix B

Appendix B- CIVED Released Items for 14-year-old Students

2. Which of the following is an accurate statement about laws?
A. Laws forbid or require certain actions [behaviours].
B. Laws are made by the police.
C. Laws are valid only if all citizens have voted to accept them.
D. Laws prevent criticism of the government.

3. Which of the following is a political right? The right ...
A. of pupils to learn about politics in school
B. of citizens to vote and stand for [run for] election
C. of adults to have a job
D. of politicians to have a salary

5. A woman who has a young child is interviewed for a job at a travel agency.
Which of the following is an example of discrimination [injustice]? She does not get the job because ...
A. she has no previous experience.
B. she is a mother.
C. she speaks only one language.
D. she demands a high salary.

7. In a democratic country [society] having many organisations for people to join is important because this provides ...
A. a group to defend members who are arrested.
B. many sources of taxes for the government.
C. opportunities to express different points of view.
D. a way for the government to tell people about new laws.

11. In democratic countries what is the function of having more than one political party?
A. To represent different opinions [interests] in the national legislature [e.g. Parliament, Congress]
B. To limit political corruption
C. To prevent political demonstrations
D. To encourage economic competition

12. In a democratic political system, which of the following ought to govern the country?
A. Moral or religious leaders
B. A small group of well-educated people
C. Popularly elected representatives
D. Experts on government and political affairs

16. What is the major purpose of the United Nations?
A. Safeguarding trade between countries
B. Maintaining peace and security among countries
C. Deciding where countries' boundaries should be
D. Keeping criminals from escaping to other countries

17. Which of the following is most likely to cause a government to be called non-democratic?
A. People are prevented from criticising [not allowed to criticise]
the government.
B. The political parties criticise each other often.
C. People must pay very high taxes.
D. Every citizen has the right to a job.

18. Which of the following is most likely to happen if a large publisher buys many of the [smaller] newspapers in a country?
A. Government censorship of the news is more likely.
B. There will be less diversity of opinions presented.
C. The price of the country's newspapers will be lowered.
D. The amount of advertising in the newspapers will be reduced.

The next three questions are based on the following imaginary political leaflet [political advertisement].

We citizens have had enough!

A vote for the Silver Party means a vote for higher taxes.
It means an end to economic growth and a waste of our nation's resources.
Vote instead for economic growth and free enterprise.
Vote for more money left in everyone's wallet!
Let's not waste another 4 years! VOTE FOR THE GOLD PARTY.

23. This is an election leaflet [political advertisement] which has probably been issued by ...
A. the Silver Party.
B. a party or group in opposition to [running against] the Silver Party.
C. a group which tries to be sure elections are fair.
D. the Silver Party and the Gold Party together.

24. The authors of the leaflet think that higher taxes are ...
A. a good thing.
B. necessary in a [free] market economy.
C. necessary for economic growth.
D. a bad thing.

25. The party or group that has issued this leaflet is likely also to be in favour of ...
A. reducing state [government] control of the economy.
B. lowering of the voting age.
C. capital punishment.
D. more frequent elections.

26. Two people work at the same job but one is paid less than the other. The principle of equality would be violated if the person is paid less because of ...
A. fewer educational qualifications.
B. less work experience.
C. working for fewer hours.
D. gender [sex].

The next question differs from those earlier in the test. The following question contains three statements of fact and one statement of opinion.
Read each question, and then choose the opinion.

31. Three of these statements are facts and one is an opinion. Which of the following is an OPINION?
A. Actions by individual countries are the best way to solve environmental problems.
B. Many countries contribute to the pollution of the environment.
C. Some countries offer to co-operate in order to diminish acid rain.
D. Water pollution often comes from several different sources.
Image not able to copy

36. What is the message or main point of this cartoon? History textbooks ...
A. are sometimes changed to avoid mentioning problematic events from the past.
B. for children must be shorter than books written for adults.
C. are full of information that is not interesting.
D. should be written using a computer and not a pencil.

The next question differs from those earlier in the test. The following question contains three statements of opinion and one statement of fact.
Read each question, and then choose the fact.

38. Three of these statements are opinions and one is a fact. Which of the following is a FACT [the factual statement]?
A. People with very low incomes should not pay any taxes.
B. In many countries rich people pay higher taxes than poor people.
C. It is fair that some citizens pay higher taxes than others.
D. Donations to charity are the best way to reduce differences between rich and poor.

Appendix C- Items used to create composite score for teacher practice, student's perception of open classroom climate for discussion, and school safety climate

1. Teacher's practice items (5 items) (4 point Likert scales)- How often are the following activities used in your classes?
    a. I2, *btcoutsc*: Students work on projects that involve gathering information outside of schools
    b. I5, *btcgroups*: Students work in groups on different types of group work and prepare presentations
    c. I6, *btcplay*: Students participate in role play and simulations
    d. I9, *btccontr*: The teacher includes discussion on controversial issues in class
    e. I10, *btcparti*: Students participate in events or activities in the community (society)
2. Student's perception of open classroom climate for discussion (6 items)(4 point Likert sclaes)-
    a. N1- Students feel free to disagree openly with their teachers about political and social issues during class.
    b. N2- Students are encouraged to make up their own minds about issues.
    c. N3- Teachers respect our opinions and encourage us to express them during class
    d. N5- Students feel free to express opinions in class even when their opinions are different from most of the other students.
    e. N7- Teachers encourage us to discuss political or social issues about which people have different opinions.
    f. N8- Teachers present several sides of (positions on) an issue when explaining it in class.
3. School safety climate (5 items) (3 point Likert scales)- 12. Please indicate how frequently each of the following occurs at your school
    a. Vandalism

b. Drugs

c. Truancy

d. Bullying

e. Violence

Appendix D- Sensitivity Analysis: Descriptive Statistics for data that excludes Hong Kong (*K*=27)

	Minimum	Maximum	Mean	Std. Deviation
National Mean Civics Test Score	88.31	109.23	99.57	5.86
National Mean Student Perception for Open Classroom Climate	2.66	3.11	2.92	.14
National Mean Parents Education	2.48	4.42	3.63	.55
National Mean Home Literacy	1.25	3.06	2.27	.46
National Mean Home Language	.01	.25	.08	.06
National Mean Female	.47	.53	.51	.01
National Mean Student Council	.03	.60	.26	.14
National Mean Time Outside	1.04	2.27	1.66	.33
National Mean TV News	2.02	2.61	2.34	.17
National Mean Expected Education	2.43	3.75	3.09	.39
National Mean Teachers Degree	.07	1.00	.58	.28
National Mean In-Service Training	.01	1.00	.39	.27
National Mean Teacher Confidence	1.29	2.12	1.81	.19
National Mean Teacher Practice	1.12	1.96	1.34	.21
National Mean School Safety	.32	1.07	.73	.18
GINI Coefficient	23.00	52.10	31.88	7.53
GNP	1220.00	39980.00	14617.31	12117.84
Human Development Index	.77	.93	.86	.06
Democratic System	.00	1.00	.54	.51
Adult Literacy Rate (in %)	91.40	99.80	98.43	1.75
Public Education Expenditure (as % of GNP)	3.10	8.30	5.21	1.52
Internet Hosts (per 1000 people)	1.10	112.80	23.18	29.54
Seats in Parliament Held by Women	5.60	42.70	18.19	11.02
Voter Turnout	36.00	95.00	71.27	15.56

Appendix E- Sensitivity Analysis: Correlation Matrix for data that excludes Hong Kong (*K*=26)

	NMCIV	NMOC	NMPE	NMLIT	NMLAN	NMFEM	NMSP	NMOUT	NMTV	NMEXE	NMDEG	NMIS	NMTC	NMTP	NMSA	GINI	GNP	HDI	DS	AL	PEXP	IH	WOM	VOTE
NMCIV	1																							
NMOC	.471*	1																						
NMPE	.194	-.077	1																					
NMLIT	.199	-.002	.328	1																				
NMLAN	-.116	.024	.085	-.219	1																			
NMFEM	.383	.171	.134	.237	.046	1																		
NMSP	.245	.299	.071	-.037	-.216	-.078	1																	
NMOUT	.051	.459*	-.015	.066	-.111	-.278	.430*	1																
NMTV	.129	.060	-.104	-.156	-.331	.286	.089	-.111	1															
NMEXE	.198	-.008	.416*	.177	-.141	.179	-.071	-.202	.192	1														
NMDEG	.607**	.209	.135	.121	-.103	.046	.218	.247	-.146	.014	1													
NMIS	.273	-.018	.240	.230	-.143	-.060	-.078	.028	-.142	.256	.471*	1												
NMTC	.434*	.671**	-.056	-.057	-.046	-.137	.505**	.336	.079	-.119	.388	.153	1											
NMTP	-.143	.147	.173	-.129	-.237	-.236	-.031	.025	-.011	.444*	-.021	.330	.029	1										
NMSA	.210	.064	.077	.554**	.015	.401*	-.298	-.193	-.424*	.135	-.020	.073	-.196	-.137	1									
GINI	-.317	.150	.198	-.433*	.140	-.134	-.019	.199	-.110	.225	-.204	-.015	-.033	.304	-.233	1								
GNP	.334	.408*	-.339	.273	.144	.054	.063	.195	-.442*	-.251	.233	.030	.249	-.225	.573**	-.323	1							
HDI	.495*	.399*	-.268	.218	.051	.180	.113	.004	-.370	-.113	.239	-.046	.245	-.190	.659**	-.350	.897**	1						
DS	.283	.445*	-.284	-.126	.106	.134	.312	.120	-.242	-.075	.101	-.118	.252	-.072	.404*	.057	.705**	.796**	1					
AL	.137	-.065	.443*	.627**	.069	-.066	-.121	.265	-.178	.119	.334	.392*	.046	.083	.196	-.388	.119	-.010	-.376	1				
PEXP	.147	.138	-.198	.510**	-.141	.008	.023	.162	-.148	-.058	-.047	.250	.078	-.054	.362	-.466*	.424*	.328	.183	.182	1			
IH	.413*	.303	-.035	.389*	-.142	-.052	.165	.318	-.435*	.089	.320	.327	.314	-.086	.514**	-.123	.722**	.655**	.520**	.215	.545**	1		
WOM	.094	.175	-.447*	.454*	-.019	.195	-.026	.117	-.365	-.227	.061	.125	.038	-.102	.515**	-.468*	.692**	.599**	.367	.181	.720**	.579**	1	
VOTE	-.045	-.017	-.340	-.121	.160	.084	.157	-.154	.055	-.062	-.125	-.260	.086	-.049	.050	-.269	.061	.250	.249	-.129	-.103	-.207	.193	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed

Correlation Matrix Key:
NMCIV- national mean civics score
NMOC- national mean student perception of an open classroom climate
NMPE- national mean parent education level
NMLIT- national mean home literacy
NMLAN- national mean language at home
NMFEM- national mean proportion of female
NMSP- national mean school parliament participation
NMOUT- national mean time spent outside
NMTV- national mean TV news viewing
NMEXE- national mean years further of expected education
NMDEG- national mean teacher's degree
NMIS- national mean in-service
NMTC- national mean teacher's confidence
NMTP- national mean teacher's practice
NMSA- national mean school safety
GINI- GINI coefficient
GNP- Gross National Product in 1999 U.S. $
HDI- Human Development Index
DS- democratic system
AL- adult literacy rate
PEXP- expenditure percentage on education
IH- number of internet hosts
WOMEN- percent of women in parliament
VOTE- voter turn-out at the last election before the year 2000

Appendix F- Sensitivity Analysis: HLM Results for data that Excludes Hong Kong (*K*=26)

Results of HLM Analysis

	Coefficient	*p*-value
Fixed Effects		
Model for Nation mean		
Intercept, γ_{000}	100.19***	<0.001
Nation Mean Student Perception for Open Classroom Climate (NMSPOCC), γ_{001}	24.84	<0.001
National Mean Outside School, γ_{002}	-5.24	0.014
National Mean TV News, γ_{003}	6.43	0.013
National Mean Degree, γ_{004}	10.11	<0.001
National Mean In-Service Training, γ_{005}	6.20	0.005
National Mean Teacher Confidence, γ_{006}	-12.18	0.002
National Mean Teacher Practice, γ_{007}	-7.71	<0.001
Internet Hosts, γ_{008}	0.10	<0.001
Seats in Parliament, γ_{009}	-0.11	0.06
Voter Turn-Out, γ_{0010}	0.07	0.009
Mean Student Perception for Open Classroom Climate, γ_{010}	10.29	<0.001
NMSPOCC, γ_{011}	15.05	0.139
Mean Parent Education, γ_{020}	2.78	0.005
Mean Home Literacy, γ_{030}	2.09	0.101
Mean Home Language, γ_{040}	-7.36	0.167
Proportion Female, γ_{050}	-0.05	0.989
Mean School Council, γ_{060}	2.98	0.446
Mean Outside School, γ_{070}	-4.21	0.023
Mean TV News, γ_{080}	0.16	0.944
Mean Expected Education, γ_{090}	4.77	0.006
Teacher Degree, γ_{0100}	-0.94	0.611
In-Service Training, γ_{0110}	-0.08	0.957
Teacher's Conf., γ_{0120}	-0.07	0.960
Teacher's Prac., γ_{0130}	-0.22	0.868
School Safety, γ_{0140}	-1.73	0.605
Student Perception for Open Classroom Climate, γ_{100}	2.55	<0.001
Parent Education, γ_{200}	0.75	0.167
Home Literacy, γ_{300}	2.21	<0.001
Home Language, γ_{400}	-6.82	0.002
Female, γ_{500}	-3.18	0.007
School Council, γ_{600}	2.68	0.013
Outside School, γ_{700}	-2.14	0.005
TV News, γ_{800}	0.74	0.106
Expected Education, γ_{900}	2.63	<0.001

Random Effects	Variance Component	*p*-value
Level 3 Nation mean, u_{00}	2.36	<0.001
Mean Open Climate, u_{01}	12.39	<0.001
Mean Home Language, u_{04}	83.26	<0.001
Mean Female, u_{05}	22.60	0.004
Mean School Council, u_{06}	30.20	0.002
Mean Time Outside, u_{07}	7.32	0.002
Mean Expected Education, u_{09}	7.73	<0.001
School Safety, u_{014}	47.89	<0.001
Open Climate, u_{10}	0.46	0.028
Parent Education, u_{20}	1.43	<0.001
Home Literacy, u_{30}	1.19	<0.001
Home Language, u_{40}	8.88	<0.001
Female, u_{50}	5.18	<0.001
School Council, u_{60}	1.68	0.001
Outside School, u_{70}	2.52	<0.001
TV News, u_{80}	0.40	0.014
Expected Education, u_{90}	2.03	<0.001
Level 2 School mean, r_0	71.21	<0.001
Open Climate, r_1	19.90	<0.001
Parent Education, r_2	5.91	<0.001
Home Literacy, r_3	7.83	0.038
Home Language, r_4	23.18	<0.001
Female, r_5	40.45	<0.001
School Council, r_6	57.80	<0.001
Outside School, r_7	11.45	<0.001
TV News, r_8	8.53	<0.001
Expected Education, r_9	11.91	<0.001
Level 1 error, *e*	12.	152.27***

Note. ~$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$