Eurasia Journal of Mathematics, Science & Technology Education, 2008, **4**(4), 359-371

www.ejmste.com

A Comparison Study of 9th Graders in the U.S. and Albania

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Received 18 November 2007; accepted 13 April 2008

The purpose of this research is to compare American and Albanian students' achievement in Algebra 1 and to identify the educational practices that influence students' achievement in each country. The study compared algebraic solving abilities of 242 ninth-grade American students in Grand Forks (U.S.) and 219 students in Durres (Albania). The data collection instrument consisted of a Texas publicly-released standardized test and a student questionnaire. The test focused on the Algebra 1 knowledge covered during the academic year 2006-2007, whereas the questionnaire attempted to measure students' perceptions of educational practices exerted in their classrooms and communities. The results showed that Albanian students outperformed American students in both overall achievement and algebraic representation skills. The first difference was significant at .05 level whereas the second difference was not significant. Albanian students seem more involved than their American peers in practices, such as studying textbooks for understanding and test-taking, reading for enjoyment, and learning for the next day. Compared to Americans, Albanian students seem more satisfied with being in school and learning mathematics, and view mathematics as conducive to entering a college or university. American students, on the other hand, seem more concerned than Albanians about using and requiring calculators, spending out-of-school time with friends, sport activities, and electronic games. For them studying mathematics is about understanding other classes of high school curriculum Algebraic achievement of Albanian and American students seem to be affected by four and six educational practices, respectively.

Keywords: Students' Achievement, Educational Practices, Instruction.

INTRODUCTION

After a rich experience with teaching algebra in his home country, Albania, the author of this study had the opportunity to tutor, observe, and teach this discipline in the U.S. A number of differences related to educational practices, exercised in school and out-of-school environments of both countries were observed. These differences led in generating the following questions: Do these differences result in algebra achievement differences? Are there other differences in cultural educational practices, which also affect achievement of students in both countries? This study provides an endeavor of answering these questions.

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Many previous studies have focused on cultural educational practices that are associated with students' learning. Their authors have pointed out that a classification of cultural practices into instruction-related and non instructional-related educational factors produce a better understanding of the effect of cultural experience in mediating learning. The proposed suggestion has been useful in designing both international and multinational large-scale studies. This study was designed to make a contribution to this field by comparing Algebra achievement of ninth grade students in the U.S. and Albania, as well as by identifying the educational practices within each culture that may affect student learning.

The topic of this study was Algebra 1 because this mathematics course is considered a gateway to further mathematical preparation of almost all high school students in every country. American and Albanian students' achievement in Algebra 1 was measured by

E-ISSN: 1305-8223

using a standardized test, commonly used in the U.S. The examination of educational practices was determined by obtaining students' perceptions about educational practices. In the student' questionnaire items were divided into two categories, instructional and noninstructional. The first category included students' perceptions of teacher strategies, use of textbooks and use of calculators. The second category included students' believes about the organization of their school-days, students' attitudes toward school and mathematics, and their feelings about home environment.

The results of this study will allows teachers of both countries to compare best practices and to further develop their own improvements, ones appropriate for their school systems.

Purpose of the Study

The first purpose of this study was to compare algebraic achievement of students in the U.S and Albania. This comparison was made at two levels:

1. Students' mastering of the overall algebraic achievement.
2. Students' mastering of algebraic representation skills.

The second purpose was to compare the instructional and noninstructional practices of the two countries, as well as to identify educational practices which contribute toward overall algebraic achievement of students in each country.

LITERATURE REVIEW

Algebraic achievement

The overall algebraic achievement

TIMSS International Studies show that Japanese and Singaporean students outperform US students (Beaton et al., 1996). TIMSS students from some European countries, such as Germany, Belgium and Holland also display higher levels of achievement compared with that of the U.S. students (Lemke & Gonzales, 2006; Stigler & Hiebert, 1999). In 2003, the U.S. achievement in mathematics literacy and problem solving was lower than the average achievement for most industrialized (OECD) countries. The United States also performed below the OECD average on each mathematics literacy subscale representing a specific content area (NCES, 2004).

A review of research indicates that there is a lack of information with regard to Albanian students' participation in international competitions or comparisons. The most recent information is related to Albania's participation in PISA 2000, where Albanian students scored second worst in the international assessments of student learning outcomes in reading, mathematics and science literacy (OECD, 2001).

Students' Preference of Representation Models

National Assessment of Educational Progress showed that most seventeen-year-olds in the U.S. could perform basic arithmetic operations, but nearly all of them failed to solve multi-step problems that require symbolic algebra (Dossesy et al., 1988). Healy & Hoyles (2000) found also that using algebraic means in order to justify and explain problem-solving procedures is really hard for high school students. In their attempts to solve algebra word problems many American secondary students prefer to justify and explain mathematical solutions in a verbal mode (Cai, 2004).

The Institute of Pedagogical Studies in Albania recently conducted a study to examine, among other things, students' work with algebra word problems given on the National Leaving Examinations. The findings showed that the vast majority of Albanian students preferred a numerical mode of representation; more specifically, 37 percent of answers were in verbal and diagram mode, and only 11 percent were represented in an algebraic mode (Lulja, 2003).

Instructional and Noninstructional Factors that

Affect Algebra1 Achievement

A review of previous research was conducted in an attempt to examine the differences between educational practices used in the two cultures as well as the role of these practices on student achievement.

Instructional Factors

Several studies have examined the relationship between students' academic achievement and students' beliefs about instructional factors, such as instructional strategies, use of textbooks, and use of calculators.

Instructional *strategies:* Students' perceptions of what kind of instructional strategy their teachers employ in classroom have an important influence on their responses to school. Studies have shown that American algebra teachers vary substantially in terms of the content they teach and the cognitive approach they pursue (Farrell & Farmer, 1998).Thus, Stigler and Hiebert (1999) underline three main characteristics of American teaching of high school algebra. First, American teachers use a variety of teaching strategies. Students may work together as a class or break off into small groups. Second, American teachers spend nearly 87 of the class time by working with their students and much of it is spent with individual students or small

groups, rather than with the class as a whole. Third, most teachers in the U.S. use visual devices to focus students' attention. As they finish each part of their oral presentation, they often erased that part of the written material and moved to the next item.

In Albania, when teachers grade individual students, often they call students on the board for completing an exercise; the rest of the class observes (Musai & Boce, 2003). Other research on the teaching of algebra provide data, which show that Albanian teachers tend to spend a lot of instructional time on examining algebraic reasoning of eighth and ninth graders (Lambiri, 2004; Musai & Boce, 2003).

Textbooks. Between 67 and 90 percent of all classroom instruction in any subject and at any level consists solely of textbook applications (Muth and Alvermann, 1992). Schmidt et al. (2001) found that American ninth graders do not devote adequate time to studying their textbooks, and this attitude is negatively correlated to their achievement. On the other hand, Albanian researchers (e.g., Llambiri, 2004) have documented a strong influence of textbooks on mathematics attainment of Albanian students.

Calculators. A comprehensive review of the research on handheld graphing calculators in secondary mathematics instruction indicated positive correlations between use of calculators and mathematics achievement. For example, Telese (2000) found that students in the U.S. who more frequently used calculators during mathematics lessons showed higher algebra test scores. Other authors indicated that there is improved student conceptual understanding when students use graphing calculators with curricula specifically designed to take advantage of the technology (Burrill et al., 2002; Ruthven, 1990). The Heller and Paulukonis' study (2000) reached the same conclusion on the domain of Algebra.

Albanian teachers do not seem to rely on the calculators when they develop their lessons. Furthermore, they do not encourage their students to use calculators on tests (Llambiri, 2004).

Noninstructional Factors.

Stigler and Hiebert (1999) assert that, besides instructional factors, there are other noninstructional factors, such as school day organization, students' attitude towards school, students' attitude towards learning mathematics, and home environment, which tend to affect students' leaning outcomes.

School-day organization. Research in cognition (e.g., Martin et al., 1995; Stevenson & Lee, 1990), has shown that American out-of-school students' experiences have a substantial effect on their learning. With respect to students' management of free time, in about half the TIMSS 1995 countries, including the U.S., the highest mathematics achievement was associated with watching from one to two hours of television per day. This was the most common response, reflecting from 33 percent to 54 percent of the students for all countries (Martin et al., 1995).

Two recent studies (Mita, 2001; Rrapo, 2006) have examined the school day organization of ninth graders in Albania. Based on PISA 2000 study results, for Albanian students, watching television less than one hour per day, generally was associated with lower average mathematics achievement than watching one to two hours (Mita, 2001). In another study, Rrapo (2006) attempted to examine the association of high school students' achievement with the noninstructional time, spent on learning. He found a significant positive relationship between these variables. The relationship was found to be even stronger when the time was spent on doing written homework.

Students' attitude to school. Students' attitude toward going to school has been given various labels, such as, students' sense of belonging at school, social aspect of schooling, etc. Consideration of students' sense of belonging at school has been shown as an effective way for measuring the relationship between students' attitude toward school and student achievement. Following this approach, PISA 2003 study showed that higher scores in the variable of "belonging at school" were associated with higher scores on OECD students' achievement (Nohara, 2001). In addition, results of TIMSS 1995 study showed that the American "student's aspirations for future education" was one of the strongest school-level predictors of achievement (Martin et al., 1995). Sociologists have found that students in the United States focus more on the social aspects of school than the academic ones; for them school is about friends (Coleman, 1988; Goodlad, 1982).

PISA 2000 results show that Albania is among the four countries, which scored lowest on students' sense of enjoying school. More specifically, students' sense of belonging to school in programs designed to provide direct access to the labor market, tends to be lower than in academically oriented programs (Mita, 2001). The social aspect of schooling is important for Albanian students as well. But, many students who enter high school level seem more focused on the academic aspect of schooling. They want to complete it successfully in order to enter a college or university. Their ultimate goal is to find a good job that will lead to a higher standard of living (The World Bank, 2005).

Students' attitude to learning mathematics. Ma (1999) has demonstrated that primary among the variables that determine achievement in mathematics (AIM) is attitude toward mathematics (ATM). The research literature, however, has failed to provide consistent findings regarding the relationship between ATM and AIM. Thus, a number of researchers have demonstrated that,

in the samples of the U.S students, the ATM-AIM correlation is quite low, ranging from zero to 0.25 in absolute value, concluding that the ATM-AIM relationship is not of practical significance (Wolf & Blixt, 1981).

Results of PISA 2000 study show that Albanian students with greater interest in and enjoyment of mathematics tend to achieve better results than those with less interest in and enjoyment of mathematics (Mita, 2001).

Home environment. Numerous sociological studies have found that the home environment has an impact on achievement in the United States (Riordan, 2004, Kutner, 1996). Referring to the TIMSS 1995 results, Martin et al. (1995) point out, that the parental academic pressure was found to be significant in the U.S., with higher pressure generally being found in the higher-achieving schools. In addition, these authors report a positive relationship between achievement and the presence of academic aids, such as computers, study desks, and dictionaries, at American students' homes.

That most of Albanian high school students seem more focused on the academic aspect of school probably has much to do with the involvement of parents in children's education. Albanian parents regard doing well in school as the single most important task facing their children. This attitude is expressed, for example, on the complete participation of parents in teacher-parent conferences, scheduled on the last Thursday of every school month (Musai & Boce, 2003). What makes these conferences unique in Albanian culture is that they are used by parents to both receive the necessary feedback about children's academic progress and provide support for teachers as they try to do their job (The World Bank, 2005).

METHOD AND INSTRUMENTS

Locations

Durres. The region of Durres was chosen for the study of Albanian high school students primarily because its schools are populated not only by the native families of this city, but also by children of families that a decade ago used to live all over Albania. In consultation with the regions' education authorities, a representative sample of high schools was selected. This sample included one of the city's most outstanding schools, two average schools in rural area of the city, and one school in the countryside. Of four chosen schools, three were comprehensive and one was vocational. The subjects included all Algebra 1 students present on the first and second hour period on the day each of the four schools were visited and included 219 students.

Grand Forks. The sample of American students was chosen from Grand Forks county, state of North Dakota, which is the researcher's living area. The data available from the National Assessment of Educational Progress (NAEP) indicates that ND appears to be among the top states for its high scores in mathematics of grade 8 (NCES, 2005). Located in the Northern Plains of the U.S. Grand Forks county is somewhat homogeneous in terms of population and economic status. Schools were selected in consultation with education authorities to represent the full range of the county's high schools.

All ninth graders in attendance of four schools visited during the first two hours of the test days were included in the sample. The total number of students included in the Grand Forks sample was 242. April and May 2007 were the periods of data collection in Grand Forks and Durres, respectively. Children in both countries begin compulsory education at age 6 so that there is no difference in age of students at the same grade level. In addition, the statistical data made available from the Ministry of Education in Albania indicates that 80 percent of eight graders enrolled in the academic year 2005-2006, continued to the upper secondary school. This percentage is similar to the enrollment rate of students in Grand Forks, given that not all ninth graders attend Algebra 1. Part of them is enrolled in faster or slower paths than Algebra 1 subject matter.

Measures

Instrument. The instrument consisted from a student questionnaire and an Algebra 1 achievement test. The student questionnaire was used to collect information about cultural practices in both countries. More specifically, the questionnaire included questions about teacher practices, use of textbooks, homework assignments, calculator usage, the school day organization, attitude towards school and learning, attitude towards mathematics and home environment (see Appendix A). Students' responses were measured in a 4-point scale. Only two questions related to "home environment" factor were measured in a dichotomous scale. Questions were analyzed to identify predictors of student scores on the algebra test.

A Texas publicly-released standardized test was administered to Algebra 1 students in four schools of Grand Forks and four schools of Durres (see Appendix B). The test was based on the careful analysis of the content of Algebra 1 (Mathematics 1.1, in Albania) and the respective syllabi. Mathematics teachers in each country checked each type of problem concerning its inclusion in the respective curricula. In the process of test design, attention was paid to selecting those items that fulfill the following conditions:

1. Items belong to the Algebra 1 content.
2. Items belong to the topics that are studied in all participating classrooms.
3. Items involve simple arithmetic computations with relatively small integers.

The test contained 15 problems. The first nine problems were multiple-choice questions and the last six problems were response-constructed questions. Students' answers on the 9 first questions were measured using 0-1 system: 0, for the wrong answer and 1, for the right answer. Students' responses on the last 6 questions were measured twice; they were checked for both the correct answer on 0-1 system and for the written representation approach on a 6-point scale. Thus, students' achievement was examined twice. The wrong-right system was used to assess the overall algebraic achievement, while the 6-point scale was used to measure the use of algebraic representations of solutions. Regardless of an answer being correct or not correct, the solution representation was measured as follows: 0-no solution at all, 1-use of arithmetic manipulations, 2-use of words or verbal representation, 3-use of charts, tables or any graphical representations, 4-use of language, such as algebraic symbols, equations, inequalities, and 5-use of combination of algebraic methods with other computational methods

Despite the frequent use of calculators, many teachers in Grand Forks and Durres do not allow their students to use calculators in test. Thus, some classes of both countries used calculators in this test and some did not. Because the test items did involve simple computations, the calculator usage was thought to have little impact on the overall performance.

Skilled, bilingual professionals translated the test and questionnaire from the original version in English into Albanian. The questionnaire and the test were included in the same booklet. Forty-five minutes were allowed for students of both countries to answer the questions of the questionnaire first, and then complete the test.

Initially, the instrument, first, was piloted in a class of the city of Grand Forks in order to check its reliability. The internal reliability of the test was high; Cronbach alpha coefficient for the test was .83. The Cronbach alpha for the items in the questionnaire ranged from .69 to .97.

RESULTS

Achievement test

The analysis showed that Albanian students in the overall test outperformed the American students; this difference was statistically significant at 0.05 level. The average score for the American students was 6.67 (SD = 2.99) and for the Albanian students it was 7.36 (SD = 3.19), [F (1, 459) = 5.7], p = 0.0173. The advantage of the Albanian students was also evident in the constructed response part of the test, which examined algebraic representation skills. In this domain the average score for American students was 8.4 (SD = 5.6), whereas for Albanian students it was 8.9 (SD = 7.5) (see Figure 1). But this difference, unlike the previous one, was not significant ($p > 0.39$)

Table1. The comparison of average scores on the overall achievement and algebraic skills

Country	Albania	US
Overall achievement	7,36	6,67
Representation skills	8,9	8,4

Questionnaire

The perceptions of students in the two countries were compared in an attempt to clarify their possible relation to the Algebra 1 scores. Below is presented the instructional category, which included questions related to teacher practices, students' use of their textbooks and calculators.

Teacher practices. When students were asked about grading in front of the class, Albanian students responded with an average score of 1.8, whereas the average for American students was 1.1. [F (1, 462) = 98.9], $p < .001$. Lecturing from the board was scored higher from Albanian students. On a 4-point scale it was 2.5, whereas the American average score was 1.9. [F (1, 464) = 51], $p < .001$. Albanian teachers tend to ask for students' explanations and justifications more than American teachers do. Thus, the average score of Albanian students for this type of instruction was 2.5 whereas for American students it was 1.8. [F (1, 459) = 60.5], $p < .001$. More drastic was the difference of scores given by students when they were asked about beginning homework in class (see Table 1).

Use of textbooks. In Table 2 we see that not only Albanian students, compared with their American peers, are more dependable on their textbooks, but also that American students use relatively little their textbooks. The biggest difference in average scores is related to studying for exam. On the 4-point scale American students scored .96 whereas Albanian students 2.6 [F (1, 464) = 536.7], $p < .001$.

Use of calculators. Although some teachers involved in the study did not allow calculators during the test, students are always allowed or encouraged to use their calculators in mathematics classrooms. When students were asked about how much they use calculators in classroom, American students responded by an average score of 2.5, whereas Albanian students, 1.2, [F (1, 462) = 165, $p < .001$ Likewise, American students were more relied on their calculators. On a 4-point scale, they

scored 1.7 as opposed to Albanian students who scored 1.2. [F (1, 462) = 44, p < .001.

Noninstructional factors included items related to school day organization, students' attitude toward school and mathematics, and home environment.

Organization of the school day. When students were asked to rate themselves in terms of spending a daytime in non-school related activities, in most of these activities American students gave themselves higher ratings than did the Albanian students. The respective average ratings for the U.S and Albanian students on *I watch TV, videos, use Internet or play with computer games* were 2.3 (SD=1.0) and 1.9 (0.9) [F (1,464)=18.9], p < .001. The item *I Read a book for enjoyment* was rated higher by Albanian students than by American students. In addition, Albanian students spent more time in preparing classes for the next day than did the American students, which is a clear indication that American students gave less emphasis to effort than did the Albanian students. Students of the two countries did not

Table 2. Teacher Practices

	AL (N=217)		US (N=242)		
	M	*SD*	*M*	*SD*	*F-value*
Our teacher grades solutions we present on the board	1,8	0,8	1,1	1	74
We explain or answer the question "why?"	2,4	0,7	1,8	0,9	60,5
We copy lecture notes from the board	2,5	0,7	1,9	1,1	0
We begin our homework in class	0,5	0,6	2,5	0,7	991

Note: All items are rated on a 4-point scale (see Appendix 2). df (1, 458-464). All Ps < .001

Table 3. Use of Textbooks

	AL (N=217)		US (N=242)		
	M	*SD*	*M*	*SD*	*F-value*
I use my textbook:					
To carefully read for understanding	2,6	0,6	1,2	0,9	342
To look at examples	1,9	0,9	1,6	0,9	9,8
To study for the exam	2,6	0,6	1	0,9	536,7

Note: All items are rated on a 4-point scale (see Table 1). df (1, 461-464). All Ps < .001

Table 4. Organization of school days

	AL (N=217)		US (N=242)		
	M	*SD*	*M*	*SD*	*F-value*
I watch TV, videos, use Internet or play with computer	1,9	0,9	2,3	1	18,9
I spend time with my friends	1,6	1	2,6	2,9	20,6
I work at a paid job	0,3	0,9	0,8	3	7,1
I play sports	1,1	0,9	1,8	1,3	42
I read a book for enjoyment	1,7	1	0,5	0,9	188
I prepare for all classes of the next day	3,5	0,8	0,8	0,6	1312
Tutoring out of your regular class	0,7	1,1	0,5	1,6	11,6

Table 5. Attitude toward Mathematics

	AL (N=217)		US (N=242)		
	M	*SD*	*M*	*SD*	*F-value*
I usually do well in mathematics	2,1	0,6	2	0,6	0,27
I enjoy learning mathematics	2,4	0,6	1,7	0,7	127
I need mathematics to learn other school subjects	2	0,8	2	0,6	0
I need to study hard in math to get into the university	2,6	0,7	2,2	0,6	22,7

Note: All items are rated on a 4-point scale (see Appendix 2). df (1, 458-464). All Ps < .001

Table 6. Attitude toward School

	AL (*N*=217)		US (*N*=242)		
	M	*SD*	*M*	*SD*	*F-value*
I like being in school	2,9	0,4	1,75	0,7	401
I think that the most important thing of going to school is learning new things	2,7	0,5	2	0,6	185
I think that most important thing of going to school is making new friends	1,4	0,7	1,9	0,7	59,7

Note: All items are rated on a 4-point scale (see Table 1). df (1, 461-464). All Ps <.001

Table 7. Factors that are significantly correlated with algebra achievement

	US	AL
I spend time with my friends	-0,16689	-0,2045
	0,0093	0,0025
	242	217
I play sports		-0,14486
		0,0334
		216
I prepare for all classes of the next day		0,24274
		0,0003
		218
I usually do well in mathematics	0,30931	0,2442
	0,0001	0,0003
	242	215
I enjoy learning mathematics	0,17296	
	0,007	
	242	
I need mathematics to learn other school subjects	0,22106	
	0,0005	
	242	
We copy lecture notes from the board	-0,16673	
	0,0094	
	242	
I need calculator to do math	-0,17447	
	0,0065	
	242	

differ in amount of time they devoted to tutoring (See Table 3).

Students' attitude toward mathematics. Albanian students expressed more satisfaction with learning algebra than did the American students. The average score of 2.4 for Albanian students was higher than the average score of 1.7 for American students [F (1,463) = 127], $p < .001$. In terms of satisfaction with performance in Algebra 1, Albanian and American scores did not differ significantly. The differences of scores were also not significant in the question that addressed the need of learning math in order to study other disciplines (see Table 4).

Attitude toward school. As it can be seen from Table 5, Albanians are more satisfied than Americans with being in school. Albanians' average score of 2.9 is higher than Americans' average score of 1.75. While being in school, Americans score higher the friendship aspect of school, whereas Albanians scored higher the aspect of learning new things.

Home environment. Students were asked whether they had at their homes a place designed for their study. On a two-point scale, American average score of .6 was lower than that of Albanian score of .9 [F (1,462) = 98.9], $p < .001$. The other question was related to parents concern about their children's success in school. In this case the difference of average scores was not significant and for both countries was high.

Relations between Students' Perceptions and Attitudes, and Achievement

One of the main purposes of the study was to find instructional and noninstructional factors that affect Algebra 1 achievement. After separating data for the

American and Albanian students, all possible correlations of variables within each sample were computed. Only significant correlations were sorted out and are presented in Table 7.

In the case of American students, of six significant correlations, only three variables had significant positive correlations with math achievement: *I Usually Do Well in Mathematics, I Enjoy Learning mathematics,* and *I Need Mathematics to Learn Other School Subjects.* The three other variables: *I Spend Time with my Friends, We Copy Lecture Notes from the Board,* and *I need Calculator to Do Math* had negative correlations with math achievement. For Albanian students, two variables, namely, *I Prepare for All Classes of the Next Day* and *I Usually Do Well in Mathematics* had positive significant correlation with the math achievement, whereas the two others, I *Spend time with my Friends* and *I Play Sports* were related negatively with achievement.

Two variables, *I Spend Time with my Friends* and *I usually do Well in Math*, were significant predictors for both samples. The most influential predictor for the American students *was I Usually Do Well in Mathematics* and for Albanian students it was *I Prepare for All Classes of the Next Day.*

DISCUSSION

The examination of students' performance on particular items of the achievement test shows that students of both countries have difficulties with learning algebra. On average they answered less than 50 percent of test questions correctly. Results related to the first item of the test (computing the value of an algebraic expression) show that approximately 35 percent of American students lack the skills needed to perform arithmetic operations with simple integers. On this item, many students chose the answers less than one, thus demonstrating the lack of basic estimation skills that would allow them to mentally distinguish between fractional values that are greater than 1 versus those that are less than 1. Likewise, results related to question 15 of the test (solving a linear inequality with absolute value) show that American classrooms are lack top students capable of correctly solving challenging problems.

Regarding the ability of students to use the algebraic language for solving response constructed problems nearly two thirds of ninth graders participating in this study demonstrated the use of nonalgebraic methods to solve algebra word problems. In addition, the majority of Albanian students, who are dictated by mathematics 1.1 curriculum to use only algebra for solving word problems, are not able to translate the relation part into an algebraic equation (taking for granted that this relational part has been identified from them). However, Albanian students, compared with their American peers, demonstrated more use of algebra.

Findings of this study show that instructional and noninstructional factors, expressed through students' perceptions, attitudes and beliefs, influence students' performance. Lower ratings given to blackboard-based lecturing are associated with low scores for American students. Likewise, high ratings given by American students to reliance on their calculators lead to lower test scores for them in Algebra 1 test. In contrast, the high rates given by Albanian students to such teaching practices as grading students at the blackboard or asking them to justify their answers, lead to higher test scores for them.

Noninstructional cultural factors appear to be also important in terms of affecting students' performance. This study, for example, underscores the consistence of the American students' self-concept of "doing well in mathematics" with their overall achievement. For Albanian students the need for studying hard to get into the universities lead to higher scores in the achievement test. In addition, Albanian math achievement was also predicted by their satisfaction with school and learning math.

Spending time for reading and learning is another factor that significantly influences students' achievement. When the after-school time is spent for playing and socializing with friends, a factor that is rated high by American students, then their achievement test scores tend to decrease; by contrast, when the time is spent for the academic preparation for the next day or reading in general, a factor that is rated high by Albanian students, then their test scores tend to increase. This conclusion for Albanian students is aligned with their beliefs that school is for learning, rather than for making new friends.

This study represents a first attempt of exploring differences and similarities between cultural factors in the U.S. and Albania that affect students' achievement in Algebra 1. More carefully designed comparative studies, involving bigger samples and especially qualitative methods, are needed to help deepen our understanding of how cultural factors exercised in both countries influence students' learning.

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APPENDICES

APPENDIX A
Student Questionnaire (English Version)

Part ONE: Questions intended to measure cultural factors
For each item mark one option only
I. Organization of the school days

1. On a normal school day, how much time (on average) do you spend before or after school doing each of these things?

a) I watch TV, videos, use Internet or play with computer games
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

b) I spend time with my friends
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

c) I work at a paid job
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

d) I play sports
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

e) I read a book for enjoyment
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

f) I prepare for all classes of the next day?
___0 h; ___1 h; ___2 h; ___3 h; ___4 or more hours.

2. During this school year, how often have you had tutoring or extra lessons in Algebra 1 that are not part of your regular class?

_____Every day or almost every day

_____Once or twice a week

_____Once or twice a month

_____Sometimes

_____Never or almost never

II. Students' attitude towards learning mathematics

3. How much do you agree with these statements about learning mathematics?
a) I usually do well in mathematics
___Strongly agree ____Agree
____Disagree ___Strongly disagree

b) I enjoy learning mathematics
___Strongly agree ____Agree ____Disagree
___Strongly disagree

c) I need mathematics to learn other school subjects
___Strongly agree ____Agree ____Disagree
___Strongly disagree

d) I need to study hard in math to get into the university or college of my choice
___Strongly agree ____Agree ____Disagree
___Strongly disagree

III. Students' attitude towards going to school

4. How much do you agree with these statements about the school

a) I like being in school
___Strongly agree ____Agree ____Disagree
___Strongly disagree

b) I think that the most important thing of going to school is learning new things.
___Strongly agree ____Agree ____Disagree
___Strongly disagree

c) I think that most important thing of going to school is making friends
___Strongly agree ____Agree ____Disagree
___Strongly disagree

IV. Home environment

5. In your home, is there a place designed for you to study?
_____Yes ____No

6. Are your parents concerned about your success in school?
_____Yes _____No

Part TWO: Questions intended to measure instructional factors

I. Teacher practices

1. Our teacher:
a) Grades solutions we present on the board
___Always or almost always ___Most times
___Some times ___Never or almost never

Reteaches the same topic on the next day when this topic is not understood by students:
___Always or almost always ___Most times
___Some times ___Never or almost never

How often do you do these things in class?

We explain or answer the question "why?"
___Always or almost always ___Most times
___Some times ___Never or almost never

We copy lecture notes from the board
___Always or almost always ___Most times
___Some times ___Never or almost never

We begin our homework in class
___Always or almost always ___Most times
___Some times ___Never or almost never

d) We have quiz

____Every day or almost every day

____Once or twice a week

____Once or twice a month

____Sometimes

____Never

3. How often do you take these types of tests?

a) We take multiple-choice tests
___Always or almost always ___Most times
___Some times ___Never or almost never

b) We take response question tests
___Always or almost always ___Most times
___Some times ___Never or almost never

c) We take a combination of the two above tests
___Always or almost always ___Most times
___Some times ___Never or almost never

II. Students' use of textbooks

4. I use my textbook

To carefully read for understanding
___Always or almost always ___Most times
___Some times ___Never or almost never

To look at examples
___Always or almost always ___Most times
___Some times ___Never or almost never

To study for the exam
___Always or almost always ___Most times
___Some times ___Never or almost never

III. Calculator usage

5. We use calculators during math classes
___Always or almost always ___Most times
___Some times ___Never or almost never

6. We are allowed to use calculators on tests
___Always or almost always ___Most times
___Some times ___Never or almost never

7. I need calculator to do math
___Always or almost always ___Most times
___Some times ___Never or almost never

APPENDIX B
The Standardized Achievement Test (English Version)

Part I: MULTIPLE-CHOICE QUESTIONS
Use the blank spaces surrounding the given questions or the backs of these sheets as a place for your scratch notes

Read each question. Then mark or circle the letter for the answer you have chosen.

1. What is the value of $y = \frac{x^8}{x^6}$ if x is 2?

a) $\frac{1}{8}$

b) $\frac{1}{6}$

c) $\frac{1}{4}$

d) $\frac{1}{2}$

e) *None .of .the .above*

2. Which function includes all of the ordered pairs in the table?

x	-2	-1	0	1	2
y	9	3	1	3	9

a) $f(x) = x + 4$

b) $f(x) = x^2 + 1$

c) $f(x) = 2x^2 + 1$

d) $f(x) = -x^2 + 2$

e) $f(x) = -x + 3$

3. At which point does the graph of $f(x)=x^2+3x-18$ intersects the x-axis?

a)(–9,0)*and*(2,0)

b)(–6,0)*and*(–3,0)

c)(–6,0)*and*(3,0)

d)(–3,0)*and*(6,0)

e)(–2,0)*and*(9,0)

4. What is the value of x in the following equation?
3x-4(x+1)+10=0

a)2

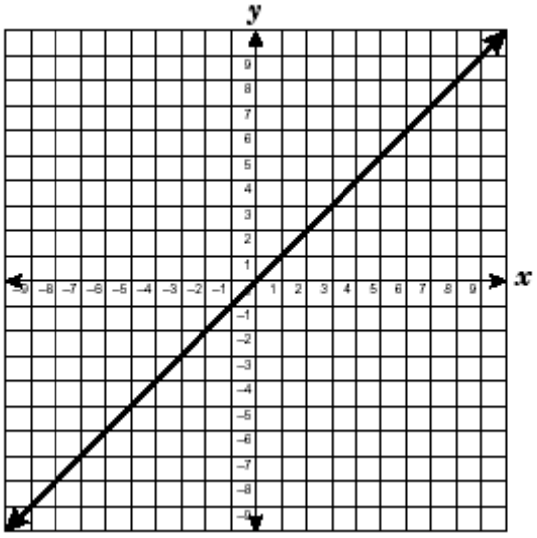
b)6

c)10

d)11

e)14

5. Which function is best represented by the graph below?



$a) y = \frac{1}{2}x - 1$

$b) y = -x$

$c) y = x^2$

$d) y = x$

$e) y = \frac{1}{2}x + 1$

6. Lola keeps a record of her weekly read pages. Last week she studied a total of 6 hours and read 51 pages. This week she studied a total of 9 hours and read 76.5 pages. Which equation can be used to find the amount of pages she would read at this rate if she studies x hours?

$a) y = \frac{2}{17}x$

$b) y = \frac{2}{3}x$

$c) y = 1.5x$

$d) y = 8.5x$

$e) y = 12.75x$

7. A portion of the graph of the function $y=2x^2-7$ is shown on the grid below. For which other value of x does y equal 1?

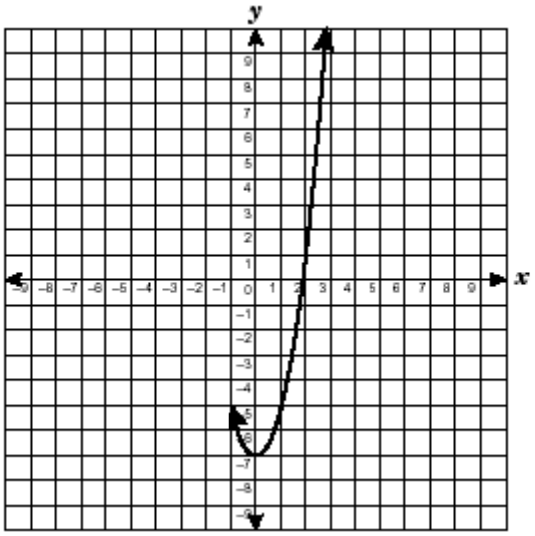
$a) -1$

$b) -2$

$c) -3$

$d) -4$

$e) -5$



8. Which equation represents the line that passes through the points (6, -1) and (-2, 3)?

$a) y = \frac{1}{2}x + 4$

$b) y = \frac{-1}{2}x + 2$

$c) y = \frac{1}{2}x - 2$

$d) y = 2x - 1$

$e) y = 2x - 11$

9. The height of a ball that was batted into the air at 160 feet per second is a function of t, the time in seconds after the ball was hit. The height is determined by subtracting 16 times the square of t from 160 times t. Which equation can be used to find t when the ball is 400 feet high?

$a) 160t - 16t^2 = 400$

$b) (160 - 16)t^2 = 400$

$c) 160(t^2 - t) = 400$

$d) 160 - (16 - t^2) = 400$

$e) 16t^2 - 160t = 400$

Part II: CONSTRUCTED RESPONSE QUESTIONS

In the following questions show all the steps that lead to your answer. Use the space below each problem to present your explanations

10. To convert a temperature in degrees Fahrenheit F, to a temperature in degrees Celsius C, the following formula can be used.

C= (5/9) (F-32)

What is the minimum value of F that will make C greater than or equal to 70?

11. Linda cut a 60-inch wire into 3 pieces. The longer piece was twice as long as each of the other 2 pieces, which

were the same length. What was the length of the longest piece of wire?

12. Yesterday, a total of 24 students were present in Alfred's class. There were 3 fewer girls than twice the number of boys. Find the number of girls and boys who were present in Alfred's class.

13. Ms. Ann has saved $325 for a new refrigerator. She plans to save an additional $50 per month. What is the least number of months she will need to save money in order to have enough to buy a refrigerator that costs $760, including tax.

14. Draw by hand a coordinate plane and shade the part that represents the graph of $2x-3y \leq 18$.

15. Solve the inequality: $|3x-5|+1 \geq 8$ and graph the solutions on the number line.