Instructional Variables Involved in Problems Associated with Diglossia in Arabic Speaking Schools in Israel: PIRLS 2006 Findings

Ruth Zuzovsky, Tel Aviv University and Kibbutzim College of Education

Technology and the Arts, ruthz@post.tau.ac.il

Abstract

PIRLS-2006 findings establish that reading literacy attainments of 4th graders in Arabic-speaking countries are poor. This low attainment is also reflected in the findings of PIRLS 2006 in Israel when comparing Arabic-speaking 4th graders' reading literacy mean score with that of their Hebrew-speaking peers (428 vs. 528). Findings of a previous study (Zuzovsky, 2008) supported an explanation that the existence of diglossia typical of the Arabic language (two linguistic codes – written and spoken) is the main cause of the low results of Arabic-speaking students in Israel and recommended educational interventions aimed to directly treat the problems of diglossia. Following these recommendations the present study aims to identify specific instructional activities that are significant in the effort to overcome the problems associated with Arabic diglossia.

Of fourteen reading literacy activities positively associated with reading attainment, six exhibited significant interaction effect with the ethnic group variable indicating their relatively higher contribution to the achievement of students in Arabic-speaking schools.

The most effective variables for Arabic-speaking students appear to be those indicating early home literacy activities that foster phonemic awareness and letter sound recognition. Among the school literacy activities, repeated listening to the sounds of written Arabic and being actively engaged in reading text and gradually in more challenging tasks, are promising school practices.

Keywords: Reading achievement, Arabic diglossia, reading instruction

Introduction

Findings from the most recent international study on Reading Literacy (PIRLS-2006)[1] establish that reading literacy attainments of 4th grade students in Arabic-speaking countries are poor. The three Arabic-speaking countries that participated in this study (Qatar, Kuwait, Morocco) are at the bottom of the league table of the 45 participating countries and educational entities, scoring 353, 330, 323, respectively, more than two standard deviations of the international score distribution ($SD = 100$) below the highest achieving country – the Russian Federation (565).

This low attainment is also reflected, more specifically, in the findings of PIRLS 2006 in Israel, if we compare Arabic-speaking 4th graders' reading literacy mean score with that of their Hebrew-speaking counterparts (428 vs. 528).

Although Arabic-speaking students in Israel did better in PIRLS 2006 tests than Arabic-speaking students in Arab countries, the gap in favor of Hebrew-speaking students is still higher than one standard deviation of the national score distribution ($SD = 95$); indeed it even increased since the previous PIRLS study in Israel, which was conducted in 2001 (from 113 to 120 points score).

Students of these two sectors mostly learn in two separate school systems divided by their language of instruction and supervised by different inspectorates [and of course they are also divided by the fact that the Arabic speaking schools draw a non-Jewish, Arabic speaking student body, while the Hebrew speaking schools are almost totally Jewish].[2] They were each tested in their own language.

Two alternative explanations are usually given to the low levels of reading literacy of Arabic-speaking students. One associates reading literacy, like other aspects of school attainment, with socioeconomic factors (Benabou, 1996; Bradley & Corwyn, 2002, Chiu & McBride-Chang, 2006, Ogle et al., 2003, Walker, Greenwood, Hart, & Carta, 1994; Willms, 1999, 2003, 2006), and the other puts the blame specifically on the diglossia factor (Ferguson, 1959), i.e., two significantly different linguistic codes: written and spoken, which is typical of the Arabic language, but does not occur, for instance, in Hebrew (Abu-Rabia, 2000, Ayari, 1996; Maamouri, 1998; Saiegh-Haddad, 2003, 2007). These two linguistic codes in the Arabic language differ in vocabulary, phonology, syntax and grammar and have become distanced from each other. Students who are used to spoken Arabic and meet the standard written language only when entering school, encounter difficulties similar to those typical to learning a second language (Ayari, 1996).

Data obtained in Israel for PIRLS-2006 on achievements in reading literacy (which is likely to be affected by diglossia), and for TIMSS-2003 on achievements in science and mathematics (less likely to be affected by diglossia), as well as data on a large number of socioeconomic factors playing a role in students' opportunities to learn, enabled me in a previous study (Zuzovsky, 2008) to control

---

[1] Progress in International Reading Literacy Study (Mullis, Martin, Kennedy, & Foy, 2007).

[2] There are only very few schools (1-2) in Israel where instruction is given in both Hebrew and Arabic. Mixed population classes appear only in Hebrew-speaking schools.

for socioeconomic factors and examine the effect of diglossia on achievement. Contrary to my expectations I found that the achievement gap in reading literacy between Hebrew-speaking and Arabic-speaking students in favor of Hebrew-speaking students after controlling for the socioeconomic factors still remained large although it decreased, whilst in mathematics and science the previously existing gap had almost completely disappeared and even reversed.

These findings supported the explanation according to which Arabic diglossia is the main cause of the low reading attainment of Arabic-speaking students in Israel and may have implications for the low achievement in other Arabic-speaking countries as well.

These findings also suggest that educational interventions should be directly targeted at the problems caused by diglossia rather than only compensating for socioeconomic factors as was done in several affirmative five-year plans aimed, unsuccessfully, to elevate achievement among the Arabic speaking population in Israel (Abu, Asba, 2006; Golan, 2005; Dichter & Asad, 2003).

Following this line of thinking, the present study aims to identify instructional variables and learning activities that specifically work toward overcoming the problems associated with Arabic diglossia, i.e., that are positively associated with reading attainment among Arabic-speaking students.

The research question that guided this study was, thus, formulated as follows:

Are there any interaction effects between reading instruction variables and the ethnic affiliation variable (Arabic-speaking or Hebrew-speaking) that result in relatively higher achievement gains of students in Arabic-speaking schools?

Theoretical Background

In looking for collective reading instruction activities I was guided by two well-known publications of research findings on successful educational interventions, including some relating to reading instruction the "What Works Clearing House" – (WWC), (US Department of Education), published periodically since the early 1980s, and another set of publications, dedicated solely to reading – published from the 1990s: the US National Reading Panel Report – NRPR (National Institute of Child Health and Human Development [NICHD], 2000, 2006). These two sources are often used by educators as well as by researchers in recommending and adopting practices and in designing studies to further investigate reading instruction modes.

The instructional variables and literacy activities delineated as effective, pointed toward developing phonemic awareness, teaching phonics, reading aloud, encouraging independent reading, extending reading as part of homework, and improving reading comprehension skills.

The practices recommended by the above sources and also featuring in the PIRLS (2006) database constitute the basis for this study, which aimed to select, from amongst them, those instruction activities that are more effective for Arabic-speaking students.

Sample

The data for this study derived from the PIRLS-2006 study in Israel, which was based on a nationwide representative sample of 4th graders in Hebrew-speaking schools and Arabic-speaking schools. The sample consisted of 3,908 fourth graders from 149 schools. Of them, 2,715 students studied in 109 Hebrew-speaking schools and 1,193 in 40 Arabic-speaking schools.

The data relating to the specific instructional variables that served this study were obtained from student, parent and teacher questionnaires. Variables obtained from student or parent questionnaires were averaged to represent measures at the school level. Because of missing data, from parents and sometimes from teacher questionnaires, the number of schools varied from one variable to the other.

Method

The first step in the analysis was aimed to identify from the selected instructional activities, those that are more positively associated with reading attainment in the Arabic-speaking sector than in the Hebrew-speaking sector. Descriptive statistics of the variables associated with these activities in the two sectors, including independent-sample *t*-test, to compare their means and the Pearson correlation coefficients between these variables, and the overall reading literacy scores in the two populations, were used for this purpose. (They appear further on in the Results section.)

The delineated instructional variables were then fitted into a set of multilevel regressions analyses. Using HLM6 software for the analyses (Raudenbush, Bryk, Cheong, & Congdon, 2004) helped in finding significant interaction effects between the variables we expected to positively affect reading attainment and schools' ethnic affiliation (referred to as "sector" variable). The models specified for these analyses were two-level models of students nested in schools/classes.[3] At their first level, all models included three student variables known to be associated with reading achievement: gender; number of educational aids at home, and an index describing student reading self concept.[4] At the second level all alternative models specified included a "sector" variable (0-Arabic-speaking; 1-Hebrew-speaking). In addition, for each of the alternative models specified, only one of the literacy activities expected to significantly affect reading achievement and its interaction term with the "sector" variables were introduced into the model. The reason for this was associated with computational constraints on the number of model parameters allowed to be included in the regression equation.

---

[3] This is the result of the PIRLS sampling procedure which allows the sampling of at least one class per sampled school.

[4] Of these three student level variables, only the gender variable was found to have a significant random effect; the two others were specified as having fixed effects.

The regression equations for the HLM analyses were as follows:

Level 1 model:

$$\gamma = \beta_0 + \beta_1 \text{ (gender)} + \beta_2 \text{ (number of educational aids at home)} + \beta_3$$
$$\text{(student reading self concept)} + R \text{ (error term)}$$

where γ is the overall reading literacy score of students nested in schools, β_0 is the intercept, β_1, β_2 and β_3 are the coefficients that indicate the slopes of the regression line for gender, educational aids at home and the student reading self concept, and R is the residual error term.

Allowing the intercept β_0 to be modeled as random and regressing it in alternative models that each time include a different instructional variable and its interaction term with sector, produces an "intercept – as outcome" model (Raudenbush & Bryke, 1986).

In an equation format the second level of the model is thus as follows.

Level 2 model:

$$\beta_0 = \gamma_{00} + \gamma_{01} \text{ (sector)} + \gamma_{02} \text{ (the relevant standardized instructional variable)}$$
$$+ \gamma_{03} \text{ (sector * the relevant standardized instructional variable)} + u \text{ (error term)}$$

To avoid the problem of multicolinearity and to maximize interpretability, the instructional variables were standardized around their grand mean (Aiken & West, 1991, p. 43).

Models that exhibited a significant interaction effect were then used to predict reading achievement for students in Arabic-speaking and for students in Hebrew-speaking schools at different levels of the relevant instructional variables. Three possible standardized values of these variables were used for these predictions: 1 – *minimal value*; 2 – *actual mean value set to 0*, and 3 – *maximal value*.

Plotting these predicted outcomes is a known technique for probing and visualizing interaction effects (Aiken & West, 1991). In this study these plots highlight the differential role of the instructional variables in promoting reading literary among 4th graders in both Hebrew-speaking and Arabic-speaking schools and in reducing the achievement gap between the two sectors.

The Variables Employed in this Study

Data on student characteristics were derived from student questionnaires. Three variables were selected. The first variable is *gender* (0 – girl; 1 – boy); the second is an index that indicates the *number* (between 0-4) of *educational aids at the student's home* (NEDAIDS) – (computer, study desk, books, daily newspaper). The third is another index – (SRSC) – *student's perception of her or his own reading self concept.* The index was divided into three categories indicating various levels of the students' reading self concept: (1 – *high*; 2 - *medium*, and 3 - *low*). [5]

All variables related to reading activities to which students were exposed were recoded to indicate higher frequencies on the higher levels of their scale.

Following is a list of these variables. The recoded scale and the source that served these variables are in brackets.

From parent responses, we selected two variables that describe early home literacy activities:

1. *Before the child started school, parent engaged with him or her in play with alphabet toys–* HHA04 (1 – *never*; 3 – *often*) (parent 2d).

2. *Before the child started school, parent wrote letters or words with him or her* – HHA08 (1 – *never*; 3 – *often*) (parent 2h).

From student responses, we selected two variables describing student exposure to reading or engagement in reading outside the school:

1. *Student listens to someone at home reading aloud* – TOC2 (1 – *never*; 4 – *every day*) (student 3b).

2. *Student talks to someone at home about what s/he reads* – TOC4 (1 – *never*; 4 – *every* day) (student 3d).

Most of the variables on student engagement in reading literacy activities in class were obtained from student responses. We preferred the credibility of this source except for in the case of three advanced literacy activities – where students are less familiar with their terms so that we preferred the teachers' report:

1. *Teacher reads aloud in class* – HC1 (1 – *never or almost never*; 4 – *every day or almost every day*) (student 6a).

2. *Student reads aloud to the whole class* – HC2 (1 – *never or almost never*; 4 – *every day or almost every day*) (student 6b).

3. *Student reads silently on his/her own in class* – HC4 ((1 – *never or almost never*; 4 – *every day or almost every day*) (student 6d).

---

[5] For further details see PIRLS (2006) Technical Report, p. 207.

4. *Student reads book s/he chooses* – HC5 (1 – *never or almost never*; 4 – *every day or almost every day*) (student 6e).

5. *After reading, student answers questions orally about what s/he read* – FR3 (1 – *never or almost never*; 4 – *every day or almost every day*) (student 7c).

6. *After reading, student talks to other students about what s/he read* – FR4 (1 – *never or almost never*; 4 – *every day or almost every day*) (student 7d).

7. *Teacher includes reading as part of homework* – HWRD (1 – *never*; 5 – *every day*) (student 8).

8. *Teacher asks student to identify main idea* – DEV1 ((1 – *never or almost never*; 4 – *every day or almost every day*) (Teacher 17a).

9. *Teacher asks student to explain/support his/her understanding of what s/he read* – DEV2 (1 – *never or almost never*; 4 – *every day or almost every day*) (teacher 17b).

10. *Teacher asks student to describe the style and structure of the text* – DEV7 (1 – *never or almost never*; 4 – *every day or almost every day*) (teacher 17g).

The mean of the five plausible values[6] of the overall reading proficiency scores generated for each respondent, aggregated to the school level, served as our dependent variable.

Results

Below are the results with reference to the steps carried out in the analysis.

Stage 1: Looking for Instructional Variables that are more Effective in Arabic-Speaking Schools

Table 1 displays descriptive statistics of the 14 selected variables describing students' past engagement in early reading activities in their home, and currently outside school or in their reading class. All the statistics are measures at school/class level and are provided separately for Hebrew-speaking schools and Arabic-speaking schools, with *t*-values and significance of differences between the two sectors. The table also provides Pearson correlation coefficients for these variables with the overall Reading score in the two sectors. Because of missing data, the number of schools for the different variables varied and is reported in Table 1 for each variable.

Insert Table 1

Of the 14 instructional variables presented in the table, eight occurred significantly more frequently in Arabic-speaking classes than in Hebrew-speaking classes:

Before the child started school parents play with alphabet toys with him/her (HHA04);

Before the child started school, parents wrote letters or words with him/her (HHA08);

Student listens to someone at home reading aloud (TOC2);

Student talks to someone at home about what s/he reads (TOC4);

---

[6] For more information on the scores used in PIRLS study – see Foy, Galia, & Li, 2007.

Student reads aloud in class (HC2);

After reading student answers questions orally about what s/he read (FR3);

After reading student talks to other students about what s/he read (FR4);

Student is asked to read as part of homework (HWR);

The frequent occurrence of these literacy activities in the Arabic-speaking sector probably indicate awareness of parents and teachers of the difficulties Arabic-speaking children fact in learning to read and the special efforts made at home to overcome these difficulties. All these variables also appear to be positively, and in most cases, significantly, associated with reading achievement of Arabic-speaking students.

In the Hebrew-speaking sector, these literacy activities are less frequent and they are probably only targeted at low achievers. The negative, though not always significant, correlations of these variables with reading achievement in Hebrew-speaking schools confirm this hypothesis.

Three variables occur with the same frequency in both sectors:

Teacher reads aloud in class (HC1)

Teacher asks student to identify main idea in the text (DEV1)

Teacher asks student to describe the style and structure of the test (DEV7)

With the exception of the last variable, which seems to refer to an advanced skill beyond the capability of students at this age, especially in the Arabic-speaking sector, the other two are positively associated with achievement in the Arabic-speaking sector and not associated, or even negatively associated, with reading achievement in the Hebrew-speaking sector.

The only instructional variables that were statistically more frequent in Hebrew-speaking schools are:

Students read silently on their own in class (HC4);

Students read books they themselves choose (HC5);

Teacher asks students to explain or support their understanding (DEV2).

Despite being more frequent in Hebrew-speaking classes, these variables are more positively associated with achievement in the Arabic-speaking sector. It seems that such independent literacy activities are suitable for advanced students in this sector, or for those who come from homes with high levels of literacy in both sectors. The relatively little variation of these variables, as inferred from their standard deviation, in the more homogeneous Hebrew-speaking sector, suppresses their effect in this sector.

Stage 2: Looking for Instructional Variables and Literacy Activities that Significantly Interact with "Sector" in a Way that Contributes More to the Achievement of Arabic-speaking Students

Each of the instructional variables found to be associated with reading achievement more in Arabic-speaking schools, along with the "sector" variable and with the interaction term between the

relevant instructional variable and the "sector" variable, were fitted as second-level variables in alternative HLM regression models. Since some of the models contained variables describing early literacy activities at home which were obtained from parents (with a lower response rate than variables obtained from students), two separate null models were specified for the HLM analyses – one with maximum 3,599 level-one units and with maximum 137 level-two units, and a second model with a maximum of only 2,798 level-one units and 108 level-two units. The analyses of these models are reported separately in Tables 2a and 2b. As HLM requires a complete data set and some second-level variables were missing in certain schools, the number of the level-two units varied slightly from one analysis to the other.

Insert Tables 2a and 2b about here

The between-school variance of 4th graders' reading literacy scores that appeared in the two analyses reached 49% and 44% of the total variance, indicating that a substantial part of the variability in students' reading outcomes occurs between schools. The models with only the student-level variables explained about a quarter of the between-school variance. However, when adding the second-level variables, the alternative models, each devoted to only one of the reading literacy activities and its interaction term with sector, explained an additional large portion of the between-school variance beyond what was already explained by the student-level model (35% - 51%). Altogether, most models explained more than 70% of the between-school variance. These models appear to have quite remarkable explanatory power regarding the between-school variance in literacy scores.

The most important output of the multilevel regression analyses were estimates of the regression coefficients for all predictors involved in the models and their standard error of measurement.

As all predictors that described students' engagement in different reading literacy and instructional activities were standardized, their coefficients indicate an increase or decrease in achievement scores due to a change of $1SD$ on the scale of the relevant predictor, above or below its mean value (Aiken & West, 1991, pp. 38-39). The interpretation of the regression coefficient of the interaction term γ_{03} represents change in achievement score points due to increase by $1SD$ above the standardized mean of the relevant predictor in the Hebrew-speaking sector versus that of the Arabic-speaking sector. The negative coefficient of these interaction effects indicates additional score points that students in Arabic-speaking schools achieve due to an increase by $1SD$ above the mean of the standardized predictor compared to the achievement of students in Hebrew-speaking schools.

Table 3 presents a summary of the regression coefficients of all terms involved in the models including the interaction term of the instructional variable with the sector variable.

Insert Table 3 about here

9

Of the fourteen reading literacy activities that were fitted into the regression equations, six were found to have negative and significant ($p \leq .05$) interaction effects with "sector", indicating their higher contribution to the achievement of students in Arabic-speaking schools. These variables were: *teacher reading aloud in class*; *student listens to someone reading at home; after reading, student talks to other students about what s/he read;* and *student reads a part of homework*. Two additional variables describe two types of early home literacy activities in which parents engaged with their children before they went to school: *Playing with alphabet toys* and *Writing letters or words* were also found to be more beneficial for students in Arabic-speaking schools.

The rest of the variables that showed negative, though less significant ($p \leq .08$), interaction effect with the sector variable are the following: s*tudent reads aloud to the whole class; after reading, student answers questions [orally] about what s/he read*, and variables describing more elaborate engagements such as: *teacher asks student to explain his/her understanding,* and *teacher asks student to describe the style and structure of the text*

Effective variables - more so among Arabic-speaking students - appear to be those indicating early home literacy activities which parents do at home with their children, especially learning to write letters or words, as well as other mediating literacy activities such as listening to someone reading aloud at home.

Among the literacy activities at school, listening to the sounds of written Arabic when *the teacher reads aloud to the whole class* and when *the student reads aloud in class*; as well as variables that describe active engagement in *reading as part of homework*, and as part of after-reading activities – such as: *talking to other students* or *answering questions, orally*, *about what the student reads*, seem to represent promising practices in Arabic-speaking schools.

Stage 3: Probing the Significant Interaction Terms Delineated in the HLM Analyses

The variables that were found to interact significantly or almost significantly with school's ethnic affiliation in a way that favored the achievement of students in Arabic-speaking schools over students in Hebrew-speaking schools, can provide some clues regarding the nature of effective interventions and modes of instruction that take into account the diglossic situation in Arabic.

Using the regression equations that included these variables allowed the computation of predicted outcomes at different levels of the relevant instructional variable. Table 4 presents these predicted outcomes. The relative effect these variables have in the two sectors can be inferred from comparing the predicted student achievement under maximal and minimal values of the relevant variables (level gain). The achievement gap between the predicted outcomes of students in Hebrew-speaking schools and in Arabic-speaking schools under the three values of the instructional variables indicates the role of these variables in narrowing the achievement gap between the sectors (the sector gap). Table 4 demonstrates these effects.

Insert Table 4

The gap between the mean score of students exposed to maximal and to minimal levels of the instructional variables (level gain), in favor of students in Arabic-speaking schools, indicates that these variables are more effective for Arabic-speaking readers. This is the case with many variables and it is most profound when students were exposed to early home literacy activities with their parents, when students *are listening to their teacher reading aloud*, when they themselves *read aloud to the whole class*, or when students are *reading as part of their homework.*

In some cases, while the predicted scores of students in Arabic-speaking schools are higher at the maximal value level than at the minimal value level of the relevant instructional variable, the opposite occurs in Hebrew-speaking schools where scores at the maximal value of the relevant instructional variables are much lower than those predicted at their minimal value. This occurs, for instance, when students *read aloud in class*; *answer questions orally about what they read*; *talk to other students about what they read*; *read as part of homework*; *listen to someone at home reading aloud;* or when, *before starting school, they wrote letters and words with their parents.*

In all these instances, the sector gap narrows dramatically at the maximal value levels of instructional variables. The only variable that seems to negatively affect the achievement of Arabic-speaking students and result in larger sector gaps when it occurs often, is when students are asked by their teacher to *describe the style* and *structural features of the text they read* (an advanced skill).

As mentioned, plotting the predicted outcomes at different value levels of the relevant variables separately for students in Hebrew-speaking schools and for those in Arabic-speaking schools enables to demonstrate how the instructional variables differentially affect achievement in the two sectors and indicates, consequently, the narrowing of the achievement gap between students in Hebrew-speaking schools and Arabic-speaking schools.

Several plots[7] were chosen to demonstrate these effects: some describe the effect of early home literacy activities, others out-of-school activities and other classroom activities. All the plots demonstrate the relatively higher positive gains in reading achievement of the selected variables in Arabic-speaking schools. The achievement of students in Hebrew-speaking schools does not change as a result of higher values of the instructional variables. In some cases, achievement even declines.

The effects of **early home literacy activities** are described in Figures 1 and 2.
Before the child started school, parent engaged in play with alphabet toys with him or her
Before the child started school, parent wrote letters or words with him/her

---

[7] The plots are based on the regression equation of the interactive relevant models specified earlier and the data that served the analyses.

	low	mean	high
HS	531	529	527
AS	345	398	446
GAP	186	131	81

Figure 1: Predicted reading literacy scores at three levels of home early literacy activity *(Parent played with alphabet toys with her or his child HHA04)*

Key :   HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

	low	mean	high
HS	542	526	511
AS	265	367	462
GAP	277	159	49

Figure 2: Predicted reading literacy scores at three levels of early home literacy activity *(Parent wrote letters or words with his/her child HHA08)*

Key :   HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

These figures show that in the maximal values of early home literacy activities parents engage in with their child before s/he starts schools, the achievement gaps between the sectors narrow dramatically. The plots also indicate that these early home activities mostly related to acquaintance with letters and words and the alphabet principles are typically beneficial for Arabic-speaking students.

The effect of **out-of-school literacy activity** which complements school activities is presented in Figure 3. This plot, that describes the role of listening to someone at home reading aloud, demonstrates a positive relationship with reading achievement in the Arabic-speaking sector and a negative relationship in the Hebrew-speaking sector:

Student listens to someone at home reading aloud TOC2

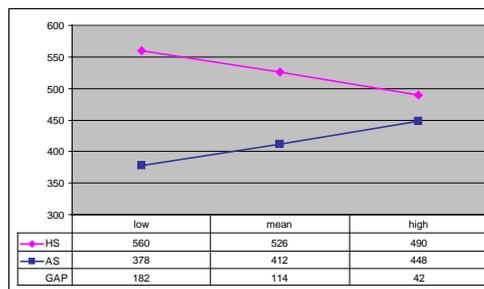|	low	mean	high
HS	560	526	490
AS	378	412	448
GAP	182	114	42

Figure 3: Predicted reading literacy scores at three levels of *Student listens to someone at home reading aloud* (TOC2)

Key :   HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

The value of listening to the sounds of the written language when someone at home reads aloud to them is helpful even for 4th grade Arabic-speaking students. While for the 4th grade Hebrew-speakers, frequent listening to someone who reads aloud at home probably indicates difficulty in reading.

Three plots describe activities related to **class instruction**. *Teacher reads aloud in class; Student reads aloud in class*, and *Student reads as part of homework.*
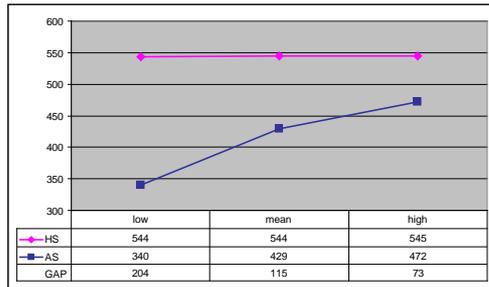

Figure 4: Predicted reading literacy scores at three levels *of Teacher reads aloud in class (HC1)*

Key : HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

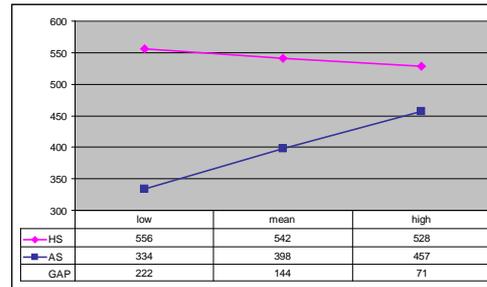|	low	mean	high
HS	544	544	545
AS	340	429	472
GAP	204	115	73

Figure 5: Predicted reading literacy scores at three levels of *Student reads aloud in class* (HC2)

Key : HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

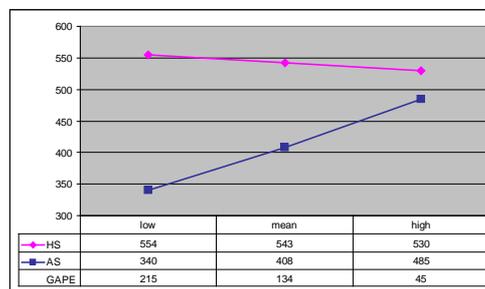|	low	mean	high
HS	556	542	528
AS	334	398	457
GAP	222	144	71

Figure 6: Predicted reading literacy scores at three levels of *Student reads as part of homework* (HWR)

Key : HS – Hebrew-Speaking ; AS – Arabic-Speaking
GAP – Between Hebrew-Speaking and Arabic-Speaking Students

	low	mean	high
HS	554	543	530
AS	340	408	485
GAPE	215	134	45

Two of these plots, again, highlight the value for Arabic-speaking students of listening to the sound of the written language. For Hebrew-speaking students listening to the sound of the language when reading aloud makes no difference and when it frequently occurs (probably with low achievers), it is negatively associated with achievement.

Being engaged in reading as part of homework is a very effective activity; here too, especially for Arabic-speaking students.

Conclusions and Discussion

The present study looked at reading activities which, if they occur frequently in Arabic-speaking schools, can result in profound improvement in reading literacy of Arabic-speaking students. Such variables can be regarded as effective in solving problems associated with Arabic diglossia.

The variables delineated in this study describe reading instruction or reading literacy activities that occur both before the child enters school and during the early school years, and both in class and at home.

The activities that were found to be effective for Arabic-speaking students and were also found to be more frequent in this sector, were those aimed at fostering phonological and alphabetical awareness before the child starts school, in one-on-one parent-child tutoring situations, as well as those that combine vocalization of written texts and active engagement in reading in schools and outside schools (Cummins, 2007; Guthrie, 2004). Most of these variables were found to be effective in both sectors, but more so in the Arabic-speaking sector. However, some of the variables, especially those that describe vocal activities and engagement in routine reading activities in class were found to be negatively associated with reading achievement in the Hebrew-speaking sector, i.e., predicted reading achievement of Hebrew-speaking students at maximal values of these variables is lower than that at their minimal level.

These findings are surprising from several points of view. In light of the social and economic inequality, both at home and in schools, that exists in Israel in favor of the Hebrew-speaking sector, I anticipated there to be more literacy activity in the Hebrew-speaking sector at home and in school. The findings, though, point to more frequent literacy activities in the Arabic-speaking sector and also to these activities being more associated with reading achievement in this sector.

A possible interpretation of these findings is that the relatively more frequent literacy activities in the Arabic-speaking sector are a response of Arabic-speaking parents and teachers who are aware of the difficulties their children face in encountering the Arabic written language and thus make every effort to provide suitable instruction and support to overcome these difficulties.

The higher association of these activities with reading achievement in the Arabic-speaking sector can indicate their power in overcoming the problems caused by the diglossic situation, while the absence and even negative association with reading achievement of these variables in the Hebrew-speaking sector, can be a result of the possibility that these activities are targeted purposefully and a-priori at low achievers.

Although it is hard to infer causality regarding the effectiveness of these reading activities for Arabic-speaking students as their frequent occurrence might be both a consequence of poor reading performance as well as a cause for improved reading skills, the evidence suggests that these types of activities are needed in learning to read in a diglossic situation.

Among the common approaches advocated for overcoming reading problems associated with diglossia, are those regarded as "natural", i.e., attempts of a less explicit and less structured type, including early exposure to written language both while playing at home and at kindergarten - as is often done through storytelling since this enables listening to the written language (Abu Rabia, 2000; Feitelson et al., 1993; Maamouri, 1998).

Other approaches advocate more structured interventions (Iraqi, 1990, Levin, Saigh-Haddad, Hende, Ziv, 2007; Saigh-Haddad, 2003, 2008; Somech, 1980).The need for such structured interventions is better understood in light of the "simple view of reading" model (Gough, Hoover & Peterson, 19996; Gough & Tunmer, 1986; Hoover & Gough, 1990) that regards reading as the product of two skills: word decoding and linguistic comprehension, or listening comprehension skills, and that places a strong emphasis on the role of decoding skills and of oral and aural comprehension skills in the development of reading. The approach also stipulates that grapheme-phoneme conversion is the primary mechanism for word decoding which is attained spontaneously by children while listening to their mother-tongue. Saigh-Haddad (2008) who also looked at Arabic diglossia in the Israeli context, points to the fact that these skills are absent among Arabic-speaking native children since their native spoken language is different from the written one. She claims that "explicit, structured systemic and planned exposure to [written Arabic]" that focuses specifically on "diglossic variables" representing the diglossic distance between the two forms of Arabic, may prove more beneficial in the acquisition of some basic language skills than "naturalistic" exposure. She thus suggests a strategy that includes, on the one hand, a systematic approach to developing word decoding skills dependent on phonological recoding (grapheme-phoneme conversions), and on the other, the development of listening comprehension skills.

The debate between the two approaches cannot be seen as separate from the debate regarding reading instruction in general, between those who stand for a whole-language approach (Goodman, 1986) who conceive learning to read through a naturalistic, less mediated process in a rich literacy environment, and those who advocate systematic phonics instruction (National Reading Panel, 2000, 2006). This latter approach calls for structured intervention to develop phonic awareness, letter and sound recognition and increased vocabulary in early years (kindergarten), shifting at a later stage (at elementary school) toward comprehension strategies, vocabulary knowledge and grammatical and discursive features of the language.

The findings of this study lead me to advocate a balanced approach, combining elements of both abovementioned methods, similar to suggestions made by other scholars in Israel (Abu-Rabia, 2000; Feitelson et al., 1993; Levin et al., 2007). Building on initial listening to the sounds of the written language through naturalistic exposure, and on one-to-one mediated experiences, as early as possible, at home and later in a more systematic way at school, fostering active engagement in reading and gradually in more challenging tasks in class, seems to constitute a suitable mixture of instructional activities when addressing diglossia in Arabic-speaking classes.

References

Abu-Rabia, S. (2000). Effects of exposure to literary Arabic on reading comprehension in a diglossic situation. *Reading and Writing: An Interdisciplinary Journal*, *13*, 147-157. Kluwer.

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, London, New Delhi: Sage.

Ayari, S. (1996). Diglossia and illiteracy in the Arab world. *Language Culture and Curriculum, 9*, 243-252.

Benabou, R. (1996). Equity and efficiency in human capital investment: The local connection. *Review of Economic Studies, 63,* 237-264.

Bradley, R.H., & Corwyn, R.F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53,* 371-399.

Chiu, M.M., & McBride-Chang, C. (2006). Gender, context and reading: A comparison of students in forty-three countries. *Scientific Studies of Reading, 10* (4), 331-362.

Cummins, J. (2007). Pedagogy for the poor: Realigning reading instruction of low-income students with scientifically-based reading research. *Educational Researchers, 36,* (9), 564-572.

Feitelson, D., Goldstein, Z., Iraqi, J., & Share, D. (1993). Effects of listening to story reading on aspects of literacy acquisition in a diglossic situation. *Reading Research Quarterly, 28* (1), 71-79.

Ferguson, C.A. (1959). Diglossia. *Word, 14,* 47-56.

Goodman, K.S. (1986). *What's whole in whole language?* Portsmouth, NH: Heinemann.

Gough, P.B., Hoover, W.A., & Peterson, C.L. (1996). Some observations on a simple view of reading. In C. Cornoldi & J. Oakhill (Eds.), *Reading comprehension difficulties* (pp. 1-13). Mahwah, NJ: Erlbaum.

Gough, P.B., & Tunmer, W.E. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7,* 6-10.

Guthrie, J.T. (2004). Teaching for literacy engagement. *Journal of Literacy Research, 36,* 1-30.

Hoover, W.A., & Gough, P.B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2,* 127-160.

Iraqi, Y. (1990). *Reading to Arabic-speaking kindergarten children compared to alternative enrichment activities as a means of improving listening comprehension and language skills.* Unpublished Master's thesis. University of Haifa, Israel. (Hebrew)

Levin, I., & Saigh-Haddad, E., Hende, N., & Ziv, M. (2007). Early literacy in Arabic: An intervention with Israeli Palestinian kindergartners. *Applied Psycholinguistics.* (In press)

Maamouri, M. (1998). – *Language education and human development: Arabic diglossia and its impact on the quality of education in the Arab region.* Discussion paper prepared for the World Bank Mediterranean Development Forum, Marrakesh, Philadelphia: University of Pennsylvania International Literacy Institute.

Martin, M.O., Mullis, I.V.S., & Kennedy, A.M. (Eds.) (2007). *PIRLS 2006 Technical Report.* TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College, Chestnut Hall, MA, USA.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *International Report, IEA's Progress in International Reading Literacy Study in primary schools.* TIMSS & PIRLS International Study Center, Lynch School of Education. Boston College, Boston College, Chestnut Hall, MA, USA.

National Reading Panel (2000). *Teaching children to read. An evidence-based assessment of scientific research literature on reading and its implication for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.

Ogle, L., Sen, A., Pahlke, E., Jocelyn, L., Kastberg, D., Roey, S. et al. (2003). *International comparisons in fourth grade reading literacy: Findings from the Progress in International Reading Literacy Study (PIRLS) of 2001.* US Department of Education, NCES (NCES 2003-073). Washington, DC. US Government Printing Office.

Raudenbush, S., Bryk, A., Cheong, Y.E., & Congdon, R. (2000). *HLM 5. Hierarchical linear and* nonlinear *modeling.* Lincolnwood, IL: Scientific Software International.

Saiegh-Haddad, E. (2003) Linguistic distance and initial reading acquisition: The case of Arabic diglossia. *Applied Psycholinguistics, 24,* 115-135.

Saiegh-Haddad, E. (2008). On the challenges posed by diglossia to the acquisition of basic reading processes in Arabic. *Language and Literacy, 101-126.* (Hebrew)

Somech, S. (1980). *The problem of language in modern Arabic literature. Teaching contemporary Arabic series.* Tel Aviv: Ministry of Education and Culture, Curriculum Center, Tel Aviv University, Israel. (Hebrew)

US Department of Education (1982). *What works? Research about teaching and learning*.

US National Reading Panel (2000). *Teaching children to read: An evidence-based assessment of scientific research literature on reading and its implication for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.

US National Reading Panel (2006). *Practical advice for teachers.* Learning Point Associates, Naperville, Chicago, Washington DC.

Walker, D., Greenwood, C., Hart, B., & Carta, Y. (1994).   Prediction of school outcomes based on early language production and socioeconomic factors. *Child Development, 65,* 606-664.

Willms, J.D. (1999). *International adult literacy survey: Inequalities in literacy skills among youth in Canada and the United States.* Ottawa, Canada: Statistics Canada, Human Resources Development, National Literacy Secretariat.

Willms, J.D. (2003).   Literacy proficiency of youth: Evidence of converging socioeconomic gradients. *International Journal of Educational Research, 39* (3), 247-252.

Willms, J.D. (2006). *Learning divides: Ten policy questions about the performance and equity of schools and schooling systems.* Montreal: UNESCO Institute for Statistics.

Zuzovsky, R. (2008). *The impact of socioeconomic factors on achievement gaps in reading literacy between Hebrew-speaking and Arabic-speaking students in Israel.* Paper presented at the 4th Conference of the Israel Psychometric Association, Jerusalem, January, 2008.

Table 1: Descriptive Statistics of Variables Describing Reading Activities and their Correlation with Reading Literacy Scores in Arabic-Speaking and Hebrew-Speaking Schools

Instructional Variables	Arabic-speaking Schools		Hebrew-speaking Schools			Arabic-speaking Schools	Hebrew-speaking Schools
	Number of Schools	Mean & (*SD*)	Number Of Schools	Mean & (*SD*)	*t*-Value & Sig	Correlation with Achievement	
Before the child started school, parent played with alphabet toys with him/her (HHA04) (1-3)	31	2.7 (.19)	94	2.4 (.19)	7.7***	.37*	.09
Before the child started school, parent wrote letters or words with him/her (HHA08) (1-3)	31	2.8 (.12)	94	2.4 (.19)	14.5***	.48**	-.10
Student listens to someone at home reading aloud (TOC2) (1-4)	40	3.0 (.32)	109	2.7 (.34)	4.0***	.24	-.42***
Student talks to someone at home about what s/he reads (TOC4) (1-4)	40	3.1 (.36)	109	2.7 (.31)	7.7***	.23	-.00
Teacher reads aloud in class (HC1) (1-4)	40	3.7 (.15)	109	3.7 (.19)	1.8	.48**	-.03
Student reads aloud in class (HC2) (1-4)	40	3.3 (.24)	109	2.5 (.39)	15.6***	.32*	-.21*
Student reads silently on his own in class (HC4) (1-4)	40	3.3 (.30)	109	3.5 (.21)	-5.0***	.44**	.16
Student reads books s/he chooses (HC5) (1-4)	40	3.0 (.29)	109	3.4 (.24)	-8.0***	.30*	.15
After reading student answers questions aloud about what he/she reads (FR3) (1-4)	40	3.3 (.29)	109	2.8 (.32)	8.8***	.32*	-.17

Table1/cont.

Table 1 (cont.)

After reading student talks to other students about what s/he reads (FR4) (1-4)	40	2.9	(.33)	109	2.4	(.29)	8.1***	.23	-.18
Student is asked to read as part of homework (HWR) (1-5)	40	3.9	(.53)	109	3.2	(.52)	7.8***	.58**	-.15
Teacher asks student to identify main idea (DEV1) (1-4)	39	3.7	(.46)	107	3.7	(.46)	-.64	.33**	-.04
Teacher asks student to explain or support their understanding (DEV2) (1-4)	39	3.6	(.54)	106	3.8	(.40)	-2.0*	.36**	.04
Teacher asks student to describe the style and structure of the text (DEV7) (1-4)	39	3.4	(.68)	107	3.4	(.73)	.05	-.21	.06

* $p \leq .05$; ** $p \leq .001$; *** $p \leq .000$

Table 2a: Explanatory Power of the Alternative Interactive HLM Models (maximum *n* for level 1 = 3599, maximum *n* for level 2 = 137)

Variance Components	Null Model	Student Model	Alternative Interactive Instructional Models											
			ZHC1	ZHC2	ZHC4	ZHC5	ZFR3	ZFR4	ZHWR	ZTOC2	ZTOC4	ZDEV1	ZDEV2	ZDEV7
Between school variance	4412 (49%)	3270	1124	1209	1095	1174	1162	1153	1016	1123	1334	1193	1264	1187
Within school variance	5557	3522	3523	3522	3522	3522	3522	3522	3520	4049	4050	3522	4050	3522
Total variance	8969 (100%)	6972	4647	4731	4617	4696	4684	4675	4536	5172	5384	4715	5314	4709
Deviance	40972	38269	38104	38108	38103	38108	38109	38109	38097	35624	35640	38111	35635	38113
% of between-school variance explained beyond *st* model		25.9	65.6	63.0	66.5	64.1	64.5	64.7	68.9	65.7	59.2	63.5	61.3	63.7
% of added between school variance explained beyond *st* model		35.4	48.6	46.7	49.3	47.5	47.8	47.9	51.1	48.7	43.9	47.1	45.4	47.2
Cumulative % of between school variable explained		25.9	74.5	72.6	75.2	73.4	73.7	73,8	77.0	74.6	69.8	73.0	71.3	73.1

Key: ZHC1 - *Teacher reads aloud*; ZHC2 – *Student reads aloud*; ZHC4 – *Student reads silently*; ZHC5 – *Student read book s/he chooses*; ZFR3 – *Student answers questions aloud*; ZFR4 – *Student talks with other students*; ZHWR – *Student reads a part of homework*; ZTOC2 – *Student listens to someone reading at home*; ZTOC4 – *Student talks with someone at home about what s/he reads*; ZDEV 1 – *Teacher asks student to identify main idea*; ZDEV2 – *Teacher asks student to explain or support his/her interpretation*; ZDEV7 – *Teacher asks to describe style and structure of text*; The prefix Z to all instructional variables indicates standardization.

Table 2b: Explanatory Power of the Alternative Interactive HLM Models (maximum *n* for level 1 = 2798, maximum *n* for level 2 = 108)

Variance Components	Null Model (Level 1 units 2798) (Level 2 units 108)	Student Model	Alternative Interactive Instructional Models	
			ZHHA04	ZHHA08
Between school variance	3644 (44%)	2831	1075	987
Within school variance	4602	4085	4086	4086
Total variance	8246 (100%)	6916	5161	5073
Deviance	31860	30204	30077	30071
% of between-school variance explained beyond *st* model	-	22.3%	62.0%	65.1%
% of added between school variance explained beyond *st* model	-		48.2%	50.6%
Cumulative % of between school variable explained	-	22.3%	70.5%	72.9%

Key: ZHHA4 – Early home activities *Play alphabet toys with child* (1 never -3 often); ZHHA8 – Early home activities – *Write letters or words* (1 never -3 often); The prefix Z to all instructional variables indicates standardization.

Table 3: Summary of Regression Coefficients Obtained from Alternative Interactive HLM Models

Instructional Variables	Intercept (*SE*) γ_{00}	Sector (*SE*) γ_{01}	Instructional Variables (*SE*) γ_{02}	Interaction Terms, Instructional Variables and Sector (*SE*) γ_{03}	Gender (*SE*)	Educational Aids at Home (*SE*)	Self Concept (*SE*)	Level 1 / Level 2 Units
Parents play alphabetical toys with their children (ZHHA04)	471 (15)***	131 (12) ***	241 (10)*	-25 (11)*	-12 (3)***	11 (1)***	-30(20) ***	2674/105
Parents write letters or words with their children (ZHHA08)	439 (33)***	159 (31) ***	47 (23)*	-54 (23)*	-12 (3)***	11 (1)***	-29 (3) ***	2674/105
Student listens to someone reading at home (ZTOC2)	480 (16) ***	114 (12) ***	15 (10)	-29 (10)**	-15 (3)***	11 (1)***	-28 (2) ***	3167/123
Student talks with someone at home about what she/he read (ZTOC4)	481 (16) ***	116 (14) ***	8 (10)	-9 (11)	-15 (3)***	11 (1)***	-28 (2)	3167/123
Teacher reads aloud (ZHC1)	266 (9) ***	115 (8) ***	25 (8) ***	-25 (9)**	-11 (3)**	8 (1)**	44 (2) ***	3430/134
Student reads aloud (ZHC2)	235 (30) ***	144 (30) **	31 (22)	-38 (23) *!	-11 (3)***	8 (1)***	44 (2) ***	3430/134
Student reads silently (ZHC4)	285 (9) ***	94 (9) ***	17 (7) **	-10 (7)	-11 (3)***	8 (1)	44 (2) ***	3430/134
Student reads books s/he chooses (ZHC5)	288 (10)***	91 (9) ***	17 (6)*	-11 (9)	-11 (2)***	8 (1) ***	44 (2)***	3430/134
After reading student answers questions aloud (ZFR3)	258 (17) ***	122 (17)	16 (13)	-22 (13) *!	-11 (3)***	8 (1) ***	44 (2) ***	3430/134
After reading student talks to other students about what s/he reads (ZFR4)	261 (11) ***	118 (11) ***	14 (8)*	-21 (8)*	-11 (3)***	8 (1) ***	44 (2) ***	3430/134
Student reads as part of homework (ZHWR)	245 (12) ***	134 (11) ***	30 (9)**	-35 (10)**	-1 (3)***	8 (1) ***	44 (2) ***	3430/134
Teacher asks to identify idea (ZDEV1)	274 (9) ***	107 (8) ***	-13 (7)*	14 (8) *!	-11 (3)***	8 (1) ***	44 (2) ***	3430/134
Teacher asks to explain (ZDEV2)	493 (12) **	105 (9) ***	14 (6)*	-13 (7) *!	-15 (3)***	11 (1) ***	-28 (2) ***	3430/134
Teacher asks to describe style & structure of text (ZDEV7)	273 (9) ***	108 (8) ***	10 (7)	-13 (7) *!	-11 (3)***	8 (1) ***	44 (2) ***	3430/134

Key: SE = Standard errors in parentheses, *$p\leq$ = .05; **$p\leq$ = .01; *** $p\leq$ = .001; *! $p\leq$ = .08. The prefix Z to all instructional variables indicates standardization

Table 4:   Predicted Reading Literacy Scores at Three Levels of Instructional Variables in Hebrew-speaking and Arabic-speaking Schools

		Minimal Level	Mean Level	Maximal Level	Level Gain
ZHHA04	*Before the child started school, parent played with alphabet toys with her or his child*				
	Hebrew-speaking	531.0	529	527	-4
	Arabic-speaking	345.0	398	446	101
	Sector gap	186.0	131	81	
ZHHA08	*Before the child started school, parent wrote letters or words with his/her child*				
	Hebrew-speaking	542.0	526	511	-31
	Arabic-speaking	265.0	367	462	197
	Sector gap	277.0	159	49	
ZTOC2	*Student listens to someone reading to her/him at home*				
	Hebrew-speaking	559.7	526.2	490.0	-69.7
	Arabic-speaking	378.4	412.0	448.4	70.0
	Sector gap	181.3	114.2	41.6	
ZTOC4	*Student talks with someone at home about what she/he read*				
	Hebrew-speaking	532.0	528.9	525.0	-7.0
	Arabic-speaking	398.1	412.8	431.6	33.5
	Sector gap	133.9	116.1	93.4	
ZHC1	*Teacher reads aloud in class*				
	Hebrew-speaking	543.7	544.4	544.7	1.0
	Arabic-speaking	339.9	429.1	471.8	131.9
	Sector gap	203.8	115.3	72.9	
ZHC2	*Student reads aloud in class*				
	Hebrew-speaking	556.0	541.6	528.2	-27.8
	Arabic-speaking	334.2	397.7	456.3	122.1
	Sector gap	121.8	143.9	71.9	
ZHC4	*Student reads silently on his/her own in class*				
	Hebrew-speaking	517.7	542.1	554.7	37.0
	Arabic-speaking	389.3	448.0	478.2	88.9
	Sector gap	128.4	94.1	76.5	

Table 4/cont.

Table 4 (Cont.)

ZHC5	*Student reads book s/he chooses*				
	Hebrew-speaking	525.7	542.6	554.7	29.0
	Arabic-speaking	396.6	451.3	490.4	93.8
	Sector gap	129.1	91.3	64.3	
ZFR3	*Students answer questions aloud after they read*				
	Hebrew-speaking	556.7	542.2	529.4	-27.3
	Arabic-speaking	380.9	420.6	455.2	74.3
	Sector gap	175.8	121.6	74.2	
ZFR4	*Student talks to other students about what s/he reads*				
	Hebrew-speaking	560.1	541.9	522.2	-37.9
	Arabic-speaking	390.6	423.8	460.0	69.4
	Sector gap	169.5	118.1	62.2	
ZHWR	*Student reads as part of homework*				
	Hebrew-speaking	554.5	542.6	529.5	-25.0
	Arabic-speaking	339.6	408.4	484.6	145.0
	Sector gap	214.9	134.2	44.9	
ZDEV1	*Teacher asks student to identify main idea*				
	Hebrew-speaking	546.2	544.3	544.0	-2.2
	Arabic-speaking	387.1	437.4	445.1	58.0
	Sector gap	159.1	106.9	98.9	
ZDEV2	*Teacher asks student to explain or support his/her understanding*				
	Hebrew-speaking	534.2	544.3	545.8	11.6
	Arabic-speaking	390.7	439.2	446.0	55.3
	Sector gap	143.5	105.1	99.8	
ZDEV7	*Teacher asks student to describe style and structure of the text*				
	Hebrew-speaking	537.4	544.1	546.7	9.3
	Arabic-speaking	456.6	436.3	428.3	-28.3
	Sector gap	10.8	107.8	118.4	

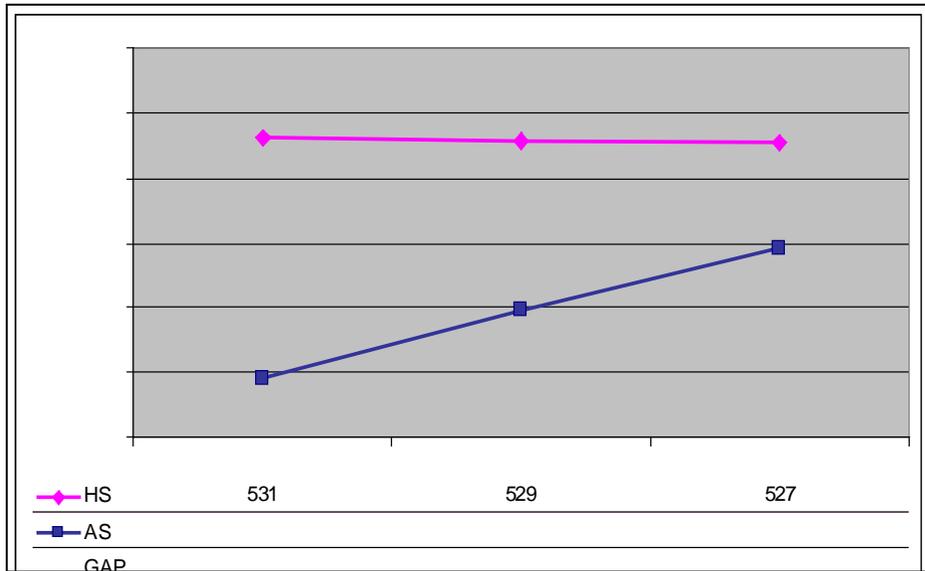|	HS	531	529	527
	AS			
	GAP			

Figure 1: Predicted reading literacy scores at three levels of home early literacy activity *(Parent played with alphabet toys with her or his child HHA04)*

<u>**Key**</u> : **HS – Hebrew-Speaking ; AS – Arabic-Speaking; GAP – Between Hebrew-Speaking and Arabic-Speaking Students**
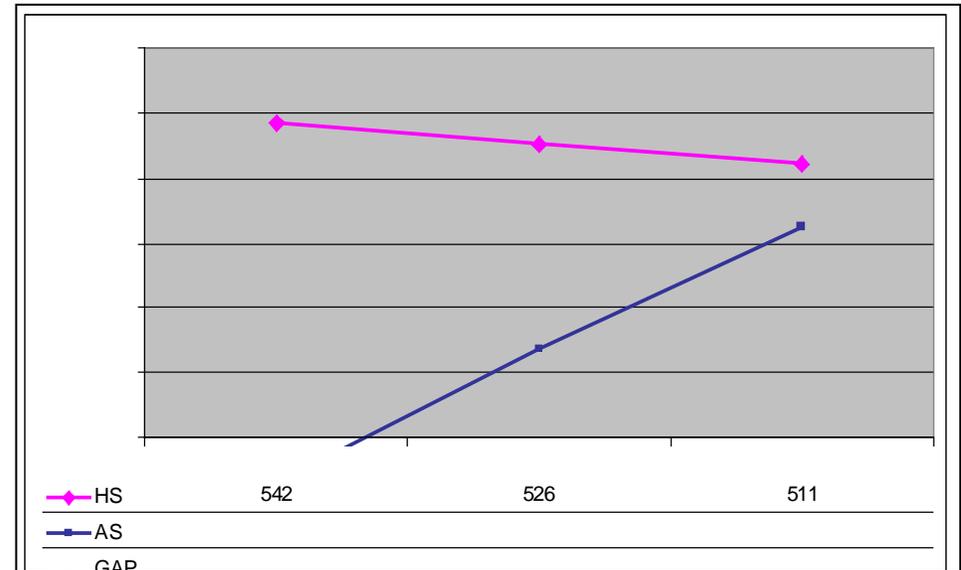

	HS	542	526	511
	AS			
	GAP			

Figure 2: Predicted reading literacy scores at three levels of early home literacy activity *(Parent wrote letters or words with his/her child HHA08)*

<u>**Key**</u> :   **HS – Hebrew-Speaking ; AS – Arabic-Speaking; GAP – Between Hebrew-Speaking and Arabic-Speaking Students**
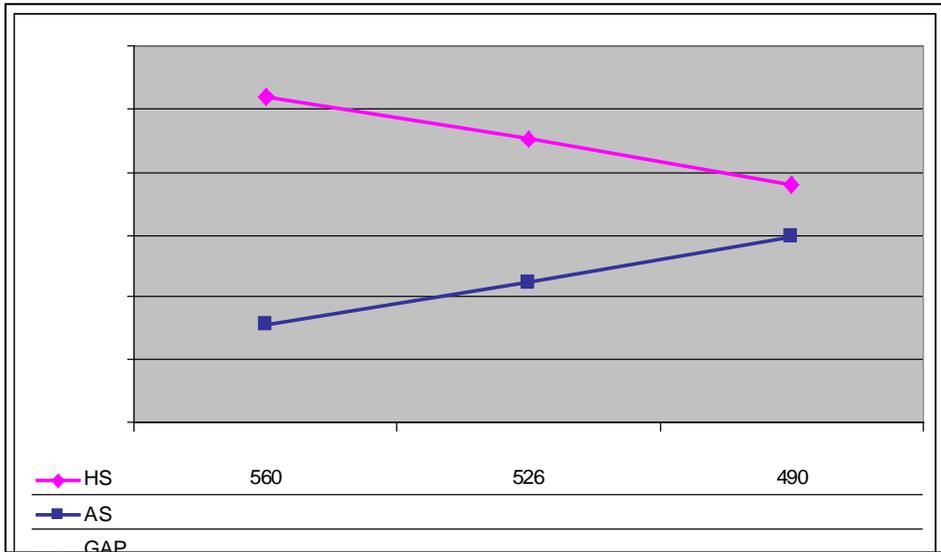
Figure 3: Predicted reading literacy scores at three levels of *Student listens to someone at home reading aloud* **(TOC2)**

<u>**Key**</u> :   **HS – Hebrew-Speaking ; AS – Arabic-Speaking; GAP – Between Hebrew-Speaking and Arabic-Speaking Students**
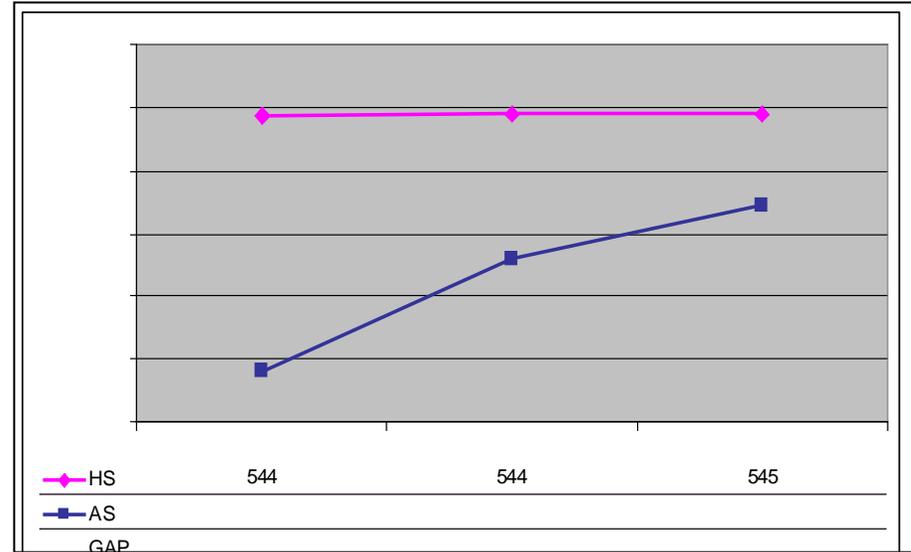

Figure 4: Predicted reading literacy scores at three levels *of Teacher reads aloud in class (HC1)*

<u>**Key**</u> :   **HS – Hebrew-Speaking ; AS – Arabic Speaking; GAP – Between Hebrew-Speaking and Arabic Speaking Students**

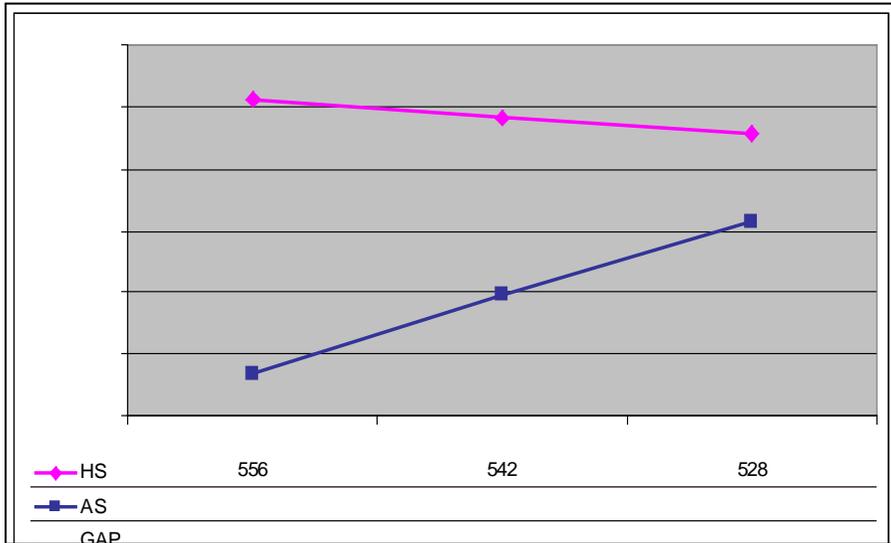| | HS | 556 | 542 | 528 |
| AS | | | | |
| GAP | | | | |

Figure 5: Predicted reading literacy scores at three levels of *Student reads aloud in class* (HC2)

Key : HS – Hebrew-Speaking ; AS – Arabic-Speaking; GAP – Between Hebrew-Speaking and Arabic Speaking Students

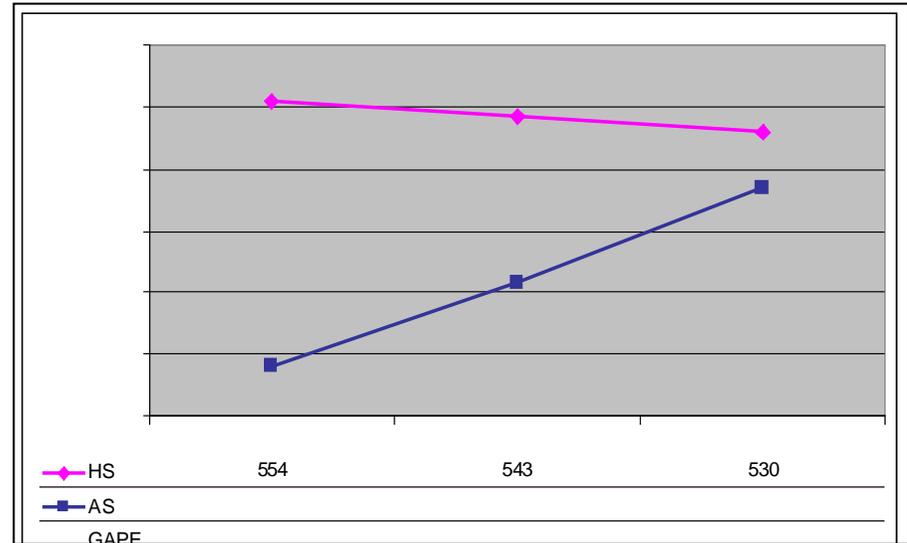| | HS | 554 | 543 | 530 |
| AS | | | | |
| GAP | | | | |

Figure 6: Predicted reading literacy scores at three levels of *Student reads as part of homework* (HWR)

Key : HS – Hebrew-Speaking ; AS – Arabic-Speaking; GAP – Between Hebrew-Speaking and Arabic-Speaking Students