Masters Thesis Project

Three Strategies That Will Influence a Reduction in the Achievement Gap

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Abstract

The academic achievement gap between majority and minority ethnic groups in the United States is one of the most discussed and debated issues in American education. Years of research have confirmed that low socioeconomic status is a predictor of low student academic achievement in the schools. Researchers have compiled and tested numerous strategies and interventions to reduce this achievement gap.

New programs and strategies need to be established at all educational levels to reach the goal of reducing disparities in achievement. This researcher will investigate three strategies for early childhood, elementary reading, and class size reduction. This paper will identify the most effective interventions for reducing the academic achievement gap.

Research indicates that the earlier interventions are implemented, the longer the test results show improvement, and so early childhood interventions will be examined here. Students who are behind in reading never seem to catch up, so reading and literacy programs will also be researched to determine the impact on higher reading and comprehension scores, therefore improving the achievement gap. The third factor is class size which can also have a significant impact on students’ learning in the early years, and as they progress through school.
Introduction

As a future professional K-12 school counselor, this researcher selected a topic that will enhance knowledge and understanding of strategies that play a significant role in reducing the academic achievement gap between minority disadvantaged students and Caucasian students.

Achievement gap is not just a new name for a trend in education, but a huge dilemma for most K-12 schools in the United States. This research will inform school counselors by providing important information that can be used to implement successful programs to reduce the achievement gap. School counselors need to be informed on the most current data and research as they help educators implement cost-effective and results-oriented programs. Districts and schools at all levels, kindergarten through twelve, will hopefully mandate some of these interventions. The earlier the intervention is implemented in the child’s life, the more influential the reduction of the achievement gap.

Research has consistently confirmed that low socioeconomic status (SES) has a negative impact on academic achievement throughout the K-12 school years. Research articles have included many variables that help contribute to the achievement gap. There have been large numbers of researchers testing interventions that will help reduce or close the achievement gap. This researcher finds three strategies that appear to be most effective. The three interventions are early childhood programs, reading and literacy, and small class size.

Due to the fact that schools cannot control the home environment, family styles, attitudes and income, it will be important to implement programs that can be monitored, evaluated and measured at the educational setting.
Three Effective Strategies to Reduce the Achievement Gap

Definitions

The achievement gap is defined as the difference in test scores between minority students and Caucasian students. The assessments used to discern the difference between students of color and Caucasian students included: standardized tests, pre/post testing, GPA, graduation rates, dropout rates, as well as reading, math, and science scores.

The issue of academic achievement and poverty came to the forefront in 1954 when the segregation of schools became unconstitutional (Rumberger and Palardy 2005). As a result of this, Rumberger cited the Coleman Report of 1966 as the first major study to do national research on student achievement as it relates to racial and socioeconomic composition. The overall conclusion over these past 40 years of research indicates that low socioeconomic status (SES) negatively affects student success in schools that have consistently lower test scores and low graduation rates. Research in 1999 by National Assessment of Education Progress (NAEP) found African American students reading at a 36% lower comprehension rate than the norm coming into kindergarten (Donahue, Finnegan, Lutkus, Allen and Campbell 2001).

The definition of low socioeconomic status (SES) is the mean of the students’ family income or the federal poverty level index provided by the U.S. Department of Health and Family Services, 2007 (U.S.D.H.F.S.).

Finn and Rock (1997), p. 221, cited the poverty income for research at $17,500, based on the random sample of student participants’ family income. Hubbard (2004) used an income of $10,000 and below to define poverty level. It appears that each research article refers to the poverty level of the area where the study is taking place, and the year it was conducted. Several studies indicated that poverty level was based on free and reduced lunch program participants (Connell, Spencer, and Aber 1994). For consistency of terminology, this review will assume that
all studies of low SES are at or below the U.S.D.H.F.S. which is $40,000 per year for a family of four.

The terms “at-risk” and “disadvantaged” are interchanged in the description of low SES. Students who are raised in poverty are often described as at-risk or disadvantaged because they do not have the same opportunities as their Caucasian peers. They frequently come to school with disadvantages because they do not have the same access and opportunities for experiences to build their school readiness knowledge. Minority students coming from poverty usually perform significantly lower in vocabulary, writing and math. Minority disadvantaged students are reading at 27% compared to Caucasian peers at 63% by the 3rd grade (Craig, Connor, and Washington 2003). This comparison confirms the achievement gap in the early primary years.

“Minority” most frequently refers to African American students in low SES. Research often used African American students as the test group to gather data on how well interventions affected successive annual test scores (Craig et al. 2003). However, the findings in this research may also include Hispanic and American Indian in the minority data. Since the achievement gap is often described as the “Black-White Gap” (Craig et al.) by researchers, this will also be the assumption in this paper.

Early childhood intervention refers to any program that provides cognitive development activities from infancy through kindergarten age. The interventions include participation in activities that promote cognitive and linguistic development (Ramey, 2004). Most of the studies tested children age 3 to 5 within a controlled daycare or preschool setting. Some of the researchers included parental involvement so they could continue the learning process while at home.
Reading and literacy programs can be defined as any intervention that stimulates effective practice in learning strategies, phonetics, whole language, comprehension, discussion and oral language skills (Ross, 1999). These interventions could include an activity such as reading to infants to a very in-depth comprehensive preschool or elementary reading program. An example of a comprehensive reading program is “Success for All” which is an intervention that teaches whole-language approach through all the elementary grades (Ross et al. 1999).

The definition of “small class size” is fewer than 20 students per classroom. In Project STAR the controlled small class size was 13-17 students (Pate-Bain, Fulton, and Boyd-Zaharias 1999). Significance of small class size is researched consistently in the primary grades, kindergarten through 4th grade, to assess short-term academic gains and long-term social benefits.

Assessments are the tools used to collect data on student achievement. The assessment data can determine the progress, or gain, that the student achieves during or after an appropriate strategy has been implemented. Often there is a pre-test and post-test to help determine the progress made by the student. In most research a standardized test is used as the assessment. The Metropolitan Achievement Test (MAT) was used to determine reading comprehension for preschoolers (Craig et al.). Several types of standardized tests were used to validate the data.

Assessments are not always tests that give scores. Many studies also use surveys and interviews to show long-term social benefits (Finn and Gerber 2005). A research team used dropout and graduation rates in a follow-up survey of the initial Project STAR, which confirmed long-term self-sufficiency benefits to the participating students.

Control group is the group of students who are not part of the intervention to reduce the achievement gap. This group of students is always comparable in age, ethnicity and
environmental factors. Researchers use the control group to determine when or if significant progress is made in comparison to the test group participating in the intervention.

This researcher’s review will determine which of the three, or combination of the three, would be the most influential in reducing the academic achievement gap of disadvantaged minority students by significantly raising test scores, and attributing to other future positive outcomes.

**Early Childhood Programs**

Early childhood education has been a focus for researchers for the past 40 years. These researchers evaluate programs for young disadvantaged children of low SES. Researchers build studies that evaluate educational games and activities that promote cognitive development and build school readiness skills for the early childhood (three to five years) and primary levels (kindergarten through 4th grades).

Children coming from low SES are usually classified as high risk in the area of academic skills due to the negative influences of poverty (Campbell, Ramey, Pungello, Sparling, and Miller-Johnson 2002). The environment in which they grow negatively affects their cognitive development. Children have inadequate nutrition that affects brain development and therefore cognitive ability. They may not have access to language and reading opportunities that can lead to low reading ability and lower test scores. Parents may not value education, ultimately resulting in a higher dropout rate. Poverty varies according to the ethnic group or area of the country. However, it has been validated that minority children are more likely to live in poverty than Caucasian children, and will often achieve a much lower academic level.

One of the most cited studies in early childhood education that identifies the influence on young adult academics is from the Abecedarian Project (ABC) (Campbell et al. 2002). This
ABC study proves the benefits of early educational intervention for children from low SES families.

The Abecedarian Project is an in-depth study initiated in 1972 with 111 infants who were divided into control and experimental groups (Campbell et al.). The children in the experimental group were given full-day, year-round childcare from infancy through preschool. The intervention involved highly trained adults who would interact and create individualized educational activities, with a curriculum that included educational games that reinforced skills in cognition, language, and behavior. Infant interactions included all sensory motor skills. As the children aged, the curriculum advanced to higher level skills and included language development (Campbell et al.).

The families were also given support services. The parents were encouraged with take-home packets to continue to work with the children for a minimum of 15 minutes per day. The children were also provided additional nutritional supplements throughout the five years. This accelerated intervention continued through preschool. The students were measured in preschool and at age 21. The tools of measurement were standardized tests, the Wechsler Intelligence Scale for Children – IV, and reading scores.

The results of the ABC project were significant, and data recorded was based on the remaining 105 test individuals. Achievement scores in reading and math were significantly higher than the control group. Calculation scores for math were 8 to 10 points higher than the control group. The scores were also higher for reading, letter recognition and word recognition, ranging from 5 to 10 points higher than the norm. This was also true for the scores earned when students were tested for reading and math at age 21 (Campbell et al., table 3, p. 49).
The other factors assessed at the age of 21 were educational attainment, employment, self-sufficiency, and social adjustment. The participants were interviewed at age 21 to determine long-term benefits. The percentage of students graduating was slightly higher than the control group. However, the number of students enrolled and attending college was 50% higher than the control group. Students were also holding jobs that were considered higher-skilled (based on the Hollingshead scores) (Campbell et al., p. 51). Those students in the ABC project also had better medical coverage and insurance than the control group. This survey reinforced that achievement is not only academic, but can also be assessed in social self-efficiency as the students grow into adulthood (Campbell et al.).

The Abecedarian Project is one of the most intensive childhood interventions ever done on low-income at-risk children. Many follow-up studies continue to confirm strong short-term and long-term benefits. This project shows that high quality consistent educational childcare makes a dramatic difference in a child’s cognitive ability and positive outcome of academic achievement. The students interviewed at age 21 had positive self-sufficiency skills (Campbell et al.).

A study conducted by Ramey and Ramey (2004) set out to prove that a child’s experiences prior to kindergarten correlated significantly with superior cognitive development, school readiness, and linguistic performance. Ramey recommended seven essential experiences in the early years that are crucial to brain development. These experiences do not require money or special equipment, but do require time, skills, and active follow-through from the family and/or caregiver (Ramey et al. 2004).

Ramey et al. indicate that the seven essential learning experiences to build brain and behavioral development are:
Three Strategies

1. Encourage exploration
2. Mentor basic skills
3. Celebrate developmental advances
4. Rehearse new skills
5. Protect from inappropriate disapproval, teasing, and punishment
6. Communicate responsively
7. Guide and limit behavior

When encouraged with these seven essential experiences, the high-risk disadvantaged children show significant gains in the intellectual and linguistic competence. Children who participate in various activities with strong language experiences develop and acquire stronger oral language comprehension than the norm. This comprehension leads to a higher ability to decipher new letter and word combinations, which leads to better reading scores (Ramey et al.).

Ramey et al. discovered that 95% of the children in the treatment group (given the seven essentials) were in the normal range of cognitive abilities when they started basic readiness skills. This reconfirms that positive early childhood experiences do result in significant positive intellectual gains for students from disadvantaged groups.

The High/Scope Perry Preschool Study directed by Schweinhart, Barnes, and Weikart, (1993) was another early childhood project aimed at ameliorating academic success in low SES students by offering a preschool with a model of learning called “plan-do-review” process. This half-day, five-day-per-week program incorporates five strategies addressing how children learn and develop: active learning, adult-child interaction, effective learning environment, daily routine, and child assessments. The children made choices about what they did, carried out the idea, and lastly reflected on their activities with an adult. The students were offered rich learning
activities, a safe environment, and supportive adults to guide and teach. The teachers also visited the families for additional follow-through and support every week. The parents were also involved in monthly developmental classes to help understand and support this learning environment (Schweinhart et al. 1993).

This study included 58 randomly selected students, and data was collected every year from ages 3 to 11 and at ages 14, 15, 19, and 27 years of age. The Perry Preschool objectives were to increase academic achievement in reading and math. The program also helped children to develop social and emotional skills and required significant parental involvement. The benefits of the High/Scope strategy empower students by encouraging them to initiate and learn. It also empowers parents to partner with teachers to support the success of their child. Teachers are empowered with systematic training and curriculum.

The key findings of the Perry High/Scope Preschool were significant for academic and social success. Ninety-five percent (95%) of the participants were interviewed at age 27 to measure long-term results of the earlier preschool strategies. The individuals reported a higher level of education with 71% versus 54% completing 12 years and higher. In the financial realm the monthly earnings were 29% versus 7%, earning over $2,000 a month or more. Home ownership was at 36% for the test group compared to 13% for the control group. Another economic measure was second car ownership, at 30%, versus 13% for the control group. Socially the test group also proved to be more responsible showing only 7% arrests for varying crimes versus 35% in the control group. The researchers concluded that “high-quality preschool programs are essential for all children living in poverty.” (Schweinhart et al.). The results not only affect academics in the early years but continue to have lasting benefits throughout adulthood.
Currie et al. reviewed the early childhood program, Head Start, which started in 1965, the same era of the Perry Preschool project. The Head Start preschool program was a result of the 1965 “War on Poverty” started by President Johnson. The initial Head Start program was developed for rural disadvantaged children in poverty to give them adequate nutrition and enhance preschool, social, and cognitive development for school readiness. The objective was to bring these children up to the academic norm rather than having them start significantly behind the other children as they started kindergarten. The Head Start program focused on school readiness, cognitive skills, social and emotional development (Currie). Head Start also provides a wide range of services that include nutrition, medical care and a nurturing living environment.

The Educational Testing Services’ Longitudinal Study of Head Start showed positive effects on both verbal and reading test scores, as well as social adjustment as the children started school. Participants in Head Start had a higher probability of completing high school and attending college (Currie et al.). When federal and state funded Head Start programs are delivered by the state, not all programs provide the same high quality curriculum. The Head Start programs were ranked better than the average of most other preschool quality studies.

Currie’s review concluded that Head Start programs have significant short-term and medium-term benefits for students starting elementary school. Short-term benefits include improved health and nutrition as well as prevention of abuse and neglect. Medium-term benefits are prevention of special education that is reduced by 12%, and prevention of grade repetition was reduced by 28% during the elementary years. The long-term benefits reflect pursuit of higher education, higher employment rates, higher salaries and reduction of crime rates. The study found that the effects are greater for the more disadvantaged child.
James Heckman stated in Science Magazine after reviewing the Abecedarian, Perry, and other early childhood interventions, “that early interventions targeted toward disadvantaged children from low incomes have a much higher success and return, than later interventions that take place during adolescence.” Heckman states that beginning programs in the prenatal through preschool periods has a greater effect on cognitive brain development and higher success rates in mastery of cognitive, social, and emotional competencies. These students also show a higher motivation to learn in all academic areas (Heckman 2006).

Boocock, a professor at Rutgers, compared early childhood programs improving U.S. academic outcomes with outcomes in other nations (Boocock 1995). He states that there is widespread evidence that quality preschool programs promote cognitive development and prepare children for greater success in school. He also found that positive preschool experience has a stronger influence in the lowest income disadvantaged children. Preschool attendance can narrow the academic achievement gap in the early elementary age; however, effects seem to diminish over a long period of time. Boocock found other nations’ research shows the same positive outcomes from early childhood interventions (p. 111).

Boocock (1995) also stated that the U.S. has the most fragmented programs, underfunding and least public policy that support this research to mandate early childhood attendance. Other countries in the study started with policy and designs that are more satisfactory and implement required programs to guarantee higher academic success for disadvantaged students who are starting school (Boocock 1995).

Gormley and Gayer (2005) reported that Oklahoma established a statewide universal pre-kindergarten program for four-year-olds in the mid-90’s. Data was retrieved from Tulsa Public Schools (TPS) by testing the outcomes of the study group of pre-kindergarten students and the
new kindergarten students who were involved in the required four-year-old pre-K program. The results showed an increase in cognitive scores by 0.39 standard deviation, better fine and large motor skills by approximately 0.24 standard deviation, as well as higher language scores by 0.38 standard deviation. The most significant impact was found in disadvantaged Hispanic and African American children who had the greatest increase in reading test scores (Gormley et al. 2005).

A Wisconsin researcher investigated the effects of the Chicago Child-Parent Center and Expansion Program. This Title I program provided child education and family support services for children ages three through nine in 20 of Chicago’s poorest areas. A comparison of the 20 programs of children who attended the programs showed a 24% reduction in the high school dropout rate, and a 27% reduction of early school dropout (Temple, Reynolds and Miedel 2000). This again displays long-term benefits that extend beyond early academics and remain through 12th grade.

The cognitive and social development of 733 children from ages four to eight years was examined longitudinally to assess the quality of their preschool experience. The study showed evidence of short-term effects on children’s cognitive and socio-emotional development through 2nd grade. The findings show increased test scores in language and improved overall academic skills. It also reflected positive effects for children from more at-risk backgrounds. The research also gives evidence of long-term influences on children’s cognitive and social skills all the way through the elementary school years. These researchers found that quality childcare, as well as encouraging teacher-child relationships, were related to improved cognitive and social skills (Peisner-Feinberg, Burchinal, Clifford, Culkin, Howes, Kagan, and Yazejian 2001).
Conclusion of Early Childhood Intervention

The review of the previous articles consistently shows the influence quality early childhood programs can have on short-term, medium-term, and long-term academic and social skills of disadvantaged children living in low SES environments.

Many of the results were academic, such as higher math and reading scores, as well as lower dropout rates, higher graduation rates, and higher enrollment in post-secondary options. Other results showed a strong effect on long-term social skills. Some of these were higher employment rates, better skilled jobs, home ownership, auto ownership, better insurance, and lower participation in crime. These studies consistently show that early childhood programs for disadvantaged students can change not only academic scores in kindergarten through 12th grade, but also help produce more productive, responsible and successful adults.

Reading and Literacy Programs

Literacy has been referred to as the ability to read, understand, and use the information. Obtaining strong literacy and reading strategies has a direct correlation with academic success, as well as a link to future employment skills. Poor reading and comprehension scores for low SES children have been researched using key variables to determine the best interventions that will reduce the gap of minority and Caucasian student test scores.

Craig, Connor, and Washington (2003) have shown that minority students from low SES perform significantly lower in vocabulary, writing, math, and science scores. This academic achievement gap is apparent for minorities at kindergarten and steadily continues to widen through 12th grade compared to Caucasian children. As Torgesen (1998) observed, “The best solution to the problem of reading failure is to allocate resources for early intervention and
prevention.” (p. 32). It appears to be too late to intervene with reading programs in the elementary and middle school years.

Craig et al. (2003) produced a longitudinal study of 50 disadvantaged African American children from low SES in Detroit, Michigan. These 50 children were enrolled in a preschool program specifically designed to serve low SES and at-risk children. The children were asked to describe pictures from the Bracken Concept Development Program (Craig et al., p. 34). Adult auditors recorded the child’s description. The research staff decoded the children’s statements by units of information that included syntax, vocabulary, comprehension and nonverbal cognition. The assessment also included the Metropolitan Achievement Test (MAT) (Craig et al.). The MAT is a widely used assessment that measures specific units of literacy for each grade level. This tool was used to measure reading comprehension and to show the relationship of early language skills and later reading comprehension. In addition, each child was given the Triangles sub-test, a matching task that allows more thorough examination of cognitive abilities (Craig et al.).

Results of testing at 6, 7, 8, and 9 years of age demonstrated that reading comprehension scores continued to indicate significant growth. The grade level expectations were achieved and maintained between 1st and 3rd grades. Those students who did not have oral competency were one grade level behind after one year of intervention. The children with the mandatory public preschool experience performed significantly better. The average MAT score for the test group was 596 or 54% at age nine, while the control group was at 511 or 32% (Craig et al.).

The African American preschoolers were from low SES homes and were enrolled in a state-funded public preschool program for at-risk children. These researchers concluded that early intervention preschool programs that included oral skills would lead to higher achievement
on reading comprehension scores in the early elementary years of kindergarten through 4th grade.

The researcher’s recommendation is to implement appropriate and pertinent preschool programs for prevention of the achievement gap in future years. These programs specifically designed for African American and minority preschoolers living at low SES should be aimed at preventing reading problems and encourage achievement for high-risk groups (Craig et al.).

Research indicated that African American children from low SES are at risk for reading difficulties, and promotes greater early childhood prevention efforts to influence future reading success. Low SES children are at an increased risk of academic failure due to poverty, lack of literacy, reading, oral language experiences and home literacy practices (Washington 2001).

According to the U.S. Department of Education (1996), 43% of African American children under 18 years of age were living below the poverty line. These statistics correlate with the fact that these students would have difficulty in grasping academic content of reading and literacy and their skills are not at an average level as they start school. Studies indicate that low-income minority students represent the greatest challenge. Kindergarten may be too late to start efforts to prevent reading problems. Washington (2001) states that diverse populations require more flexibility and effective at-home strategies to maximize future success in school reading comprehension. Required preschool prevention programs for low SES minority students are key to help reduce the gap. These students need to be provided the opportunity to experience oral language, reading, books, and various language skills to build adequate school readiness skills (Washington). To positively influence the achievement gap in reading, it is imperative to have the goal of good literacy practices prior to the start of school for all low-income children.

Researchers examined the Success For All (SFA) program for minority and non-minority students in a small Midwest city. The SFA program was developed by Robert Slavin at Johns
Hopkins University. This longitudinal study demonstrated a four-year intervention to be beneficial for the lowest achievers. This program includes six important factors that make this program unique (Ross, Smith and Casey 1999).

The first factor is that the curriculum concentrates on reading and cooperative learning strategies. It includes phonics, whole language, decoding and comprehension abilities. The primary curriculum includes reading to students, developing discussions, and having students engage in oral language skills. As the children progress to 5th and 6th grade, the program focuses on comprehension, thinking skills, fluency, partner reading, writing, cooperative learning, and positive reading attitudes. The second part of the SFA program includes individual tutoring for 20 minutes each day in 1st grade for those students who are experiencing difficulty. The third aspect is to continue to evaluate reading ability and to regroup students according to reading performance. This assessment and regrouping is done every eight weeks. The fourth aspect is to create parent support, and to assist families with other health or home problems that may affect academic performance. The fifth step is to include a facilitator who plans, trains, and assists teachers with scheduling, grouping, and eight-week assessments. The sixth factor includes building an advisory committee, special student mainstreaming, and a comprehensive teacher-training program. The effectiveness of this program is a result of prevention and immediate intensive interventions.

SFA is one of the most researched longitudinal studies in education. Ross selected two SFA schools and two control group schools, kindergarten through grade six, with comparable lower class, middle class, and ethnicity. The results were recorded with pre- and post-testing of reading scales that included word identification, decoding, phonics skills, and comprehension. The findings suggest that SFA benefits the bridging of the achievement gap for minority groups.
in reading scores. Minority students enrolled in the SFA program tested higher than the non-minority students, averaging a one-half standard deviation at 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd}, and 4\textsuperscript{th} grades. This provides confirmation that SFA is a program that will be an effective way to increase test scores for all minority students. It appears that the more disadvantaged the minority student, the more the students benefit from the SFA program.

The findings of this research suggest the benefits of the SFA program can reduce the achievement gap between African American and Caucasian students. Minority students in SFA schools had higher scores in 2\textsuperscript{nd} grade than their non-minority counterparts: mean = +0.10, and –0.24, and +0.41 (Ross et al.).

The reasons that this strategy works may be the implementation of one-to-one tutoring, family support, and inclusion of all at-risk students. The philosophy of SFA also supports the idea that all children can learn when given the appropriate interventions.

Alexander, Entwisle, and Olson (2001) research consisted of studying 20 Baltimore public schools beginning in the fall of 1982. Using a random sampling of 1\textsuperscript{st} grade students through the spring of 5\textsuperscript{th} grade they analyzed summer reading retention rates. The data collected used the California Achievement Test (CAT). The reading comprehension CAT was administered in the fall and spring for 1\textsuperscript{st} through 5\textsuperscript{th} grades. The results showed that the lower SES students already lag behind by one year or more in 1\textsuperscript{st} grade reading test scores. In short this study reaffirms that gains can be made during the nine months in school, but are often lost during the summer months with no reading or literacy programs. Lower SES children would then start the new school year about where they had been in the spring (Alexander et al. 2001, table 2, p. 177).
These researchers also established that the benefit of full-day kindergarten is considerable. They also confirmed that strong preschool and kindergarten programs can reduce the achievement gap with SES students starting 1st grade. Alexander et al. recommended strong summer curriculum that included reading, books, and library usage. Use of the library during the summer months by low SES students was a predictor in seeing reading score gains. They also recommended educational policy to increase library access to low SES students (Alexander et al.).

Participating in enriching experiences during the summer also played a role in raising the reading scores. Minority students who are involved in park activities, field trips, sports, music, museums, swimming, and zoo field trips lead toward academic gains in the following year. Activity programs for low SES students should start as early as three years old. The challenge is then to have communities and parents as collaborative members in the support of learning for disadvantaged students. Organized summer programs support the academic achievement of disadvantaged children as they begin their next school year.

An article written by Allington and McGill-Franzen (2003) also focused on the summer reading setback. Several studies cite the effects of remedial reading during the school year are diminished during the summer vacation period. This is represented by an 80% reduction in achievement between 2nd and 6th grade associated with three-month summer vacations. This continues to be a consistent problem, especially in the academic reading scores.

There seem to be many factors contributing to low SES children’s loss of reading skills in the summer, while other students remain the same or increase in reading skills. Most low-achieving students are living in poverty and do not have available resources such as books, libraries, and activities. They have limited access to summer activity programs that would allow
language, discussion, and reading activities. These authors recommend education efforts that offer children in poverty access to books and reading experiences on a year-round basis. Mandating summer school attendance for children from low-income families should be explored as a way to reduce the widening achievement gap (Allington et al.). Many reading experiences, volume of reading, and being read to during summer vacation would be an indicator of reading gains for low SES students in the fall.

A study by Rush (1999) looked at the caregiver/child interactions and early literacy development of preschool children from low SES. Rush took a random sample of 39 preschoolers in Head Start classrooms in two urban settings. Observations were conducted with the students’ families to determine in-home activities that may affect reading achievement. The observers looked for several activities that included four broad categories: engagement between caregiver and child while in the home, the child’s vocal response, the child’s social behavior, and involvement in literacy-related activities. Rush (1999) found that structure and parent involvement in activities can facilitate early literacy skills. Caregiver language and positive feedback were also associated with higher test scores. It was reported that literacy-related activities, such as reading books out loud, appeared to be the most positive contribution to a child’s literacy development.

The results were tabulated by using the Peabody Picture Vocabulary Test and the Expressive One-Word Picture Vocabulary Test (Rush). The children’s literacy skills were related to letter naming, recognition fluency and phoneme blending.

The results of this study determined that early literacy can be enhanced in the low SES home environment. Students normally who were at risk for academic failure were encouraged to participate with caregivers to make academic progress. This would suggest that family and
parental training could also be a good way to prepare children for school readiness and higher future academic achievement. Rush indicates that preschool interventions have been highly researched and ultimately improve academic achievement, but targeting home-based reading interventions with caregivers may also contribute to the success of higher reading abilities and later school success.

An additional article by Neuman (2001) reflects that it is not enough just to concentrate on reading and language proficiency, but rather educators must also target knowledge that is based on reasoning, decision-making, connecting knowledge, and the cognitive process. Children need to be given the opportunities to form their own ideas, observe, and compare findings to adjust their thinking about new information. The objective is to provide high-risk children with high-quality instruction, equipping them with the skill of understanding concepts while reading.

Neuman (2001) also argues that educators may not be teaching enough content in early literacy. Instructional variation among teachers and curriculum could also be a factor in some low achievement. Higher-level questions, content, and discussion are also very important to literacy gains. Leading students towards problem-solving and critical thinking skills helps develop knowledge for better reading competency. Implementing a better balance in read-aloud books for children will also develop higher reading competency (Neuman 2001). It is suggested that both storybooks and informational books are balanced to increase the child’s knowledge. This author also is a proponent of high quality early childhood programs to provide children with essential reading skills.

The National Institute for Literacy sponsored by the U.S. Department of Education conducted an Early Childhood Longitudinal Study (ECLS) in the fall of 1998 using a random
Three Strategies

A sample of 23,000 kindergartners. The children were followed through 5th grade. Reading scores were used in both the fall of 1998 and spring of 1999 to test recognition of words by sight and context, along with simple sentence definition. The results of this research confirmed that children from diverse backgrounds lag behind their peers, and after one year of school may lag behind even more than the Caucasian control group. This again shows that just being in school is not enough to reduce the gap. Efficient and effective year-long programs need to be put in place in all elementary institutions. This study shows great progress made while students are in kindergarten in the area of literacy components. Mothers in low SES with a higher level of education had children who also achieved at a higher academic rate. It is very interesting to see the direct correlation with ethnicity and the mother’s educational background.

D’Angiulli, Siegel, and Hertzman (2004) conducted a longitudinal study in Vancouver, Canada. The 1,221 students were examined for five years while being immersed in a program with a rich literacy component. The student’s reading skills were assessed using the WRAT3, which is a list of letters and word list of increasing difficulty. The next assessment was phonological processing using the Rosner Auditory Analysis Test Grades One to Three. This is a battery that measures the student's ability to recognize and reproduce sounds orally. The students were also tested with spelling dictation in each grade. The risk of reading failure decreased from the initial rate of .26 to about a .64 in 3rd grade. The results again stated that disability in reading and inequalities in literacy can be effectively reduced by implementing early literacy programs (D’Angiulli et al. 2004).

It is evident that much work is needed to improve the academic reading scores of disadvantaged children. Reading interventions should be implemented for all low SES children and homes prior to starting elementary school. Creating programs for parents to interact and
engage with children while promoting language skills in the home would be the first step to
better prepare children for school. Allowing disadvantaged children access to books, libraries,
and early experiential activities will promote language skills. When parents are given the tools
to help their children be successful in school, a high percentage would participate with their child
in academic activities. It is evident by the reviewed articles that reading and literacy programs
are a must for disadvantaged students to start and stay on track for academic achievement.

Craig et al. stated clearly that “early prevention may be the best weapon we have to
combat reading failure.” Reading comprehension (MAT) scores were significantly higher for a
group of African American preschoolers when given the opportunity to attend a public preschool
program. The trend showed an increase of 30% to 60% higher reading scores than the control
group (Craig et al.). It appears that the best solution to resolve the reading failure is to allocate
resources for early prevention for low SES students.

Conclusion of Reading and Literacy

As documented in all the articles, early reading and literacy programs can have great
influence on reducing the achievement gap for low SES disadvantaged children. It was also
documented that early prevention is more effective than remedial reading programs in
elementary and middle schools. Implementing effective and quality reading and literacy
interventions in preschool and kindergarten will bring those disadvantaged students to a higher
academic performance level on reading test scores. When reading success is achieved and
maintained, students have a greater opportunity to excel academically across all areas of
curriculum for a longer period of time.
Class Size

Reduction of class size is another strategy that is gaining national attention. A few states have already elected to reduce class size statewide with the goal of reducing the achievement gap. The research to be reviewed will allow for more understanding about the evidence of academic achievement when reducing class size. Well over 100 experiments and studies of the effects of small class size have been conducted, with varying results, but most are in agreement that class size reduction is a good thing for all students.

The Student Teacher Achievement Ratio (STAR) project was the largest longitudinal study of reduced class size, completed in Tennessee from 1981-1985. Mosteller (1995) considered Project STAR to be “one of the most important educational investigations ever carried out and illustrates the magnitude of research needed to strengthen schools” (Mosteller 1995).

Pate-Bain, Fulton, and Boyd-Zaharias (1999) designed Project STAR to provide information on the effects of class size reduction for students in grades kindergarten through 3rd grade. The Project STAR began with 6,328 random kindergarten students assigned to small class size (13-17) and regular class size (22-25) with a full-time teacher aide. These researchers were pioneers who implemented and collected data for Project STAR. The overall findings show that small class size (SCS) produced significant long-term benefits in all years of education. Pate-Bain et al. (1999), table 1, p. 2, indicates a 5% higher math score than the control group, and 3% higher honors English score than the control group. The findings also indicate 72% of the test group graduate on time compared to 66% of the control group. The dropout rate was also 4% lower in the test group.
Researchers reported students who were in small classes for four years have better graduation rates, higher grade point averages, and higher rates of pursuing post-secondary education than the control group. Students from Project STAR were more likely to take the ACT or SAT college entrance exam. Krueger and Whitmore (2001) researched the test data and indicated that small class size cut the gap of college entrance between African Americans and Caucasians by 50%. Small class size also led to the disadvantaged students graduating in the top 25% of their classes with higher grade point averages (Pate-Bain et al.).

Krueger et al. (2001) did an examination of Project STAR in 2001 to determine the benefits of smaller class size for African American students compared to Caucasian students. When using the Stanford Achievement Test, the scores increased 7-10 percentile points for African American students, and 3-4 percentile points for Caucasian students. When students were returned to regular class sizes after four years of small class sizes, the benefits continued at a higher rate for African American students. Krueger et al. calculated that if all students were placed in small classes for primary grades, the African American-Caucasian achievement gap would decrease by 38% (Krueger et al., p. 15).

Krueger et al. also validated the results by correlating test scores using the Stanford Achievement Test in kindergarten through 3rd grade and the Comprehension Test of Basic Skills (CTBS) in grades four through eight. Both used multiple choice format to measure reading and math at the end of a school year (Krueger et al.). The scores for African American students in small class sizes were more significant than for Caucasian students, suggesting that smaller class size can reduce the gap for reading and math.

Smaller class size may also indirectly affect the frequency of negative social outcomes such as crime, welfare dependence of students, and teen pregnancy. Krueger et al. stated that 1.6
percent are less likely to be convicted of crime compared to students in regular-sized classes. Teen pregnancy was reduced by 33% for those male and female students enrolled in smaller class sizes during their education. Krueger et al. concluded “class size reduction will have the biggest bang for the buck” when targeted for schools with minority students.

Researchers Nye, Hedges, and Konstantopoulos (1999) conducted a five-year follow-up of Tennessee’s Project STAR. They compiled data for remaining students after a five-year time lapse to examine the long-term effects of small class size on maintaining academic performance. The study provides evidence that the effects are maintained over time and may benefit students through high school. The study also shows that the more years the student is in the smaller class, the higher level of academic achievement in math, reading and science. Testing was conducted using the California Test of Basic Skills (CTBS) at three grade levels (4, 6 and 8) (Nye et al. 1999). The 3rd grade math scores were 8 points higher for the test group over the students in a regular class size, and reading scores were 10 points higher than the control group. The researchers concluded that small class size in the primary years has significant long-lasting benefits for academic achievement.

Four more research teams have analyzed the original Project STAR data and conducted new research to show short-term and long-term effects of the initial project. Mosteller (1995) found when using the Stanford Achievement Test, students who would have scored in the 50th percentile in reading or math with no intervention of small class size were now testing at the 60th percentile. The academic gains were especially identified in the African American students in 1st grade. In 2nd grade, the minority students remaining in a small class size doubled their reading scores. The students in the smaller class size continued to out-test the control group at both 4th
and 5th grade. This researcher found students still benefiting academically after being returned to a regular class size in 4th and 5th grade (Mosteller et al.).

Boyd-Zaharias (1999), in the American Educator, confirmed the successful results of Project STAR. Long-term follow-up found that 8th grade students who were in Project STAR’s initial small class and then placed back into a regular sized class were ahead by 14 months in reading and 13 months in math and science. Boyd et al. (1999) also projected that 72% of the students would graduate on time as compared to 66% in the regular class size group.

Finn, Gerber, Achilles, and Boyd-Zaharias (2001) found that the association between student achievement and total number of years in a small class was consistent for all tests in math and word skill achievement. The largest observed effect for small class size was for students who had the opportunity to be in a small class from kindergarten through 3rd grade. After further analysis, these researchers also indicated that there were some academic gains found for students in a regular class size with a teacher’s aide. They concur with all previous studies that students remaining in a small class for at least four consecutive years had significant academic gains through at least 8th grade (Finn et al. 2001).

Finn and Gerber (2005) also investigated the link between small class size and high school graduation rates. The initial students were followed for 13 years, and graduation and dropout data was collected from official school and state records. In an overview of past research, a major factor for dropping out was poor academic performance. When students were enrolled in a small class for a minimum of four years, their academic performance was maintained and often improved. When students are in a small classroom from kindergarten through 3rd grade, the odds of students graduating increased. This was especially true for
students from low SES. Graduation rates rose to 67% when students enrolled in three years of a small class size, and doubled to 80% for students who attended four years in a small class.

Research findings are in agreement that students in a small class size for a minimum of four years, kindergarten through 3rd grade, increase their academic performance. The graduation rate of both African American and Caucasian students will also increase (Finn et al. 2005). These results are in agreement with the long-term benefits of early interventions for students of low SES. Krueger et al. also concluded that a higher percentage of minority students in small classes were taking college entrance exams.

Smith, Molnar, and Zahorik (2003) were the research team that analyzed the data from Student Achievement Guarantee in Education (SAGE) driven by the University of Wisconsin-Milwaukee between 1997-2001. The SAGE experiment required schools to reduce class size to 15 for kindergarten through 1st grade. They also provided rigorous academic curriculum and organized collaboration with parents, community and social services.

The SAGE evaluation involved 47 schools in 21 school districts and made a comparison with 17 non-SAGE schools. To measure achievement, the students were tested using the Comprehensive Test of Basic Skills (CTBS) battery. The SAGE students scored significantly higher in reading, language and math than the non-SAGE students. The norm group gained 33 points in reading while the students in the SAGE evaluation were recorded to gain 47 points. The same was true for the math score with the norm group gaining 35 points in reading and the SAGE group students gaining 42 points. The SAGE group gain translates into a 30% learning growth in nine months. This gain appears to remain for the SAGE students in math and reading through the 2nd grade (Smith et al. 2003). The findings of the SAGE analysis indicated that the
benefits were greater for the African American students than for the Caucasian students, and the significant gain appeared to hold through 2\textsuperscript{nd} grade.

These results indicate that low SES students participating in the SAGE program will attain greater academic achievement test results and therefore the SAGE program can claim to help reduce the academic achievement gap. The total results of the SAGE evaluation represent a one-third to one-half year's worth of growth when compared to the non-SAGE schools. It also appears that the academic gains made through 1\textsuperscript{st} grade will are demonstrated in subsequent grades. African American students also seem to benefit more than the non-SAGE group and more than Caucasian students in the SAGE group. Attendance also increased by 50\% with participation in the SAGE program (Smith et al.). The SAGE program evaluation is yet another confirmation of the importance of small class size in the early years to help students achieve and reduce the gap in achievement as the students progress through school.

The last review of class size to be discussed here was conducted in England by the University of London using over 11,000 students ages four through seven. The longitudinal study followed the students for three years with class sizes lower than 20 students per class. The findings showed a clear relationship between class size and academic achievement. Students of low literacy ability with scores at 50\% competence in reading skills were now scoring at 64\% after participating in small classes. These same students who scored at 50\% in math in a large class were at 60\% in a small class (Blatchford, Goldstein, Martin, 2003).

The conclusions of this analysis were consistent with the findings of Project STAR. This longitudinal study again indicates that small class size can significantly influence student achievement. It also states that small class size can continue to benefit students of low ability for several years. This study also found that teachers were able to teach more effectively with fewer
students in class, thus enabling students to achieve at a faster rate. Students were also observed to be less distracted and disruptive in a smaller class (Blatchford et al. 2003).

**Conclusion of Small Class Size**

Researchers indicate that students who attend smaller classes in the primary grades tend to have higher test scores than students who attend larger classes. It also indicates that African American students benefit more from reduced class size than Caucasian students do.

The overall data indicate that reducing class size to below 17 students is a very effective way to increase academic achievement and reduce the achievement gap. Students who came from low SES backgrounds respond well academically, as well as continue to benefit through school and young adulthood. Targeting schools with low test scores and implementing small class sizes would lead to a reduction in the achievement gap.

**Review of Three Strategies**

The results from early childhood/preschool, reading, and class size interventions all included data that showed improved student academic achievement. These three interventions can play a significant role in reducing the achievement gap.

When each intervention stands alone, the one that shows the greatest success in improving academics and continuing to benefit the students is overwhelming early childhood/preschool interventions. When minority students are given the opportunity to come to school prepared to learn, they appear to gain academic achievement and then it continues to benefit their academics through high school and improve many social elements into adulthood. It is estimated that early childhood and preschool programs have the greatest economic return on investment (Heckman et al.).
Early childhood programs like the Perry Project, Abecedarian Project, Head Start, and Tulsa’s Pre-Kindergarten Readiness Evaluation are all programs that are aimed toward at-risk students from low socioeconomic groups. The short-term effects are measured by academic tests that show significant gains for those at-risk students. However, the Perry Project looked at the long-range benefits such as higher rates of graduation, higher salaries, home ownership, and lower rates of welfare assistance, fewer out-of-wedlock births, and lower arrests. The economic benefit of this project alone shows a 17% rate of return.

The Perry Program invested six to eight hours per day, five days a week, and the total cost per child was about $16,500, with a total benefit savings of $144,000, which is beneficial to society (Heckman et al., p. 3).

Currie found that the children enrolled in a quality preschool program reduced the high school dropout rate by 24%. This, too, is a cost savings to the community by having more students becoming a productive part of society at an earlier rate (Currie et al.).

Currie et al. investigated several long-term outcomes including crime and delinquency, and found these were long-term benefits for students attending a quality preschool program. This includes a short cost-benefit analysis that states for every dollar spent on quality early childhood programs, the program would save $3.69 in future government cost.

Most other studies did not forecast the benefits in dollar amounts, but most realize that investing in at-risk young children will produce a much higher rate of return than other interventions or expensive later remedial programs for the discouraged student. Students who were part of the early childhood/preschool programs continued their academic gains, as well as became a more productive member of society at a higher rate than the control groups.
The other effective intervention is the reduction of class size. Project STAR was the largest research project with over 6,000 students that had findings of producing significant short-term and long-term benefits for at-risk students. This research has been reevaluated by many other teams to include data on less retention of students, resulting in an average saving of $3,547,000 in one year. Another team calculated the cost savings of fewer dropouts by calculating that students who graduate usually earn over $5,000 more per year than those who do not graduate, which would calculate to an estimated economic impact of over $2,000,000 for one year (Pate-Bain et al. 1999). Krueger et al. also concluded that the students in the smaller class size completed more advanced courses and applied to colleges at a higher rate. He also stated that the achievement gap is reduced to a greater degree when students are in a small class for four years. Minority students seem to benefit at a higher rate and retain their gain for a longer time period than Caucasian students. Krueger et al. states that class size reductions will have the “biggest bang for the buck” when targeted at schools with minority students.

The data collected after a five-year follow-up by Nye et al. also concluded that there were consistent academic gains in math and reading continuing to grade 8. This study also demonstrated that the significant effects of early participation in small class size last through high school and was reported significantly higher for African American students (Nye et al.).

The SAGE research made much the same conclusion that class size reduction provided over a half year’s growth in academic gains in one nine-month school year. The test scores showed a gain of 33 points in reading and 29 points in math from fall to spring of the first year compared to the control group. This translates into a 25-30% growth for students in the SAGE program. This study then showed narrowing of the gap between African American and Caucasian students in 1st grade (Smith et al.) within the first year.
The third most effective intervention appeared to be reading and literacy programs. All programs were high quality and teachers had additional staff training and development. It also had consistent curriculum planning and follow through by all involved staff. Parent and community involvement were an important factor in this comprehensive project. The overall findings are conclusive that math and reading scores respond positively to reading interventions in the primary grades. A researcher using the California Achievement Test (CAT) scores for math found that 16% of the test group received the highest score on the Computation section (Alexander et al.). The gains in reading scores using the Gray Oral Reading Test found increases in a range of 1 to 5 points above the mean. These results occurred in four different sections of reading competency skills for students in 2nd, 3rd and 4th grades. The research on reading and literacy concluded with no long-term social benefits to the students.

The fact does remain that students who are academically at the norm for reading will continue to maintain their academic gains, graduate on time, and find better jobs. The research also found the children from low SES performed consistently better at reading when summer reading education was provided. At-risk students had generally a higher rate of setback than their Caucasian counterparts due to lack of availability of reading materials and programs. It is important to keep at-risk disadvantaged students in continuous and consistent learning through the entire year to continue to maintain their gains in reading.

The SFA longitudinal outcomes showed great academic benefits to students in this program. This means that high quality reading programs that integrate phonics and whole language approaches are best for students to develop long-term decoding and comprehension abilities. Students who engage in discussion develop good oral and thinking skills.
The SFA program also included several other factors that created high reading scores in a short time. Each student had small class size as well as individual tutoring on a daily basis. Students were regularly tested and regrouped for consistency. This program also required a full-time reading facilitator who trained and directed teachers with appropriate curriculum and teaching techniques. The results from the SFA reading intervention showed a pretest score of -0.78, and after a 5-year period the score had increased to +0.14 with a mean of 0.00. This is compared to the control group that scored a –0.19 at pretest and actually scored lower at -0.32 at the 5-year test. The findings show reading intervention programs have a greater positive effect on minority at-risk students. The downfall to this study is that there are no conclusive results of benefits after the 5-year period, which is at 4th grade (Ross et al. 1999). The cost of this program is considerably higher and no analysis was done on the economic return on the investment of time or staff (Ross et al.).

The National Institute for Literacy sponsored the five-year longitudinal study of 23,000 students entering kindergarten in 1998. The reading scores were tested and correlated with poverty level and mother’s education level. Again, the data reveals that low SES children are at a disadvantage when starting kindergarten and having reading disabilities. Reading and literacy can help reduce the gap, but reading programs alone cannot have the long-lasting effect of both interventions of early childhood and class size reduction.

Conclusion

The achievement gap is a highly visible yet misunderstood issue. The size of the gap depends not only on minority student achievement, but also on the rates of improvement or decline in the other subgroups. Numerous complex factors contribute to the achievement gap,
including a combination of home, community and school factors. Closing the gap should be a shared responsibility of all concerned, including federal, state and local levels.

Tests are the primary tool used to assess the progress of students. All 50 states have standardized tests in place to test student progress. The size of the achievement gap depends on the changes in test performance by all the subgroups. This may mean that the African American student from low SES may have to improve at a faster rate to make up the difference seen by the Caucasian student.

The National Assessment of Educational Progress (NAEP) is a federally funded testing program that measures performance of students in math, reading, science and other academic subjects. The most recent data collected in 2000 shows a general improvement in overall individual scores. However, the African American students constitute a greater percentage of the school age population, therefore showing the national average to be lower (Kober 2001).

The Center on Education Policy (CEP) summarizes several factors that could help close the gap. Out of the 13 recommendations, three strongly correlate with this review. The CEP recommends factors that could be implemented immediately with appropriate funding policies. CEP states that class size reduction, high-quality early childhood programs, and summer reading and learning opportunities are strategies that can effectively reduce the achievement gap (Kober 2001).

Reviewing the results of several research articles has helped this researcher to conclude that class size reduction and early childhood programs have the most valid evidence of success on short-term increased test results for minority students. The findings also conclude that these two interventions have long-term benefits that continue with the student into adulthood.
Policymakers should place a high priority on strategies that show increased learning. Federal and state dollars should be allocated for quality early childhood and preschool programs for all low-income children. This would decrease the gap at its earliest point upon entering kindergarten. As low SES children start attending school, small class size is the most effective way for them to maintain and gain academic achievement at a higher level, thus reducing the achievement gap at early primary grades.

The most significant data this researcher found confirms that interventions during early childhood have the most long lasting benefits not only academically, but also socially. There is a need for policymakers to commit resources for low-income children to start decreasing the gap before it begins. Only 50% of low-income children have any access to quality preschool programs (Kober et al.). This leaves 50% of the low income minority students already becoming part of the academic gap and may never be able to catch up to their counterparts after starting school. Policies that would sustain class size reductions in high minority and low income schools for a minimum of 4 years will ensure student academic gains in the early primary years kindergarten through 3rd grade. Providing quality curriculum, teachers, and small class size will reduce the consistent widening of the achievement gap as the students progress through high school. Data has shown that low SES minority students can make great academic gains when given the appropriate interventions.

Reading and literacy interventions report data that proves short-term positive results on reading achievement and test scores. However, most studies were implemented using only a small number of students as the test group, usually under 50. All of the reading programs were conducted for short periods of time during the school day for the nine-month school year. The results showed improved reading gains during the year, but minority students would have a
reading setback during the summer months. The long-term effects of reading programs have not been documented. Therefore, the impact of reading programs is not as significant in reducing the achievement gap as are early childhood programs and reduction in class size. The question then remains who or what will it take to offer disadvantaged students the opportunity to achieve academically? This is an issue of time, quality programs, cost and mandated educational policy.

Research will continue as schools struggle with the widening achievement gap. It is clear that with the appropriate interventions, the gap will be reduced. This review of research indicates that class size reduction in the primary grades and mandatory high quality early childhood programs for minority at-risk children are two very significant interventions that can be implemented immediately, and will reduce the achievement gap.

This researcher will continue to advocate to educational institutions and state policy makers that funding committed to early childhood quality programs and small class sizes will be dollars well spent to reduce the achievement gap in the shortest period of time. Only when students succeed academically will our society as a whole benefit by producing more responsible and productive future employees.

This research review confirms the effectiveness of quality early childhood/preschool programs and class size reduction. These interventions are crucial in reducing the achievement gap in the future.
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