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## The Positive Impact of Project-Based Learning on Attendance of an Economically Disadvantaged Student Population: A Multiyear Study

Casey Creghan

*Sam Houston State University, flc003@shsu.edu*

Kathleen Adair-Creghan

*Humble Independent School District, kathy.adair6@gmail.com*

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# THE INTERDISCIPLINARY JOURNAL OF PROBLEM-BASED LEARNING

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## ARTICLE

### The Positive Impact of Project-Based Learning on Attendance of an Economically Disadvantaged Student Population: A Multiyear Study

Casey Creggan (Sam Houston State University) and Kathleen Adair-Creggan (Humble Independent School District)

Students who do not regularly attend high school are at an increased risk of failure in the classroom and may eventually contribute to a higher dropout rate. More specifically, the attendance rates of students from economically disadvantaged backgrounds have traditionally been lower than those with average means. Therefore, the purpose of this quantitative study was to examine the effects of a project-based learning (PjBL) environment on economically disadvantaged high school students in regard to their attendance rates. Data were collected in order to compare attendance rates of a school utilizing traditional teaching methodologies with a school using PjBL as the main mode for instructional delivery. Findings suggest when considering attendance rates, there is substantial evidence to support the use of PjBL as making a positive impact on the school attendance of economically disadvantaged students. Study findings also lend positive support for teachers and administrators who are seeking to implement a PjBL environment in their school systems to assist in addressing the attendance needs of this student population.

Keywords: project-based learning, problem-based learning, economically disadvantaged, attendance, inquiry-based instruction

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With the implementation of the No Child Left Behind Act (NCLB) (U.S. Department of Education, 2002), the practice of education in the United States was altered in many ways. Ushered in was an era of increased accountability and requirements to meet multiple mandates in hopes of ensuring the success of all students, including those from impoverished homes. While there has always been some degree of accountability for teachers and administrators, clearly these pressures have escalated in recent times. Teachers and leaders who fail to meet accountability demands are reassigned or forced out of their current positions. On both state and national levels, requirements to meet the educational needs of all students have been ushered into place, while population dynamics in many areas of the country are in flux.

According to the National Center for Education Statistics (2010), there are approximately 55 million students in grades K–12 who are being educated in private schools, public schools, charter schools, Catholic schools, or attending home schools in our country. These students report increased pressures from school work, family problems, homework, standardized testing, and other obstacles in their lives (Park, 2013). Additionally, there appears to be a disconnect between curriculum implementation and application of

students' learning within their daily lives. Faced with these pressures, many students are choosing not to continue their education and are dropping out of school (Rumberger, 2011).

On a national basis, according to the U.S. Department of Education (2010), approximately 3 million 16–24-year-olds are not currently enrolled in school and are considered dropouts. Moreover, these high dropout rates are not found equally across all demographic groups. Milne and Plourde (2006) reported that there are proportionally more minority children found on poverty rolls than there are White children. Children who live in impoverished situations are dropping out of school at the highest rates (Hernandez, 2011). Jensen (2009) explained that the home life of children in poverty can be difficult and notes several risk factors, including: (a) emotional and social challenges, (b) acute and chronic stressors, (c) cognitive lags, and (d) health and safety issues. Moreover, Jensen (2009) noted, "Poverty is a chronic and debilitating condition that results from multiple adverse synergistic risk factors and affects the mind, body, and soul" (p. 6). The United States Department of Education reported that poverty rates are on the rise (U.S. Department of Education, 2010), moving from 17% to 19% between the years of 2007 and 2008. DeNavas-Walt, Proctor, and Smith (2009) reported that 16,134,000 children live in poverty in the United States.

The impact on the lives of these children can be seen in many areas. Children in poverty are less likely to graduate from high school and enter a college setting (Balfanz, 2009; Hernandez, 2011). They are more likely to be affected by violence and have higher rates of incarceration in our prison system (Covin, 2012; Gelles, 1992; House, 2010). To combat the increase of children in this synergistic effect, educators must increase the search for solutions to ensure the academic success and future for all students who enter the classroom.

If schools are going to meet federal and state standards and provide a comprehensive education for all children, including those in poverty, they must provide curriculum and instruction that is challenging, and that meets both the needs and interests of students by keeping them engaged in learning (National Middle School Association, 2003).

More specifically, in the area of attendance rates, not only are children of poverty more likely to drop out of school, they also tend to have poorer rates of attendance in school (Chang & Romero, 2008; Jensen, 2009). Neild, Balfanz, and Herzog (2007) ranked poor classroom attendance as one of the four leading precursors of dropping out of school. Regular school attendance is critical for obtaining and developing a foundation for general knowledge, and students below the poverty level miss more school than their affluent peers (Chang & Romero, 2008; Romero & Lee, 2008; U.S. Department of Education, 2002). Chang and Romero (2008) commented that it is not surprising, that children who missed more than 10% of required school days have significantly lower skills in math and reading.

In response to the importance of students' attendance in relation to dropout rates, some states have designated funding procedures based on the average daily attendance (ADA), of the school district, thereby making it financially imperative for districts to insure that each student is in attendance (Texas Education Agency [TEA], 2010a). ADA is considered to be the average number of students attending a particular school on any given day (TEA, 2010b). Ely and Fermanich (2013) reported that states with high incentive student count methods had lower repeated absences and dropout rates paired with an increase in the percentage of students graduating. Additionally, accountability measures may also be reflective of the importance of attendance. For example, in Texas, attendance is a performance indicator on the state-generated accountability report (TEA, 2010b). This report tracks school progress towards meeting state initiatives. To summarize, the impact of low attendance rates for economically disadvantaged students, both student graduation rates as well as school and district accountability ratings, are negatively affected. Within the study, economically disadvantaged students were those students identified as low income based on a uniform method outlined in the plan adopted by the

State Board of Education. One or more standards could be utilized by local education agencies to indicate low income. These standards included annual income at or below the official poverty line for families, as established by the Director of the Office of Management and Budget, eligibility for free or reduced-price school lunch, eligibility for benefits under the Food Stamp Act of 1977, and eligibility for services under Chapter I of Title I of the Elementary and Secondary Education Act of 1965 as amended by the No Child Left Behind Act of 2001 (TEA, 2010b).

## Project-Based Learning (PjBL): A Possible Solution for Attendance Issues?

The question therein becomes, how can educators positively impact low attendance rates for impoverished students? One learner-centered instructional delivery method that has shown promise in raising attendance rates is project-based learning (PjBL) (Thomas, 2000). PjBL is an innovative methodology used to provide instruction for students in an authentic work-related setting (Buck Institute for Education, 2013). According to Grahame (2011), PjBL is "a systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks" (p. 95). The methodology of PjBL has been used effectively in several educational areas and has helped to scaffold students toward self-directed learning (Savery, 2006). High schools in many parts of the world are applying PjBL principles to deliver their curriculum (Weatherby, 2007).

Another closely related instructional delivery method, problem-based learning (PBL), has been used by educators to provide learner-centered instruction, but with a problem-solving focus, rather than a project-based outcome (Savery, 2006). According to Savery (2006), PBL "is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" (p. 12). The medical field has embraced PBL in training future doctors to conduct medical rounds in their practice (Donner & Bickley, 1993). In recent years, several engineering schools have moved to using PBL for their introductory engineering principles courses (Nedic, Nafalski, & Machotka, 2010). While the debate over the effectiveness of PBL continues, Boaler (2002) found increased performance in mathematics over a three year period with high school students who used PBL as compared to students who were in a traditional classroom. Dischino, DeLaura, Donnelly, Massa, and Hanes (2011) advocated the use of PBL for

increasing the amount of students in the Science, Technology, Engineering, and Mathematics (STEM) pipeline.

In the United States, some schools have not only adopted PjBL principles, but have moved to teaching the majority of their content in a PjBL format. New Tech Network Schools from California and Texas are delivering their curriculum through a PjBL environment (New Tech Network, 2013). According to the New Tech Network (2013), a high school in the New Tech Network of schools uses innovative techniques, such as PjBL, to increase student engagement in a rigorous curriculum environment.

Recently, with the aid of substantial donations from the Michael Dell Foundation and the Melinda & Bill Gates Foundation, the Texas High School Project has established 59 Science, Technology, Engineering, and Math (STEM) Academies that use PjBL to deliver instruction in innovative environments (Communities Foundation of Texas, 2011). Larmer and Mergendoller (2010) proposed that most students want to have a voice and choice in developing their learning and usually want to explore issues that are relative to their lives. Incorporating student choices and engraining these experiences in real-world scenarios will enrich the learning experience for the student (Yamzon, 1999) and result in high levels of student engagement (Brush & Saye, 2008).

It is important to note that some schools are using both learner-centered methods of PjBL and PBL. The New Tech Network Schools in California and Texas report using PjBL as an overall methodology, but also using smaller problem-based scenarios, primarily in mathematics (New Tech Network, 2014). This research study was conducted using a school from the New Tech Network, so both PjBL and PBL methodologies were utilized, but with an overall methodology of PjBL, as noted by the school's academic information on the school-provided website.

When employing instructional delivery methodologies, such as PjBL and PBL, a need for research has arisen to determine if these techniques have a greater impact on specific populations (Ravitz, 2009). The Buck Institute (Markham, Larmer, & Ravitz, 2003) also noted that more research is needed to address the issues of PjBL's effect on low-income students. Therefore, in order to address the need for additional research in this area, the purpose of this quantitative study was to examine the effects of a PjBL environment on economically disadvantaged high school students in regards to their attendance rates. The research question addressed in the study was as follows: Are there statistically significant differences in attendance rates of economically disadvantaged students in a PjBL environment as compared to a traditional learning environment?

Several assumptions were made during the course of this study. First, the campuses selected for the study were

of similar demographic make-up. Secondly, all information obtained from the TEA Public Education Information Management System (PEIMS) was accurate. Third, free or reduced lunch information, was considered an accurate measure of low-socioeconomic status and the designation as economically disadvantaged. Additionally, the processes used for the data collection, instrumentation, and the statistical analysis were suitable for the investigation. Finally, attendance rates obtained from the TEA were accurately compiled and submitted by the district schools that are the subject of this study.

There were overall limitations on the current research. First, the participants from this study, albeit from different schools, were from the same school district and community, thereby narrowing the scope for generalizing results. Secondly, extraneous variables that could have had an effect on the results could not be controlled. These variables could include, but are not limited to, culture and environment of the school, amount of parent involvement, quality of instruction delivered by individual teachers, and school leadership style.

Delimitations applied to the study included first, that participants had to be enrolled in Alpha or Beta High School during the 2009–2010, 2010–2011, or the 2011–2012 school years. Secondly, participants had to have a Public Education Information Management System (PEIMS) data record on file. Additionally, attendance rates were only obtained for the 2009–2010, 2010–2011, or the 2011–2012 school years. Finally, and of importance to the purpose of the study, only students who were economically disadvantaged were considered for the study.

## Method

This study focused on the effectiveness of PjBL in schools with high rates of economically disadvantaged students. Since past research studies have focused on the overall effectiveness of PjBL or PBL rather than addressing specific attendance concerns of economically disadvantaged students, the effects of PjBL on these students are largely unknown. In order to examine the effect of PjBL on attendance rates of economically disadvantaged students, the research design compared two different high school campuses located within the same independent school district in Texas. The first campus, called Alpha for the purposes of this study, is a traditional comprehensive high school with approximately 1,200 students enrolled. Mixon (2007) described traditional high schools as those schools designed to teach traditional subjects, such as English, math, or science, in isolation by plan. A majority of high schools in the country follow this scheme. Examples may include schools that have a wing or a hallway that is predominantly dedicated to a specific content area. As explained by the school website for Alpha, instructional

delivery at the school included projects, research, and collaboration by students, but no use of practices such as inquiry-based instruction or PjBL.

The second campus, called Beta for the study, is a member of the New Technology Network of schools and delivers instruction in a PjBL saturated environment. Beta High School was created and built upon the premise of using a PjBL environment. Therefore, no attendance data was available in a non-PjBL environment for this campus. As mentioned previously, New Tech Schools also utilize PBL scenarios, so both methodologies are included in this research. In other words, the majority of the curriculum at Beta is delivered using principles of PjBL, but students also work together to solve real-world problem scenarios (i.e., PBL). Instructors at Beta receive professional development on PjBL through the Think Forward Institute, and also act as mentors to other teachers learning PjBL methodologies. Beta has a current enrollment of approximately 330 students.

The two study schools are located approximately 2 miles apart and draw students from the same community and school district. Students who attend Beta are accepted for participation in the school through a blind lottery system held through the larger school of Alpha. Students at Alpha and Beta participate in the same athletic teams and community events within the district. Student demographics of the schools vary in that Alpha has a higher rate of economically disadvantaged and at-risk students than Beta school, but the student population at Beta is as diverse as that of Alpha, including the two largest subpopulations for the school district. However, only economically disadvantaged students, as defined by the state of Texas by placement into a free and reduced lunch program, were considered as participants in the study.

The participants for this study were selected based on their designation by the TEA as an economically disadvantaged student enrolled in the schools being researched for this study. Currently, Alpha High School provides educational services to 973 economically disadvantaged students (Table 1), while Beta High School provides services to 173 economically disadvantaged students (TEA, 2012a).

This study used Lipsey's (1990, p. 137) Sample Size Table: Approximate Sample Size per Experimental Group Needed to Attain Various Criterion Level of Power for a

Range of Effect Sizes at Alpha = .05. It was inferred from Lipsey's table that 65 participants from each school should be selected at random from the population for each school year under analysis. This study used a random, convenience sampling of the economically disadvantaged populations of the two schools. Therefore, 65 economically disadvantaged students were selected at random from each campus for the 2009–2010, 2010–2011, and the 2011–2012 school years. Due to the size of the schools, it is possible that some students were included in the random sample for more than one year. Information from the 2013–2014 school year was not available at the time of the study. Some students may have been chosen for one or more years of the study, but this information was not available, as students were only identified by a random student identification number assigned by the Texas Education Agency (TEA) for each year under review.

A public information request for attendance data from the school district was denied; therefore, data were collected from the TEA Public Education Information Management System (PEIMS). PEIMS is a program/system encompassing all data requested and received by TEA about public education, including student demographic and academic performance, personnel, financial, and organizational information (TEA, 2013). Attendance rates from the three years under review in the study were retrieved from the TEA for both campuses. For purposes of this study, attendance rates were considered to be the total number of days students were present in a particular school year divided by the total number of days students were in membership of the same year (TEA, 2011).

The data were analyzed using descriptive and inferential statistical methods to determine if there was a statistically significant difference between the attendance rates of the two schools. Both means and standard deviations were used in the analysis. When appropriate, an analysis on the inferential level was conducted using a *t*-test to determine if there was a significant difference between the two independent groups. The statistical significance level, *p*, established for this study, was set at the .05 level. Participants at each school were considered independent of each other for data analysis, while they remained members of the same local community in which they lived. Effect sizes were also considered.

Table 1. Number of economically disadvantaged student participants per setting

School	2009–10	2010–11	2011–12
Alpha High School	838	889	973
Beta High School	177	172	173

Note. Adapted from Texas Education Agency. 2010–11 Academic Excellence Indicator System (TEA, 2011a). 2011–12 Academic Excellence Indicator System (TEA, 2012a).

## Results

An analysis was conducted for each of the school years: 2009–2010, 2010–2011, and 2011–2012. The following tables illustrate the findings of the analyses.

### 2009–2010 School Year

Table 2 shows the mean and standard deviation for Alpha and Beta high schools. An independent sample *t*-test was conducted to compare attendance rates for the two schools. The attendance rates for Alpha ( $M = 148.2$ ,  $SD = 35.93$ ) and Beta ( $M = 165.88$ ,  $SD = 10.49$ );  $t(128) = -3.087$ ,  $p < .001$ ,  $d = .69$ . The *p* value was found to be statistically significant because it fell below the customary alpha level (.05) established at the beginning of the study.

Table 2. 2009–2010 attendance rates

School	<i>n</i>	<i>M</i>	<i>sd</i>
Alpha High School	65	148.2	35.93
Beta High School	65	165.88	10.49

The results indicated there was a statistically significant difference in the attendance rates in the two learning environments during the 2009–2010 school year. This information suggests that during the 2009–2010 school year, economically disadvantaged students at the traditional high school had lower attendance rates than students at the PjBL school.

### 2010–2011 School Year

Table 3 shows the mean and standard deviation for Alpha and Beta high schools. An independent sample *t*-test was conducted to compare attendance rates for the two schools. The attendance rates for Alpha ( $M = 146.97$ ,  $SD = 40.21$ ) and Beta ( $M = 166.88$ ,  $SD = 18.48$ );  $t(128) = -3.627$ ,  $p < .001$ ,  $d = .64$ . The *p* was found to be statistically significant because it fell below the customary alpha level (.05) established at the beginning of the study.

Table 3. 2010–2011 attendance rates

School	<i>n</i>	<i>M</i>	<i>sd</i>
Alpha High School	65	146.97	40.21
Beta High School	65	166.88	18.48

The results indicated there was a statistically significant difference in the attendance rates of economically disadvantaged students in the two learning environments during the

2010–2011 school year. This information suggests that during the 2010–2011 school year, economically disadvantaged students at the traditional high school had lower attendance rates than students at the PjBL school.

### 2011–2012 School Year

Table 4 shows the mean and standard deviation for Alpha and Beta high schools. An independent samples *t*-test was conducted to compare attendance rates for the two schools. The attendance rates for Alpha ( $M = 143.95$ ,  $SD = 44.56$ ) and Beta ( $M = 163.54$ ,  $SD = 28.88$ );  $t(128) = -2.973$ ,  $p = .004$ ,  $d = .52$ . The *p* value is statistically significant because it is below the customary alpha level (.05) established at the beginning of the study.

Table 4. 2011–2012 attendance rates

School	<i>n</i>	<i>M</i>	<i>sd</i>
Alpha High School	65	143.95	44.56
Beta High School	65	163.54	22.88

The results indicated there was a statistically significant difference in the attendance rates of the two learning environments during the 2011–2012 school year. This information suggests that during the 2011–2012 school year, students at Alpha high school attended school at lower rates than students at Beta.

In regards to the research question, the study investigated relevant data to determine if there were statistically significant differences in attendance rates of economically disadvantaged students in a PjBL environment as compared to a traditional learning environment. With the inferential statistics provided, there appeared to be a statistically significant difference in the attendance rates for the schools under each year of the review. Economically disadvantaged students at Beta, the campus utilizing a PjBL saturated environment, attended school at higher rates than students at Alpha, utilizing a traditional instructional approach. These findings are consistent with the effects of PjBL and PBL on attendance rates in various environments studied in previous research conducted on entire student populations (Smith & Cook, 2012; Zusevics, Lemke, Harley, & Florsheim, 2013).

## Conclusions and Implications

As the results of the study indicate, utilizing the instructional methodology of PjBL positively impacted the study school, Beta, in the area of attendance of economically disadvantaged students. As noted previously in the limitations of the study, extraneous variables such as culture, individual teaching

practices, and expertise may not be controlled within this type of study and may have also have impacted attendance. However, attendance gains were statistically significant consistently over a period of three years, and given the similarities in demographics of the two campuses, the major difference between the two study schools lies in the instructional delivery method used at each campus. These results may not necessarily be applied to other schools and environments; nevertheless, the information gained in this study may be helpful in ascertaining the effects of utilizing PjBL with economically disadvantaged students in other schools.

Previous studies have shown that PjBL and PBL methodologies may positively impact student attitudes, collaboration, and buy-in, and these factors may contribute to the higher attendance rates shown in the study. Although in this study it was not determined if the PjBL environment impacted these other factors, there is some thought that increased student attendance may lead to positive changes in school culture and climate (Thomas, 2000).

As educators, a major focus in evaluating instructional delivery methods should be the impact of our instruction on the success of our students. In this light, we might consider the founding principles of PjBL methodology in providing relevant, learner-centered experiences for all students. Although implementing a PjBL environment requires ongoing training and support for teachers to be able to integrate PjBL methodologies within complex educational content required by state and national standards, PjBL may increase student interest and engagement in school. Because PjBL, as well as PBL, appear to affect the attendance rates of students, as evidenced by the results of this study and others (Smith & Cook, 2012; Zusevics et al., 2013), an effective implementation of PjBL methodology may lead to more of our economically disadvantaged students attending school on a more regular basis and actively striving toward graduation. Additionally, increased rates of attendance by economically disadvantaged students may impact not only graduation rates, but also accountability ratings for the study school and district. Therefore, the information gained in this study may be beneficial for other schools and districts in considering programmatic changes that could increase attendance rates for students of poverty.

In conclusion, districts should consider the implementation of PjBL as a means of addressing student attendance issues contributing to low graduation rates. Although previous research has focused on the implementation of PBL across school-wide settings, the research has not addressed specific populations for effectiveness. This study provides an initial step in determining the impact of PjBL on students from poverty, but further research is needed to replicate the results of this study in other environments, and additionally

to attempt to eliminate other extraneous variables from consideration in raising attendance rates for economically disadvantaged students. More specifically, future research could include state-wide comparisons of attendance rates of economically disadvantaged students in PjBL environments as compared to those in non-PjBL schools. Additional studies might include comparisons of attendance rates of economically disadvantaged students in small- and/or medium-sized schools as compared to non-PjBL schools of like size.

In light of the results of this study, school districts that desire to meet mandates issued by federal, state, and local governments would be well served to consider the educational needs of minority, economically disadvantaged, and at-risk student populations. While students in poverty may come to school with a different set of learning experiences than those students coming from more affluent households, schools have a moral imperative to meet the needs of every child. Due to the very nature of PjBL principles of collaboration, hands-on inquiry, and relevance to students' lives, an effectively implemented PjBL environment may, based on study results, meet the personal interests and relevancy needs of the economically disadvantaged population, therefore leading to increased attendance.

In an accountability-driven society, educators falling short of their goals often continue to deliver instruction in the same manner they have historically rather than adapting to the changing needs of student populations. PjBL offers students a proactive, challenging curriculum in which all students can excel. If schools are going to be successful in today's learning environment, educators must reach out and embrace creative, constructivist teaching methods that will keep all types of students engaged in the classroom, keep students coming to school, and lead to improved academic success. Harris (2004) asked administrators, "Who will advocate for the children who are abused, poor, and under-served who sit in our classroom?" (p. 81). It is up to our educational leaders and teachers to be the advocate for change in providing for the needs of our under-resourced student populations. PjBL may be one tool in positive implementation of that change.

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Casey Creghan, Ed.D. is an assistant professor of curriculum and instruction at Sam Houston State University in Huntsville, Texas. He has served in a number of teaching and leadership positions across the state of Texas, including serving as the dean of a STEM academy, principal of an exemplary high school, and as a professional development consultant providing support in the area of project-based learning and addressing the needs of under-resourced students. Casey's research interests include project-based learning, under-resourced student needs, and teacher preparation and retention. Please direct correspondence regarding this article to Casey Creghan, Sam Houston State University, 1908 Bobby K. Marks Drive, Box 2119, Huntsville, TX 77341-2119; Tel: (936) 294-3325; Email: [flc003@shsu.edu](mailto:flc003@shsu.edu)

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Kathleen Adair-Creghan, Ed.D. has been a professional educator since 1999. Kathy currently serves as the director of curriculum and instruction for Humble Independent School District in Harris County, Texas and as an adjunct for Sam Houston State University. She has served in a number of teaching and leadership positions, including leading curriculum writing projects, conducting professional development for teachers and administrators, teaching in public schools, and working with teachers through the instructional coaching model. Kathy's professional and research interests include STEM and science education pedagogy, addressing the needs of at-risk and second language learners, Response to Intervention, inquiry-based instruction, and working with educators at all levels.