

A Longitudinal Evaluation of Project Lead The Way in the State of Iowa

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Collaboration between Iowa State University, University of Iowa, and Iowa Department of Education
Component of the Iowa Math and Science Education Partnership (IMSEP) Core 2 Project
Collaboration with Iowa State University College of Engineering

OBJECTIVE

The State of Iowa has implemented *Project Lead the Way* (PLTW), which offers a sequence of pre-engineering courses for students in middle schools, high schools, community colleges. PLTW's stated goal is to "increase the number of young people who pursue engineering and engineering technology programs requiring a four- or two-year college degree" (Blais, 2003, p.13). Despite the popularity and rapid growth of PLTW program in Iowa, little is known about its efficacy. This study proposes a statewide, longitudinal evaluation, using a K-16 assessment model in Iowa's high schools, community colleges, and Regent universities. This evaluation utilized secondary and postsecondary data maintained by the State of Iowa and the National Student Clearinghouse to evaluate and measure students' course taking patterns, academic achievement, and progress from high school to postsecondary education. To achieve this goal, the authors, representing three institutions, have teamed together to collaborate on developing the methodology for the statewide longitudinal evaluation of Iowa's PLTW.

Utilizing the K-16 assessment model, three research questions are addressed in the first phase of this evaluation research:

- **RQ1: What are the demographic characteristics – socio-demographic, academic, and cognitive – of PLTW students and what characteristics predict early entry into the program?**
- **RQ 2: Do PLTW students take more math and science courses than non-PLTW students?**
- **RQ3: Is the cognitive improvement for PLTW students greater than non-PLTW students?**

Several statewide educational data sets were combined in order to track students from secondary institutions to postsecondary institutions, which is the first known study to take place in Iowa. The Iowa Department of Education's K-12 dataset, known as Project EASIER, was merged with Iowa Department of Education's Community College Management Information System (MIS) and National Student Clearinghouse. The Project Lead The Way database will soon be merged with transcript data from Iowa's Regent universities.

The resulting data set, simply known as "PLTW", currently contains 95 variables that follow participants and nonparticipants from 2005 to 2008—the most recent data. So far all of the students are still in high school, although future research will follow graduates into postsecondary education.

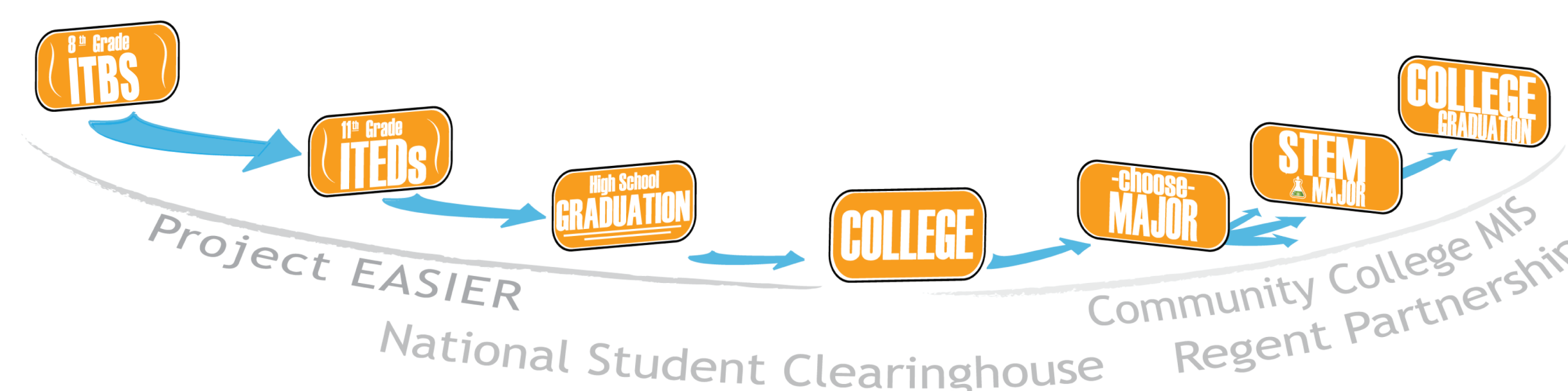
METHOD

By analyzing Project EASIER's course information, students who were enrolled in a Project Lead The Way course were identified and denoted as a Project Lead The Way student. A "control cohort" was chosen from students who were enrolled at a school which offered Project Lead The Way, but were not actually enrolled in any Project Lead The Way courses.

Students have been typically tracked and analyzed by graduation cohorts. Each cohort is based on the year students are expected to graduate. Thus, each cohort has similar ages, equivalent opportunity to participate in Project Lead the Way, and face the same school environment. Four cohorts have been identified in this study—the class of 2008, 2009, 2010, and 2011.

Since the earliest available data was 2005, researchers have educational data on the class of 2008's entire high school enrollment, while researchers only have middle school information from the class of 2011. Researchers will continue to measure student outcomes as students progress through the school system.

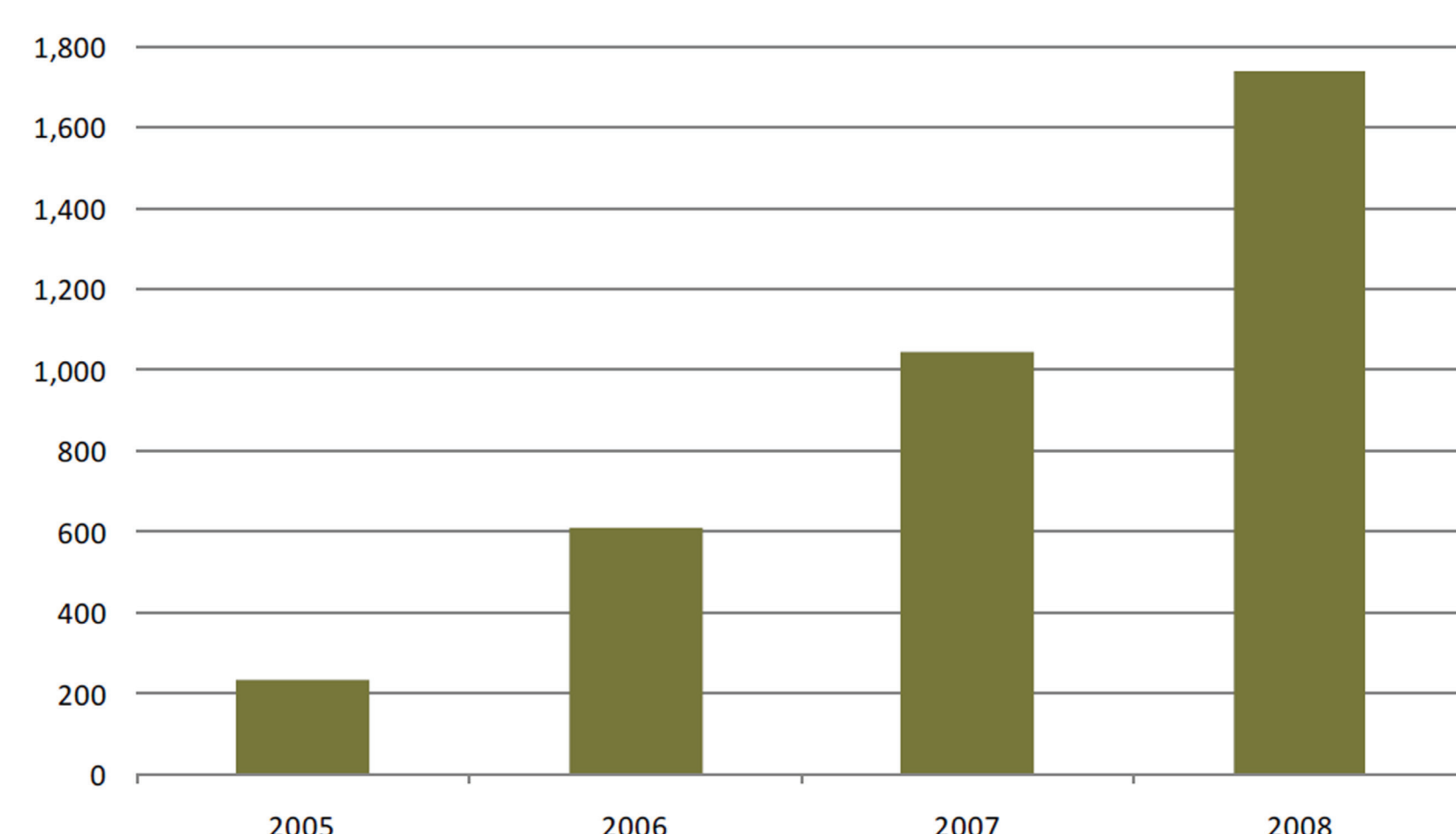
Course data is available since 2006. For this paper, courses have been analyzed based on "course area", which is the first two digits of the NCES course codes. This report only provides descriptive data comparing Project Lead The Way participants and nonparticipants. Descriptive data is broken down by each cohort—2008, 2009, 2010, and 2011. Iowa Project Lead The Way is still quickly expanding in the state so there are large differences between participants expected to graduate in 2008 and the many more participants expected to graduate in 2011.



DEMOGRAPHIC CHARACTERISTICS OF PLTW PARTICIPANTS

Figure 1 shows enrollment in Project Lead The Way from 2005 through 2008. In 2008, 1,737 students were enrolled, which was an increase of 66 percent since last year. Overall, 15.5 percent of participants were female, compared to 50.4 percent of nonparticipants.

Figure 1. Enrollment in Project Lead The Way: 2005 - 2008



1. PLTW participants were disproportionately white compared to nonparticipants. 90% of participants were white, compared to 79% of the nonparticipants. (Figure 2)
2. PLTW participants were dominantly male. In contrast, the nonparticipants were evenly divided between males and females. Female participants were greater in PLTW for the younger cohorts. (Figure 3)

3. PLTW participants were less likely to be eligible for free or reduced lunch* than their peers. 22% of participants were eligible for free or reduced lunch; 41.4% of nonparticipants were eligible for the same program.

* *An indicator of low-income students. Married couples with two children are eligible for free meals if they earn less than \$18,200 a year and eligible for reduced price meals if they earn less than \$25,900 (Iowa Department of Education, 2009).*

Figure 2. Percentage of Enrollment by Race/Ethnicity and Project Lead The Way Participation

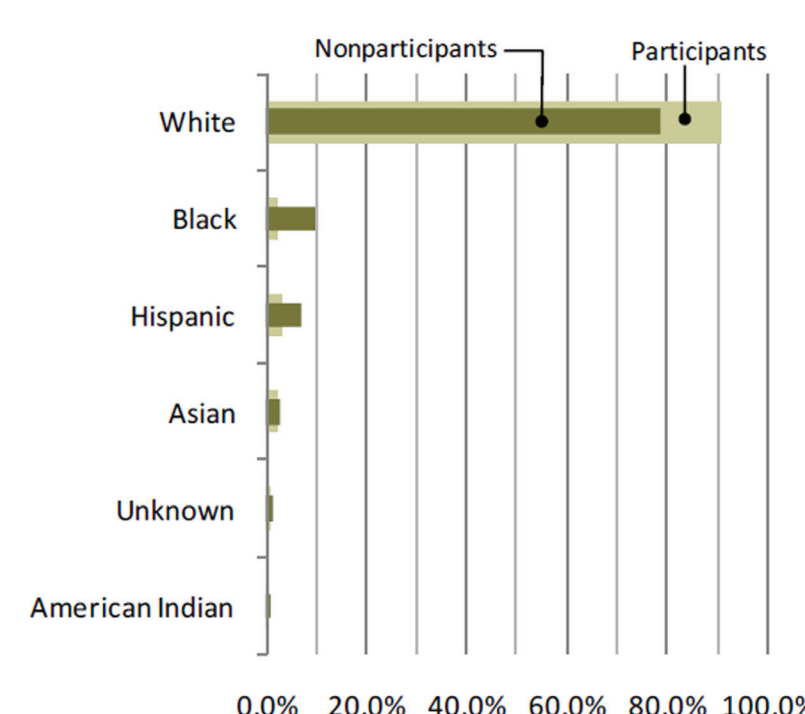
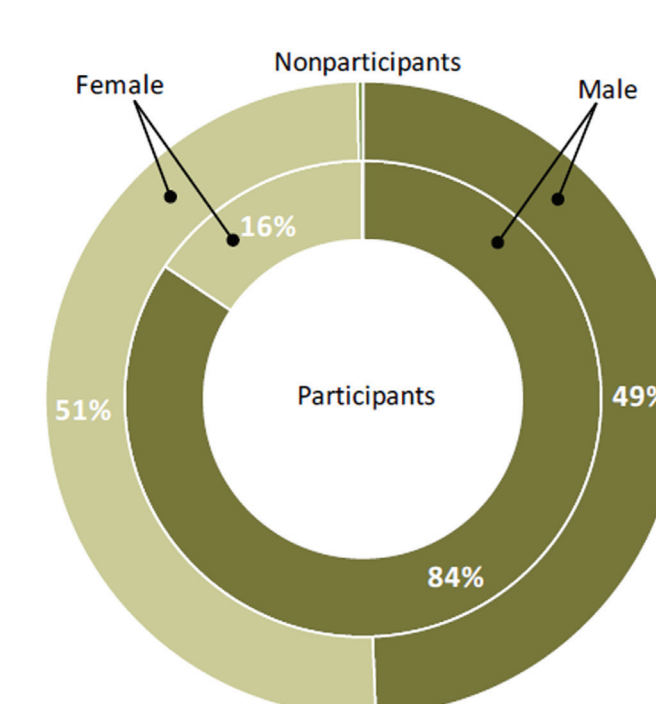


Figure 3. Percentage of Enrollment by Gender and Project Lead The Way Participation



4. PLTW participants were more likely to jointly enroll at a community college. 17% of participants were jointly enrolled, compared to 12% of non participants.

5. PLTW participants were more likely to be enrolled in gifted and talented programs*. 30% of participants met the requirements in 2008, compared to 12.6% of nonparticipants.

* *Gifted and talented students have either demonstrated achievement or potential ability or require educational services to meet their abilities that are beyond the regular school program.*

6. PLTW participants performed better in math and science before high school and in their junior year.
 - a. 61% of participants were above 80th percentile in math, compared to 28% of nonparticipants
 - b. 55% of participants were above 80th percentile in science, compared to 28% of nonparticipants
7. PLTW participants performed comparatively better on the junior year ITEDs.
 - a. 64% of participants were over the 80th percentile in math, compared to 34% of nonparticipants
 - b. 61% of participants were over the 80th percentile in science, compared to 36% of nonparticipants
8. PLTW participants were more likely to enroll in math, life and physical sciences, industrial and technology, foreign language, and drafting courses than nonparticipants. Nonparticipants disproportionately enrolled in business, consumer and homemaking education, English language and literature, military science, social sciences, and history course at a higher rate.

For additional information regarding the PLTW project, contact Tom Schenk Jr., Consultant, Iowa Department of Education.

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