

Career and Technical Education: An evidence-based dropout prevention strategy

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Since 1986, the National Dropout Prevention Center (NDPC) has pursued a mission of reducing the high school dropout rate by meeting the needs of youth in at-risk situations. The NDPC has partnered with local and state education agencies, sponsored workshops and national conferences, published research, and collaborated with policymakers to help meet the goal of ensuring that every student graduates from high school. While much progress has been made over the past thirty-plus years regarding reducing the dropout problem, a crisis remains. Nationally, nearly one-third of students do not graduate on time. About one million students drop out of high school each year, with nearly half of all students of color failing to graduate (Bridgeland, DiJulio, & Morison, 2006). These alarming statistics have far reaching consequences on both an individual and society level. Dropouts are more likely than high school graduates to be unemployed, in poor health, living in poverty, in prison, on public assistance, and to have children who also drop out of high school, contributing to a cycle of poverty (Bridgeland et al., 2006). On average, a dropout earns about \$10,000 less a year than a high school graduate and about \$1 million less over a lifetime than a college graduate.

Research about model prevention programs along with input from practitioners led directly to the 15 Effective Strategies for Dropout Prevention now promoted by the NDPC and used in many state agencies and school districts across America. These strategies were examined in Chappell et al.'s report (2015), bringing the work of the NDPC to a more scientific level to further promote the effectiveness of the strategies in combatting the national dropout crisis.

-Dr. Jay Smink, former NDPC Executive Director

A primary product of the NDPC's work is the establishment of fifteen effective, research-based strategies to combat the high school dropout problem and positively impact the high school graduation rate. Though these strategies are independent of one another, in practice they work well together and frequently overlap. Evidence indicates that these strategies are successful in all school levels from K-12 and in rural, suburban, or urban settings (Smink & Schargel, 2004).

In 2015, a team of researchers conducted a study to examine the impact of these fifteen strategies to determine which strategies are most effective in successfully reducing dropout rates. We employed a meta-analysis methodology, which allowed us to combine results from different studies to estimate an overall effect of dropout prevention efforts. The meta-analytic approach is often referred to as a study of studies where researchers can investigate patterns and trends in outcomes among the varying strategies employed as well as sources of disagreement and other interesting relationships that may be revealed in the context of multiple studies. One of the steps

in the meta-analytic process is to identify factors that might predict how the overall effect may vary, and we chose to focus on the dropout prevention strategies identified by the NDPC to measure their impact on the overall dropout rate. We were particularly interested in determining if one or more strategies had a stronger influence on preventing dropouts.

Methodology

We employed a meta-analysis research design (Borenstein, Hedges, Higgins, & Rothstein, 2009) to estimate a mean effect size of dropout prevention efforts on the dropout rate. The meta-analytic approach requires a number of steps from determining inclusion criteria, identifying variables to be used as predictors of the dropout rate, conducting a search for appropriate studies, and coding studies according to the chosen predictors. Once all data were extracted and the studies were coded for predictors, we calculated an overall estimate of effect size for the dropout rate. We also conducted a meta-regression to determine which dropout prevention strategies were statistically significant predictors of the dropout rate effect size.

We reviewed over 500 studies that evaluated dropout prevention efforts. Overall, we included 61 studies in the dropout rate analysis. The analysis sample was $n = 38,155$ (21,255 treatment and 16,900 comparison). Each of the studies included in the final analyses were coded to identify the strategies employed to prevent students from dropping out of high school. Members of the research team served as coders and each was trained in coding procedures. To determine interrater reliability for the coding, we calculated Pearson product moment correlations following Multon's (2010) technique and established an acceptable interrater reliability coefficient of .71.

Data extracted from each study included sample sizes, means, and standard deviations for treatment and comparison groups, and effect sizes. We used the standardized mean difference value as effect size to allow for a standardized

Dropout Prevention Strategies Included in Analysis

- Academic Support
- Adult Education
- Afterschool
- Behavioral Interventions
- Career & Technical Education
- Credit Recovery
- Family Engagement
- Gang Prevention/Intervention
- Health & Wellness
- Life Skills Development
- Literacy Development
- Mentoring
- School/Classroom Environment
- Service Learning
- Work-based Learning

These strategies were derived from the NDPC's 15 Effective Dropout Prevention Strategies (<http://dropoutprevention.org/effective-strategies/overview/>). Definitions of each strategy are included in the appendix.

measure of impact across studies. Where standardized mean difference effect sizes were not reported, we gathered the reported outcome statistics and transformed them into standardized mean difference effect sizes using the Comprehensive Meta-Analysis software (Borenstein, Hedges, Higgins, & Rothstein, 2013).

In our analysis, we included dropout prevention strategies as variables to determine if any of the strategies predicted the overall effect size for the dropout rate with statistical significance. To do this, we accessed the *Effective Strategies for Dropout Prevention* web page (National Dropout Prevention Center, 2013), which lists strategies that have been shown in the literature to have positive impacts on dropout rates. These strategies have been implemented successfully at all education levels and environments throughout the nation and include Systemic Renewal, School-Community Collaboration, Safe Learning Environments, Family Engagement, Early Childhood Education, Early Literacy Development, Mentoring/Tutoring, Service-Learning, Alternative Schooling, After-School Opportunities, Professional Development, Active Learning, Educational Technology, Individualized Instruction, and Career and Technology Education (see <http://dropoutprevention.org/effective-strategies/overview> for additional information).

These overarching strategies were further partitioned into tangible, measurable variables to be included in our study. We relied upon the 2007 report by Hammond, Linton, Smink, and Drew titled *Dropout Risk Factors and Exemplary Programs: A Technical Report*, which guided the development of the list of the fifteen predictors we included in our analysis. See the sidebar on page three for a list of the variables/strategies we examined.

Findings

The results revealed a statistically significant mean dropout rate effect size of $d = .15$. To appropriately interpret this effect size, we need to view it in the context of other high school reform efforts. Research indicates that mean effects for high school reform efforts are estimated at about .24 (Hill, Bloom, Black, & Lipsey, 2007). However, these are effect sizes that represent school-wide populations, not just the at-risk or very at-risk populations that are included in most of the studies we included. From that perspective, we interpret the overall dropout effect size of .15 as substantial.

However, what we really wanted to know was which of the strategies has the greatest potential to positively impact the dropout rate. To answer this question, we conducted a meta-regression to determine if any of the strategies were able to statistically significantly reduce the probability that a student will drop out of high school.

Our findings indicated statistically significant positive effects for eight of the strategies, with the Career and Technical Education (CTE) strategy emerging as the strongest predictor of the dropout rate (see figure 1). We observed an effect size of .81 for the CTE strategy, a finding that indicates this strategy substantially influences positive outcomes for students in terms of

completing high school and transitioning either into post-secondary education pathways or directly into the workforce.

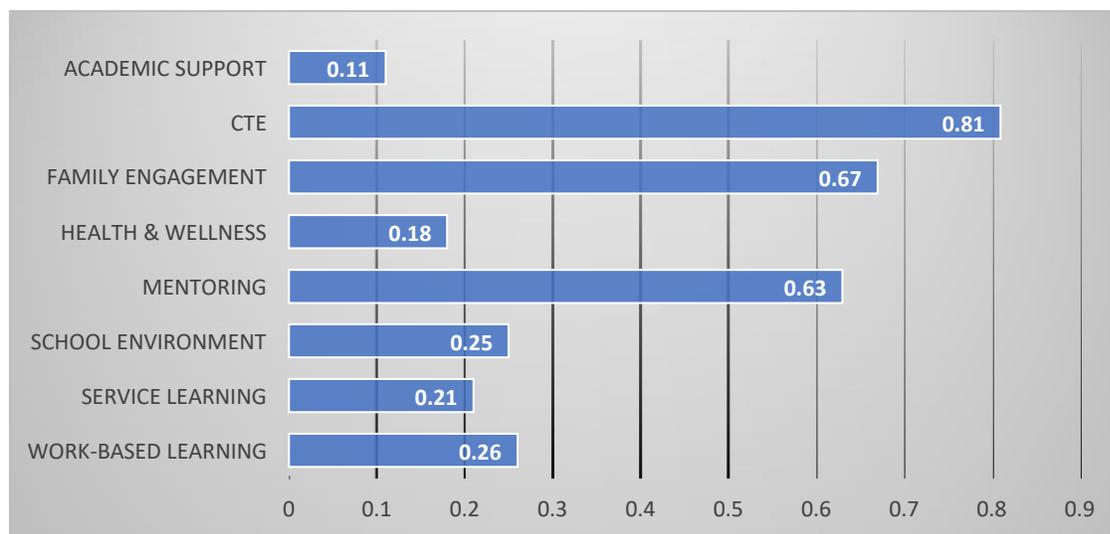


Figure 1. Effect size estimates derived from meta-regression of dropout prevention strategies.

Discussion and Implications

Our findings indicate that dropout prevention efforts are resulting in positive impacts on students, which is especially important considering the cost of dropouts on both an individual and societal level. Further, we now have empirical evidence to support CTE as a key strategy in preventing high school dropouts.

We identified several implications for educators from these findings. First, these findings support decisions to prioritize CTE programming because of its ability to prevent dropouts and help students move beyond high school onto meaningful college or career pathways and into successful lives. Second, it reinforces current CTE efforts. If a school or district's CTE programming is not delivering promising results, then perhaps it is time to assess their current state of CTE. A needs assessment may be in order to ensure that the voices of all stakeholders are included in CTE decisions, including students, parents, school staff, administrators, employers, and the community. They should ensure that needs are aligned with program efforts and that multiple perspectives are represented in determining the proper solutions. Once new programming is put in place, it is important to conduct formative reviews to make sure CTE goals and objectives are being met. Use data from these reviews or evaluations to adjust as needed. This is a cyclic process.

We recommend that schools implement CTE programming that engages students in authentic learning experiences that use project-based learning and other forms of active learning to meet student, school, and employer needs. Be sure to engage the community as well, including employers. As educators and/or policy makers, we may not be aware of the emerging

technologies and the skills needed to succeed in these new environments. Make sure students are immersed in the teaching and learning of these new skills. Next, ensure that professional development efforts allow opportunities for teachers to understand the principles of quality CTE teaching and learning. Make sure teachers and staff have the skills necessary to integrate the technological components into their classrooms. We also encourage administrators and policy makers to review the literature to stay current on strategies within the CTE field. Finally, evaluate to measure programming impacts on student outcomes and adjust when and where appropriate. Seek out professional support from organizations such as the National Dropout Prevention Center when needed and make use of the numerous resources out there to maximize student and teacher effects.

Ultimately, we have empirical evidence that CTE is a highly effective strategy for preventing high school dropouts and promoting students into successful post-secondary lives. A lot of resources go into the development of CTE programming;



It is important to note one simple but critical point: CTE programming should be implemented as intended – or with fidelity. That really is the key to success.

be dedicated to making the most of those resources, and make sure that everyone on your staff is committed to the same goals and objectives. Finally, and most importantly, implement CTE strategies as they are intended – or with fidelity. That really is the key to success.

Conclusion

It is obvious that there is still substantial work to be done in the dropout prevention field, but the findings here indicate that we are making progress in this area. Support is available for schools who wish to expand or develop their CTE program offerings. The CTE Technical Assistance Center (CTE TAC) of New York operates to assist The New York State Education Department (NYSED) in carrying out its mission of improving the quality, access, and delivery of CTE through research-based methods and strategies resulting in broader CTE opportunities for all students. CTE TAC employs expert practitioners in the field to assist schools and districts with professional development, the program approval process, best practices and model programs, support for multiple pathway initiatives, communication and marketing to the community, and networking with similar schools and districts.

Hopefully, these results will allow dropout prevention advocates to more smoothly build or extend relationships with schools and program developers as we now have empirical evidence to identify those strategies that are most impactful on dropout rates. Programs that employ CTE strategies have larger effects than those that do not, with positive impacts also observed among related strategies such as Mentoring, Service Learning, and Work-Based Learning.

Costs involved with implementing prevention programs are often quite large and can inhibit

broad scale implementation of programs. Not surprisingly, some strategies are more costly to

implement than others, some are more appropriate to specific populations and settings than others, and some are more easily modified to fit within existing programs and processes. Those needing to make decisions about program implementation usually know these types of constraints but until now have not been aware of the varying strengths of strategies. We believe that our findings can enable educators to narrow the focus of resources, whether financial, material, or human, toward these strategies that ultimately improve efficiency and effectiveness and therefore should result in more positive student outcomes.

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Appendix

Strategy Included in Analysis	Description/Definition	Mapping to NDPC's 15 Effective Strategies
Academic Support	Help with remediation, support learning, other than tutoring, such as computer labs; academic skills enhancement programs that use instructional methods designed to increase student engagement in the learning process and hence increase their academic performance and bonding to the school (e.g., cooperative learning techniques and “experiential learning” strategies); includes homework assistance and tutoring.	<ul style="list-style-type: none"> • Mentoring/Tutoring • Active Learning • Individualized Instruction • Professional Development
Adult Education	Educate adults through a variety of means, such as continuing education courses or online courses; adult secondary education, including GED preparation; English-as-a-Second-Language programs; adult basic education, literacy; work skills or work-based education; lifelong learning/opportunities for adult growth and development.	<ul style="list-style-type: none"> • Alternative Schooling
Afterschool	<p>Rewarding, challenging, and age-appropriate activities in a safe, structured, and positive environment after regular school hours. They may reduce delinquency by way of a socializing effect through which youth learn positive virtues such as discipline or simply reduce the opportunity for youth to engage in delinquency.</p> <p>This category also includes: Structured Extracurricular Activities</p>	<ul style="list-style-type: none"> • After-School Opportunities
Behavioral Interventions	Individualized interventions designed to decrease a specific behavior, by shaping and reinforcing a desired alternative replacement behavior, while	<ul style="list-style-type: none"> • Safe Learning Environments

	<p>tracking changes over time; designed to improve the individual’s overall quality of life (i.e., student development).</p> <p>This category also includes: Conflict Resolution/Anger Management Court Advocacy/Probation/Transition Substance Abuse Prevention Truancy Prevention</p>	
Career & Technical Education (CTE)	<p>Provision of social, personal, and vocational skills and employment opportunities to help youth achieve economic success, avoid involvement in criminal activity, and subsequently increase social and educational functioning.</p>	<ul style="list-style-type: none"> • Career & Technology Education
Credit Recovery	<p>An alternative to repeating a course for students who have failed required courses for graduation. Services may be offered online or face-to-face using traditional or technology-based instruction.</p>	<ul style="list-style-type: none"> • Individualized Instruction
Family Engagement	<p>Encompasses a broad range of events from picnics and field trips to activities that involve families in their children’s education.</p> <p>This category also includes: Family Strengthening Family Therapy Teen Parent Support</p>	<ul style="list-style-type: none"> • Family Engagement
Gang Prevention/Intervention	<p>Prevent youth from joining gangs; intercede with existing gang members during crisis conflict situations.</p>	<ul style="list-style-type: none"> • Safe Learning Environment • School-Community Collaboration
Health and Wellness	<p>Health issues are known to affect a student’s risk of dropout and should be addressed to reduce the impact on school experience. These issues may include</p>	

	<p>obesity, mental and physical health as well as the following:</p> <p>This category also includes: Mental Health Services. Pregnancy Prevention</p>	
Life Skills Development	<p>Communication skills; the ability to cope effectively with relationships; problem solving/decision making; critical thinking; assertiveness; peer selection; low-risk choice making; self-improvement; stress reduction; consumer awareness; peer resistance; recognize and appropriately respond to risky or potentially harmful situations; appreciation for diversity; social influences on behavior; overviews of conflict resolution skills and social skills; leadership skills/training; and health education.</p>	
Literacy Development	<p>Early interventions to help low-achieving students improve their reading and writing skills establish the necessary foundation for effective learning in all other subjects.</p>	<ul style="list-style-type: none"> • Literacy Development
Mentoring	<p>Relationship over a prolonged period of time between two or more people where an older, caring, more experienced individual provides help to the younger person as he or she goes through life.</p>	<ul style="list-style-type: none"> • Mentoring/Tutoring
School/Classroom Environment	<p>Reducing or eliminating problem behaviors by changing the overall context in which they occur; interventions to change the decision-making processes or authority structures; redefining norms for behavior and signaling appropriate behavior through the use of rules; reorganizing classes or grades to create smaller units, continuing interaction, or different mixes of</p>	<ul style="list-style-type: none"> • Safe Learning Environments

	students, or to provide greater flexibility in instruction; and the use of rewards and punishments and the reduction of down time.	
Service-Learning	Community service with integration of service experience into classroom curricula.	<ul style="list-style-type: none"> • Service-Learning
Work-based Learning	Consists of a variety of learning experiences designed to narrow the gap between theory and practice. Experiences include apprenticeships, career fairs, field studies, mentoring, guest speakers, job shadowing and student internships. WBL can be a component of Career-Technical Education programming or offered to all students usually at the secondary level.	<ul style="list-style-type: none"> • Active Learning