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EDUCATIONAL PLANNING

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Special Publication Announcement

The Executive Board of the International Society for Educational Planning passed a resolution in its 2016 Annual Conference governing the publication of Educational Planning as follows:

1. Educational Planning, the official publication of International Society for Educational Planning, will be published for four issues per year.
2. Starting from the second issue of Educational Planning in 2017, the journal will be published online and will be available on the website of the International Society for Educational Planning.
3. Hard copies of the journal will continue to be printed for the issue authors and for all the library/institution subscribers.

From the Editors

This particular issue of Educational Planning is devoted to highlighting some of the unique academic papers presented in the 2016 International Society for Educational Planning Annual Meeting at New Orleans, LA, U.S.A. These papers were initially screened for suitability for presentation at the annual meeting. They were then peer-reviewed and were revised for acceptance for publication in the Journal. Four papers are selected for publication in this issue circling around the theme of educational reform under effective leadership with focus on improving student academic achievement.

The paper by Aljabri and Barry examined the mathematics and science teaching approaches used in high-achieving countries in the world. They found that every country in the sample had schools from which reformers could draw approaches to close the achievement gap. Based on these findings, the authors highlighted the importance of considering approaches used within-country by proposing a framework for education reformers as to where and how to initiate reform to close the achievement gap.

The case study by Peace, Polka and Mete is focused on assessing and promoting student-centered teaching and learning practices by using a quantitative educational planning tool. The objective of the research project is to promote educators' recognition and appreciation of the many differentiation strategies, techniques, and activities being implemented on a frequent basis in several different teaching-learning contexts. The case study provides valuable quantitative reference information to facilitate the promotion of greater differentiation in micro-local contexts as well as in regional and global settings.

The paper by García-Pérez and Johnson aims at understanding the effect of an intervention program on high school graduation rates in St. Cloud, Minnesota. It involves a longitudinal study of 4-year-cohort graduation and retention rates across years using student level administrative data from Access and Opportunity Program participants. Results of the study showed that students of color participating in the program had higher odds to graduate from high school and across cohorts there was an increase in retention rates.

Finally, Rice's paper links inefficient school management to the disconnection between heralded business concepts and effective school leadership. This paper examines the operational and strategic issues that separate business ideology and school management in an attempt to describe why the marriage has been unsuccessful. In particular, the reductionist methodology of business management was compared to the systemic nature of educational enterprises.

The authors of these papers have provided us with different perspectives in planning for education, especially in pursuing to improve student achievement. All effective planning strategies need to be brought in for consideration of the complexity of local contexts and community needs.

Editor: Tak Cheung Chan
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April 2017

About the Authors

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Mónica García-Pérez, Ph.D., is an Associate Professor of Economics, Co-Director of the SCSU Survey Center, and Director of the Faculty Research Group of Immigrants in Minnesota at St. Cloud State University. She specializes in econometrics, labor economics, economics of immigration, and health economics.

Robert C. Johnson, Ph.D., is professor of Ethnic and Women's Studies, principal investigator of the Access and Opportunity Program, and director of Pre-College Pipeline Programs at St. Cloud State University. He specializes in educational equity issues, science-technology-engineering-mathematics education programs for underrepresented groups, and comparative race relations.

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Jack Rice is the Director of the Center for Montessori Education at Loyola University Maryland and an Affiliate Faculty Member in Loyola's Educational Leadership Program. Jack holds a B.Sc. from Western University Canada, a Diploma in Secondary Education form McGill University and an M.B.A from York University. Jack spent 22 years as a High School Teacher and Head of School in Canada and Australia before joining Loyola's School of Education in 2014.

CHANGING APPROACHES TO ADDRESS STUDENT ACADEMIC ACHIEVEMENT GAP: RECOMMENDATIONS FOR SCHOOL REFORMS AND REFORMERS

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ABSTRACT

The Trend in International Mathematics and Science Study reveals how the math and science achievement of students in participating countries compares with that of their international peers. Since 1995, the results have been surprising and disappointing for some countries. Astonished and disappointed by such outcomes, scholars and educational leaders are turning to top-achieving countries for approaches to close the achievement gap. To reverse the achievement gap, it is imperative to consider whether approaches used in top-achieving countries deserve primacy over approaches used within-country. Using TIMSS data, findings from this study show that every country in the sample has schools from which reformers could draw approaches to close the achievement gap. Additionally, this study revealed existence of schools serving disadvantaged students achieving at the top and schools serving advantaged students achieving at the bottom. Based on these findings, we highlight the importance of considering approaches used within-country by proposing a framework for education reformers as to where and how to initiate reform to close the achievement gap.

INTRODUCTION

The Trend in International Mathematics and Science Study ("TIMSS") is an international comparative study. TIMSS measures students' academic achievement in mathematics and science at the fourth- and eighth-grade levels. It is one of the studies of the International Association for the Evaluation of Educational Achievement (IEA). TIMSS assesses students' academic achievement in participating countries on a regular 4-year cycle since 1995.

Over the past 20 years, TIMSS has administrated five assessments (1995, 1999, 2003, 2007, and 2011). Each assessment shows student achievement in math and science in comparison to the achievement of international peers (Foy, Arora & Stanco, 2013). Some East Asian countries (e.g., Singapore, South Korea, Hong Kong, Chinese Taipei, and Japan) consistently take top positions. The average score in mathematics and science for eighth-graders in these countries is always among the highest since 1995 (IEA, 2015).

Achievement that falls below expectations is disappointing and generates concerns in countries that spend enormous amounts on education (i.e. Saudi Arabia and the United States). Certain questions commonly arise: Why do some East Asian countries regularly take the top positions? What are they doing right that we are missing? Why do we rank at this level despite the resources that we invest in our education system? If we fall behind in math and science, how can we compete in the global knowledge economy?

Following the release of the 2011 TIMSS assessment, the US Secretary of Education Arne Duncan issued a press release in which he called the results "unacceptable". He expressed "the need to close the large and persistent achievement gaps." He had made a similar statement earlier in response to the 2009 PISA results. According to the statement, the PISA results "show that American students are poorly prepared to compete in today's knowledge economy--Americans need to wake up to this educational reality" (Carnoy & Rothstein, 2013, p.7). Goodwin (2012) expressed similar concerns and stated that "there is a deep concern in the U.S. that the country is falling behind its peers across the globe, and that drastic reforms in education and in teaching are desperately needed to rectify this crisis" (p.186).

Concerns and disappointments are not unique to the US. The 2007 TIMSS results show that students in the Middle East and North Africa continue to lag behind students of other countries (Bouhlia, 2011). Studies documented concerns about student achievement in Australia, Chile,

England, South Africa, Sweden, and Germany (Köller, Baumert, Clausen, & Hosenfeld, 1999; Masters, 2005; Prais, 1997; Raminez, 2006; Reddy, 2010; Rolfsman, Wiberg, & Laukaityte, 2013).

To respond to these alarms, scholars and educational leaders are focusing more on approaches used in top-achieving countries. This study, thus, examined one central question:
Do approaches used in top-achieving countries deserve primacy over approaches used within-countries? To answer this central question and provide a framework to close the achievement gap, we 1) examined the level of student achievement for each school within each country in the sample; 2) identified schools achieving in the top and bottom 25^{th} percentiles; and 3) identified school composition in the top and bottom 25^{th} percentiles according to student economic backgrounds.

LITERATURE REVIEW

In the last twenty years, many studies have examined how top-achieving countries deliver education (Bugas, et al., 2012; Carnoy & Rothstein, 2013; Darling-Hamond, Wei, & Andree, 2010; Goodwin, 2012, 2014; Hojo & Oshio; 2012; Masters, 2005; Mourshed, Chijioke, & Barer, 2011; Wang & Lin, 2005; Wobmann, 2005). Four main factors explaining the achievement gap between top and low-achieving countries emerge from these studies: Student characteristics and family backgrounds; curriculum and instruction; teaching and teacher quality; and education systems, policies and resources.

With regard to student characteristics and family backgrounds, Carnoy and Rothstein (2013) maintained that one of the main reasons for the low performance of US students is social class inequality. They suggest that the average US student scores is lower with respect to comparable countries due to the social class distribution of US. Using the production function technique, Hojo and Oshio (2012) determined that Japanese students' test scores are strongly associated with family background, particularly for variables affecting the household environment.

In another investigation using TIMSS data, Hojo and Oshio (2012) found that the key determinants of educational performance in top-achieving countries are associated with the individual students, family backgrounds, and peer effects. Considering the same five top-achieving TIMSS countries, Wobmann (2005) found that in South Korea and Singapore, family background is a strong factor predicting student performance.

Attempting to explain the causes of achievement differences in mathematics across countries, Jürges and Schneider (2004) support that social background factors (parents' formal education, language spoken at home, and resources at home) are the strongest predictors of student achievement.

With respect to curriculum and instruction, scholars argue that the curriculum in American schools lacks coherence, focus, and rigor. These arguments imply a fragmentation of the US education on math and science whereas other countries have a clear and consistent voice on expectations for pupils (Consortium for Policy Research in Education, 1998). The same policy briefing appears to suggest maintaining the decentralized system in the US while moving toward state standards as a promising way to reduce the dispersion of curriculum among localities, states, federal governments, and other less official actors.

Schmidt, Wang, and McKnight (2007) documented similar findings in their study, which investigated the coherence and rigor of content standards of the top five countries among the highest achievement relative to other TIMSS countries. The findings support that the organizational structures for mathematics and science topics in the best achieving countries contrast with the composite standards of 21 American states, suggesting that curriculum coherence is critical to learning.

Referring to the quality of teachers, teachers' education and training are essential for student achievement. Research findings show that students taught by a teacher with a master's degree with extra training outperform students taught by a teacher with only a secondary education (Jürges & Schneider, 2004). TIMSS videos of real classrooms also support that teachers in Germany and Japan are much more likely to develop concepts and procedures rather than simply stating them, as is the case in the US. Hence, pupils in Japan spend more time analyzing and proving ideas, whereas their

peers in the US tend to engage in routine procedures (Consortium for Policy Research in Education, 1998).

Evidence from high-performing school systems reveal that three of the most important aspects of teacher quality are "getting the right people to become teachers; developing them into effective instructors, and ensuring that the system is able to deliver the best possible instruction for every child" (Darling-Hammond, Wei, & Andree, 2010, p.1). In search for models and approaches, two international summits on the teaching profession held in New York City in 2011 and 2012 to share the world's best policies and practices for developing a high-quality profession (Goodwin, 2014).

With regard to education systems, policies, and resources, Lee (2014) argued that the extensive level of teachers' participation in decision-making in significant areas of school curriculum and students' learning is one of the main reasons for Hong Kong's educational success. The policy briefing of the Consortium for Policy Research in Education (1998) recognized that curriculum and instruction involve a combination of both top-down and bottom-up actions. Accordingly, goals and contents are determined nationally and matters relating to instruction are determined locally. Examining how the world's most improved school systems continue to improve, Mourshed, Chijioke, and Barber (2011) identified six policy strategies to enhance the quality of education:

> "Revising the curriculum and standards, ensuring an appropriate reward and remunerations structure for teachers and principals, building the technical skills of teachers and principals, assessing students, establishing data systems, and facilitating improvement through the introduction of policy documents and evaluation laws" (p.20)

Bugas, Kalbus, Rotman, Troute, and Vang (2012) argued that three general conditions distinguish top-achieving countries from low-achieving countries: The quality of education, institutional productivity, and equal opportunity for students. From a different perspective, Jürges and Schneider (2004) highlighted the importance of school autonomy. Students in schools that had the authority to hire their own teachers score on average four points higher than students in less autonomous schools.

From these studies, we understand the factors explaining the achievement differences between top-and low-achieving countries. However, the crucial question remains: Do approaches used in these top-achieving countries deserve primacy over approaches used within-country? Using TIMSS data, this study sought to answer this question and provide recommendations beneficial to education reforms and reformers.

DATA AND PROCEDURES

This study used TIMSS 2011 data for eighth-graders in math and science for five East Asian countries consistently achieving at the top in mathematics and science since 1995 (i.e., Singapore, South Korea, Chinese Taipei, Hong Kong, and Japan) and for two countries of interest (chosen based on researchers' knowledge and experiences with the education systems of these two countries---the US and Saudi Arabia).

We downloaded the data from the TIMSS international database (IEA, 2015), which contains information on students' achievement and economic backgrounds (Foy, Arora & Stanco, 2013).

For the analysis of the data, we utilized the IEA international database analyzer software, which allows users to merge and convert data into SPSS files for analysis. The data analysis involved three steps. The first step involved determining the level of student achievement for each school within each country using all five plausible values as recommended (Carstens & Hastedt, 2010; OECD, 2009; Wu, 2005). We used as dependent variables, the results of the aggregated statistical analyses for mathematics (BSMMAT01-05) and science (BSSSCI01-05) performed on each of the five plausible values. To display the analyzed data, we used a boxplot to show the achievement in math and science of schools within each country.

The second step aimed to identify each school within a country by showing its ranking and achievement score in the top or bottom 25th percentile. The rationale for including the bottom 25th

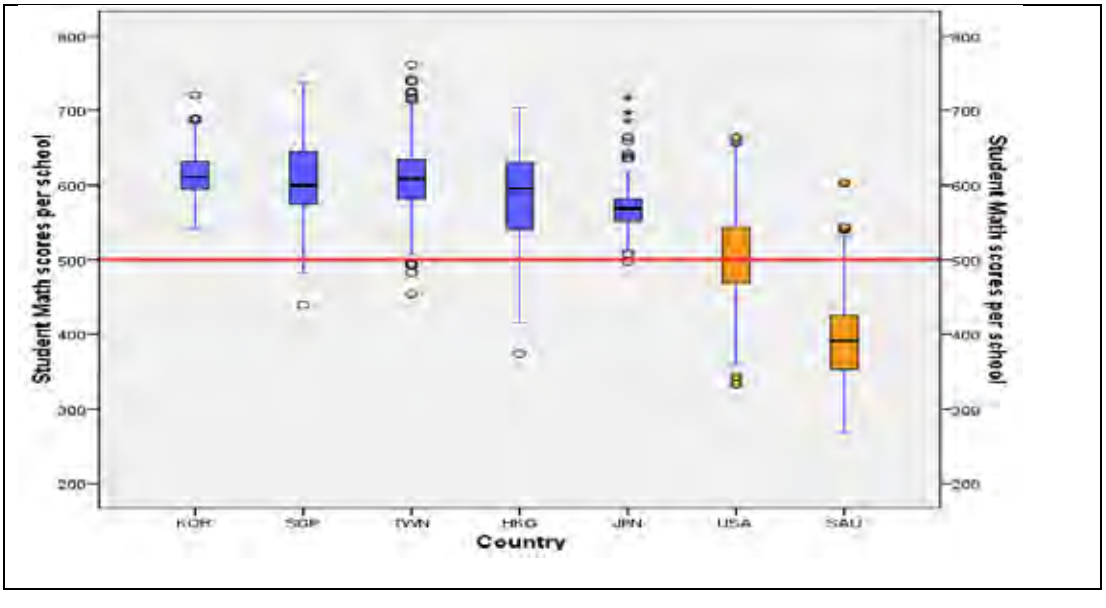
percentile is that school reformers need to know as well which schools are scoring at the bottom and what factors are responsible for their poor achievement scores.

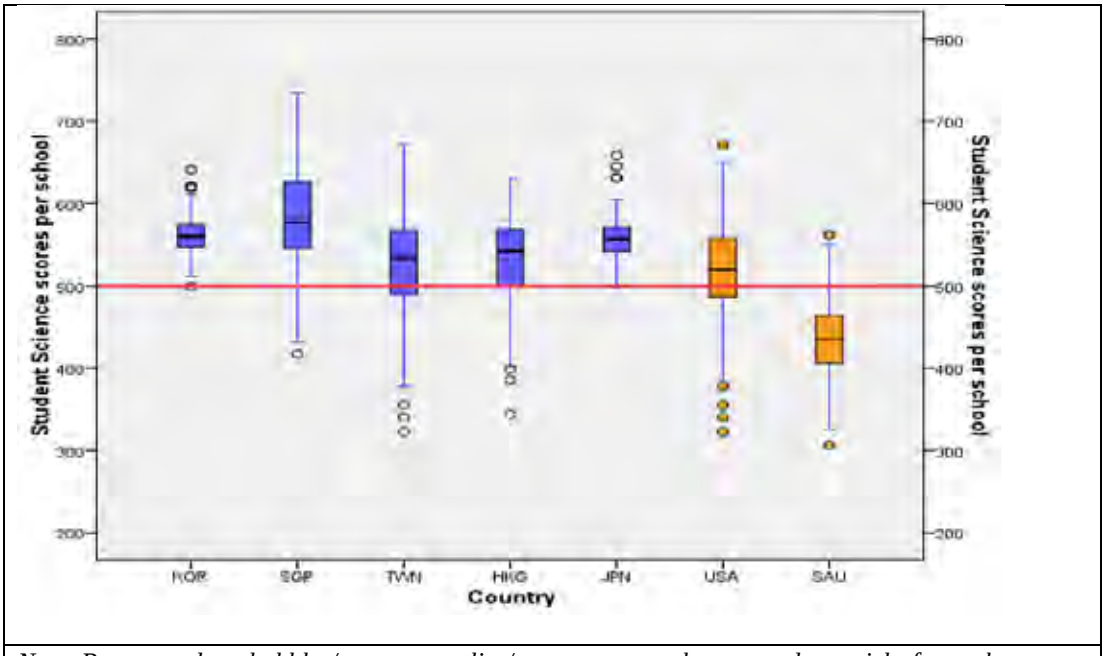
The third step of the analyses involved computing the top and bottom 25% of student achievement by school composition according to student economic backgrounds. In 2011, TIMSS and PIRLS (Progress in International Reading Literacy Study, IE) jointly collected information about school composition. TIMSS put schools in three economic background categories: More affluent; neither more affluent nor more disadvantaged; and more disadvantaged. This study used these three categories to identify student achievement in math and science by school composition in the top and bottom 25th percentiles. We displayed the results of this analysis in a table to help identify schools that can serve as models in their approaches within a country.

The rational for including both math and science achievement in this analysis is to make sure that a school achievement in the top or bottom 25th percentile did not happen by chance. In other words, for a school to be used in our arguments as model school, its student achievement in the top or bottom 25th percentile must be consistent in both math and science.

FINDINGS AND INTERPRETATON

***Student Achievement by School within Countries*:** For each of the countries in the sample, we analyzed and found students' academic achievement in each school as illustrated in Figure 1.





Note: *Bottom and top bubbles/stars are outlier/extreme scores, bottom and top wicks for each country represent approximately 25% of the scores, and the middle of the box represents 50% of the scores.*

Figure 1. *Students' academic achievement in math and science by school and by country*

The results (Figure 1) show that not all schools in top-achieving countries are achieving at the top and that not all schools in low-achieving countries are achieving at the bottom. For instance, in Singapore, Chinese Taipei, and Hong Kong, the achievement scores for some schools are below the international average score (mean=500) and well below the mean scores in their own countries. Even in South Korea and Japan, where all school scores are at or above the international mean score, some schools' student achievement is below the mean score in their own countries, which serves as a reference for comparison across countries.

We observe the opposite for countries that achieve below expectations, such as the US and Saudi Arabia. The results show that some US schools' student achievement scores are above the mean scores of the top-achieving countries. In Saudi Arabia, where the country's mean score is well below the international average (M=500), some schools' student achievement scores are above the country's international average and are comparable to the mean scores of top-achieving countries.

As shown in Figure 1, any schools within a country (any top bubble, star, or wick) whose scores are comparable to the mean scores of the top-achieving countries could serve as models in their approaches to close achievement differences. This information provides an important step for school reforms and reformers to consider. The second step of the analysis sought to identify schools representing these top bubbles, stars, and wicks as well as their rankings and specific scores. We, thus, analyzed all schools within each country. However, table 1 presents only schools whose student achievement falls in the top and bottom 25th percentiles within their country, as our interest, is to identify schools that could serve as models to close the achievement gap.

Table 1. ***Student academic achievement by school and composition within each country***

		TIMSS 2011 Eighth grade Mathematics					TIMSS 2011 Eighth grade Science				
Country ID		Sch ID	Sch .Rk	Sch Cp.	Variables		Sch ID	Sch Rk	Sch Cp.	Variables	
					PV1-5	SD				PV1-5	SD
Chinese Taipei	Top 25th	*290*	*1*	*2*	*760.6*	*58.0*	*290*	*1*	*2*	*672.2*	*48.3*
		278	*2*	*3*	*738.9*	*56.9*	*223*	*2*	*1*	*646.2*	*53.2*
		.	.	.	.	.	.	.	.	.	.
		183	*37*	*2*	*630.9*	*87.5*	*212*	*37*	*1*	*583.1*	*68.7*
	Bottom 25th	*260*	*107*	*3*	*580.7*	*108.7*	*299*	*107*	*2*	*545.0*	*79.0*
		237	*108*	*2*	*580.2*	*91.5*	*171*	*108*	*2*	*541.9*	*82.9*
		.	.	.	.	.	.	.	.	.	.
		261	*143*	*3*	*453.8*	*99.8*	*261*	*143*	*3*	*453.6*	*79.7*
Hong Kong SAR	Top 25th	*271*	*1*	*1*	*704.3*	*43.2*	*294*	*1*	*2*	*630.1*	*45.7*
		294	*2*	*2*	*694.6*	*51.8*	*271*	*2*	*1*	*629.0*	*38.5*
		.	.	.	.	.	.	.	.	.	.
		264	*26*	*2*	*637.6*	*50.8*	*297*	*26*	*2*	*572.4*	*42.3*
	Bottom 25th	*181*	*76*	*3*	*539.9*	*64.0*	*181*	*76*	*3*	*499.3*	*62.6*
		280	*77*	*2*	*538.7*	*54.2*	*189*	*77*	*3*	*498.6*	*53.5*
		.	.	.	.	.	.	.	.	.	.
		159	*101*	*2*	*373.7*	*110.6*	*159*	*101*	*2*	*343.6*	*99.8*
Japan	Top 25th	*291*	*1*	*1*	*717.3*	*45.2*	*297*	*1*	*1*	*658.5*	*57.4*
		297	*2*	*1*	*697.1*	*59.2*	*1,293*	*2*	*2*	*644.9*	*40.1*
		.	.	.	.	.	.	.	.	.	.
		211	*33*	*3*	*581.0*	*71.3*	*274*	*33*	*1*	*571.4*	*80.1*
	Bottom 25th	*212*	*97*	*1*	*552.4*	*80.6*	*258*	*97*	*2*	*545.4*	*74.1*
		170	*98*	*3*	*551.7*	*75.1*	*275*	*98*	*2*	*544.6*	*78.1*
		.	.	.	.	.	.	.	.	.	.
		215	*129*	*2*	*496.9*	*103.1*	*215*	*129*	*2*	*498.5*	*96.5*
South Korea	Top 25th	*164*	*1*	*1*	*720.6*	*57.5*	*164*	*1*	*1*	*641.2*	*55.4*
		191	*2*	*1*	*689.3*	*87.3*	*189*	*2*	*1*	*621.3*	*70.1*
		.	.	.	.	.	.	.	.	.	.
		277	*36*	*2*	*630.6*	*95.7*	*182*	*36*	*1*	*574.3*	*62.9*
	Bottom 25th	*264*	*104*	*2*	*595.1*	*99.5*	*289*	*104*	*2*	*547.2*	*60.5*
		218	*105*	*3*	*591.8*	*80.6*	*296*	*105*	*2*	*545.8*	*93.2*
		.	.	.	.	.	.	.	.	.	.
		168	*139*	*3*	*542.5*	*95.9*	*168*	*139*	*3*	*498.9*	*90.4*
Saudi Arabia	Top 25th	*287*	*1*	*1*	*602.6*	*40.5*	*278*	*1*	*1*	*561.9*	*50.7*
		327	*2*	*3*	*543.6*	*65.3*	*287*	*2*	*1*	*550.2*	*47.3*
		.	.	.	.	.	.	.	.	.	.
		308	*33*	*1*	*429.3*	*77.5*	*209*	*33*	*1*	*465.7*	*64.8*
	Bottom 25th	*256*	*98*	*1*	*352.8*	*64.5*	*221*	*98*	*2*	*400.7*	*64.9*
		253	*99*	*3*	*352.1*	*95.4*	*266*	*99*	*3*	*399.9*	*72.2*
		.	.	.	.	.	.	.	.	.	.
		259	*130*	*2*	*269.2*	*75.1*	*289*	*130*	*3*	*306.6*	*51.8*

		TIMSS 2011 Eighth grade Mathematics					TIMSS 2011 Eighth grade Science				
Country ID		Sch ID	Sch Rk	Sch Cp	Variables PV1-5	Variables SD	Sch ID	Sch Rk	Sch Cp	Variables PV1-5	Variables SD
Singapore	Top 25th	*329*	*1*	*1*	*736.9*	*38.1*	*329*	*1*	*1*	*734.7*	*48.7*
		174	*2*	*2*	*719.9*	*34.9*	*174*	*2*	*2*	*715.6*	*40.5*
		.	.	.	.	.	.	.	.	.	.
		263	*40*	*2*	*641.6*	*61.1*	*280*	*40*	*2*	*624.7*	*83.5*
	Bottom 25th	*310*	*117*	*2*	*574.5*	*55.6*	*319*	*117*	*2*	*545.6*	*62.2*
		298	*118*	*2*	*574.0*	*91.4*	*266*	*118*	*1*	*545.2*	*113.3*
		.	.	.	.	.	.	.	.	.	.
		246	*156*	*1*	*438.9*	*62.8*	*246*	*156*	*1*	*417.3*	*78.8*
United States	Top 25th	*881*	*1*	*2*	*663.6*	*42.1*	*881*	*1*	*2*	*671.2*	*53.2*
		590	*2*	*3*	*652.6*	*35.4*	*774*	*2*	*1*	*650.9*	*49.0*
		.	.	.	.	.	.	.	.	.	.
		820	*112*	*3*	*543.5*	*47.2*	*510*	*112*	*2*	*558.2*	*56.6*
	Bottom 25th	*650*	*326*	*3*	*470.2*	*51.8*	*932*	*326*	*3*	*487.7*	*70.8*
		799	*327*	*3*	*469.4*	*43.1*	*937*	*327*	*3*	*487.2*	*55.3*
		.	.	.	.	.	.	.	.	.	.
		636	*437*	*3*	*333.3*	*44.1*	*651*	*437*	*3*	*322.4*	*41.1*

Note: *PV01-05= plausible values of student academic achievement.*
School composition (sch cp.) 1=More affluent, 2= Neither more affluent nor more disadvantaged, and 3= More disadvantaged student economic backgrounds.
School Rank (sch Rk): 1, 2,3…, n.

The results in Table 1 show how many schools achieved in each of the brackets (the top and bottom 25th percentiles). We identified in the top and bottom 25th percentiles 36 schools in South Korea, 40 in Singapore, 26 in Hong Kong, 33 in Japan, 112 in USA, and 33 in Saudi Arabia.

As shown in Table 1, every country has at least 26 schools (names, rankings, and scores included) from which reformers could draw approaches to close the achievement gap. This information is valuable for informing reformers, but limiting the analysis at this stage would leave school reformers with ammunition to justify reform failures. Observers frequently assume that high-achieving schools have more students from affluent economic backgrounds than do low-achieving schools. Several studies support this argument (e.g., Carnoy & Rothstein, 2013; Hojo, 2012; Hojo & Oshio, 2012; Wobmann, 2005). Thus, it is necessary to analyze the schools in the top and bottom 25th percentiles to determine student achievement of schools serving students from different economic backgrounds.

Table 2a: *Student achievement in 8th- grade Math by school composition*

Country	Student Achiev. by school	School composition (students' economic bkgrds) Adv.	Neither Adv. Nor disadv.	Disadv.	Total schools within country (excl. missing values)
Chinese-Taipei	Top 25th	*16*	*20**	*1***	*37/143*
	Bottom 25th	*1xx*	*26x*	*10*	*37/143*
Hong Kong	Top 25th	*4*	*15**	*7***	*26/101*
	Bottom 25th	*0*	*5x*	*21*	*26/101*
Japan	Top 25th	*20*	*12**	*1***	*33/129*
	Bottom 25th	*10xx*	*16x*	*7*	*33/129*
South Korea	Top 25th	*21*	*12**	*3***	*36/139*
	Bottom 25t h	*0*	*14x*	*22*	*36/139*
Saudi Arabia	Top 25th	*14*	*10**	*9***	*33/130*

	Bottom 25th	*8xx*	*11x*	*14*	*33/130*
Singapore	Top 25th	*23*	*17**	*0***	*40/156*
	Bottom 25th	*4xx*	*26x*	*10*	*40/156*
US	Top 25th	*36*	*34**	*42***	*112/336*
	Bottom 25th	*8xx*	*15x*	*89*	*112/336*

Table 2b: *Student achievement in 8th-grade Science by school composition*

Country	Student achiev. by school	School composition (students' economic bkgrds) Adv.	Neither Adv. Nor Disadv.	Disadv.	Total schools within country (excl. missing values)
Chinese-Taipei	Top 25th	*16*	*19**	*2***	*37/143*
	Bottom 25th	*1xx*	*29x*	*7*	*37/143*
Hong Kong	Top 25th	*4*	*16**	*6***	*26/101*
	Bottom 25th	*0*	*5x*	*21*	*26/101*
Japan	Top 25th	*22*	*11**	*0***	*33/129*
	Bottom 25th	*10xx*	*17x*	*6*	*33/129*
South Korea	Top 25th	*19*	*9**	*5*	*36/139*
	Bottom 25t h	*0*	*15x*	*21*	*36/139*
Saudi Arabia	Top 25th	*12*	*11**	*10***	*33/130*
	Bottom 25th	*9xx*	*11x*	*13*	*33/130*
Singapore	Top 25th	*22*	*18**	*0*	*40/156*
	Bottom 25th	*5xx*	*25x*	*10*	*40/156*
US	Top 25th	*38*	*35**	*39***	*112/336*
	Bottom 25th	*4xx*	*16x*	*92*	*112/336*

Note

** School(s) with disadvantaged students achieving in the top 25th percentile

* School(s) with neither advantaged nor disadvantaged students achieving in the top 25th percentile

xx School(s) with more affluent students achieving at the bottom 25th percentile

x School(s) with neither more affluent nor more disadvantaged students achieving in the top 25th percentile

Table 2 shows that not all schools with students from more advantaged economic backgrounds were top-achieving schools. It also shows that all schools with students from more disadvantaged economic backgrounds were low-achieving schools. Within each country, some top-achieving schools in Math for instance (table 1a) are schools serving more disadvantaged or neither more affluent nor more disadvantaged economic backgrounds (15 in South Korea, 17 in Singapore, 21 in Chinese Taipei, 22 in Hong Kong, 13 in Japan, 76 in US, and 19 in Saudi Arabia).

Likewise, some low-achieving schools are schools serving more affluent or neither more affluent nor more disadvantaged economic background (14 in South Korea, 40 in Singapore, 27 in Chinese Taipei, 5 in Hong Kong, 26 in Japan, 23 in US, and 19 in Saudi Arabia).

Student achievement in science by school composition is analogous to that of mathematics. With a minor variation, schools ranked in the top or bottom percentile in math, maintained their rankings in science, which suggests that a school achievement is consistent in both math and science.

DISCUSSION

A cross-country comparison based solely on countries' mean scores clearly shows that the five top-achieving East Asian countries are the models in their approaches. However, as shown in figure 1, focusing on countries' mean scores in the quest for suitable approaches could mislead reformers. Some schools within-countries in search for approaches (i.e. US and Saudi Arabia) have achieved results comparable to those of top-achieving countries, but the mean score of their country shadow their achievements. As referenced in the literature review, studies and reformers tend to

consider less within-country achievement and focus more on top-achieving countries for approaches although these countries' education systems, policies, and resources may not be realistic or easily adaptable for each country.

To benefit from within-country achievement, we need to analyze the achievement of each participating school within a country to identity the highest- and lowest- achieving schools. Additionally, reformers should examine the achievement of schools serving students from different economic backgrounds. In four of the five top-achieving East Asian countries (i.e., South Korea, Singapore, Chinese Taipei, and Japan), student economic background is a factor that predicts student academic achievement. This finding supports the arguments of previous studies (Hojo, 2012; Hojo & Oshio, 2012; Wobmann, 2005; Jürges & Schneider, 2004). Most of the schools in the top 25th percentile have many students from more affluent economic backgrounds, whereas all schools in the bottom 25th percentile include more students from disadvantaged economic backgrounds.

Interestingly, 61 schools (12 in South Korea, 17 in Singapore, 20 in Chinese Taipei, and 12 in Japan) classified as neither more affluent nor more disadvantaged succeeded in achieving in the top 25th percentile. In the other top-achieving East Asian countries (i.e., Hong Kong), 7 schools from more disadvantaged, 15 schools neither advantaged nor disadvantaged, and 4 schools more advantaged achieved in the top 25% percentile.

In countries achieving below expectations in this study (i.e., the US and Saudi Arabia), the picture is mixed. In the US, schools that achieved in the top 25th percentile, approximately 38% have students who come from more disadvantaged economic background (42), 32% from more affluent backgrounds (36), and 30% from neither affluent nor disadvantaged economic backgrounds (34). Of the 33 schools in Saudi Arabia that achieved in the top 25th percentile, approximately 27% are schools with students who come from more disadvantaged economic backgrounds (9), 42% from more affluent backgrounds (14), and 30% from neither more affluent nor more disadvantaged economic backgrounds (10).

These findings show that schools with students from disadvantaged economic backgrounds can be top-achievers too. Although, a disadvantaged economic background, generally a factor that negatively affects achievement, it should not be considered as an insurmountable barrier for not closing the achievement gap. These findings highlight the importance of paying attention to approaches of these high-achieving schools serving disadvantaged students. Their approaches should be regarded as the models for closing the achievement gap.

The second revelation in this study, which requires attention from school reformers, is the existence of schools serving students from more affluent or neither affluent nor disadvantaged achieving in the bottom 25th percentile (19 in Saudi Arabia, 23 in the US, 26 in Japan, 40 in Singapore, 27 in Chinese Taipei, 14 South Korea, and 5 in Hong Kong).

Based on this study's findings, we propose a framework for education reformers to use to close the achievement gap. This framework provides a road map for reformers with a step-by-step guide on where and how to start reform.

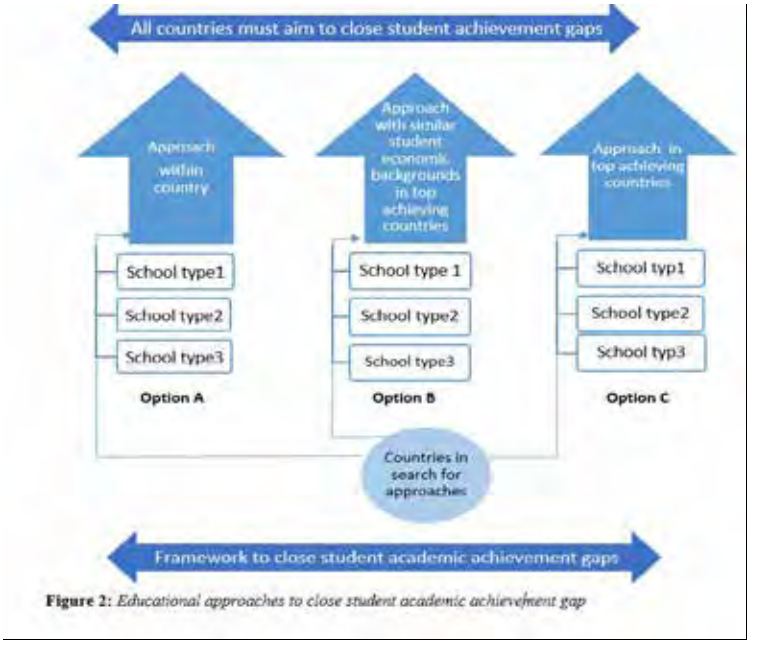


Figure 2: *Educational approaches to close student academic achievement gap*

The primary aim of this study was to answer the question whether approaches in top-achieving countries deserve primacy over approaches within-countries in order to close student achievement gap. Using the above framework (Figure 2), we first explain the framework and then provide some recommendations.

In this framework, we propose three options (A, B, and C) for countries in search of approaches to close the achievement gap. The first option (A) is the most preferred or the best of the three options. As shown in figure 1 and table 2, each country in the sample has at least 14 schools (among the schools achieving in the top 25th percentile) whose achievement scores are at or above the TIMSS mean score (M=500). Some of these schools' scores are even comparable to the mean scores of the five top-achieving countries. Because these schools, generally, have the same education system, policies, and contexts as the other schools within their country, their approaches may be easier for school reformers to adapt.

Within each option, we placed schools that achieve in the top 25th percentile in three categories (school type 1, school type 2, and school type 3). Schools Type 1 serve students from more disadvantaged economic backgrounds, schools type 2 serve students from neither affluent nor disadvantaged economic backgrounds, and schools type 3 serve students from affluent economic backgrounds.

Education reformers would agree that if the solution to a problem is at home, there is no need to seek it elsewhere. Real reform begins at home; therefore, it is important to start within country approaches before seeking solutions across countries. If the need to seek solutions across countries persists, then option B is the next suggestion.

Option B refers to countries (e.g. Hong Kong) among the five top-TIMSS achievers serving student economic backgrounds comparable to those in countries seeking new approaches (US and Saudi Arabia). In addition, it is advisable to focus on similar schools (school type 1, followed by type 2, and type 3) rather than the countries' mean scores.

Option C, which involves the other four top-TIMSS achievers in math and science (Chinese Taipei, South Korea, Japan, and Singapore) where school achievement is highly correlated with student economic backgrounds. As a result, schools in low-achieving countries with similar student economic backgrounds might consider approaches of schools in these four countries.

Based on our findings, we provide several suggestions for reformers to bridge student academic achievement gap.

1. Identify and analyze the highest- and the lowest-achieving schools within your country to determine the location of these schools (urban or rural, zones), the school types (public, private, and boys/girls), student characteristics and family backgrounds, teachers and school administrators' characteristics, curricula, and school policies and resources.
2. Determine whether the achievement scores of the top-achieving schools (models) are related to home factors, school factors or a combination of both home and school factors.
3. Help low-achieving schools benefit from the practices of top-achieving schools by working with all stakeholders at all levels (state, regional, and local).

CONCLUSION

The main question we examined in this study was to find out whether approaches used in top-achieving countries deserve primacy over approaches used within-countries. Findings from our study revealed that within each country, there are schools—particularly those serving disadvantaged students achieving in the top 25% percentile--- that can serve as models in their approaches to close the academic achievement gap. From the researchers' perspective, these schools are the "star" schools in terms of their approaches as far as closing student achievement gap is concerned. Disregarding these approaches at home and considering approaches in other countries (which may have different education systems, policies, and resources) might not bring the hoped outcomes.

REFERENCES

Bouhlia, D. S. (2011). The quality of secondary education in the Middle East and North Africa: What can we learn from TIMSS' results? *Compare: A Journal of Comparative and International Education*, *41*(3), 327-352.

Bugas, J., Kalbus, P., Rotman, J., Troute, A., Vang, P. N., & Practicum, U. P. P. S. (2012). *What can we learn about the US Education System from international comparisons?* An Analysis of PISA and TIMSS Scores and their Implications for the U.S. San Jose, CA: Stanford University.

Carstens, R., & Hastedt, D. (2010, July). *The effect of not using plausible values when they should be: An illustration using TIMSS 2007 grade 8 mathematics data*. A presentation at the 4th IEA International Research Conference (IRC-2010).

Consortium for Policy Research in Education, United States. Office of Educational Research, Improvement, National Institute on Educational Governance, Finance, Policymaking, & Management (US). (1998). *What the Third International Mathematics and Science Study (TIMSS) means for systemic school improvement*. Washington, DC: Government Printing Office.

Carnoy, M., & Rothstein, R. (2013). *What do international tests really show about U.S. Student performance?* Washington, DC: Economic Policy Institute.

Darling-Hammond, L., Wei, R. C., & Andree, A. (2010). *How high-achieving Countries develop great teachers.* San Jose, CA: Stanford Center for Opportunity Policy in Education.

Foy, P., Arora, A., & Stanco, G. M. (2013). *TIMSS 2011 User Guide for the International Database. Supplement 1: International Version of the TIMSS 2011 Background and Curriculum Questionnaires*. International Association for the Evaluation of Educational Achievement. Herengracht 487, Amsterdam, 1017 BT, The Netherlands.

Goodwin, A. L. (2012). Quality teachers, Singapore style. In L. Darling-Hammond & A. Lieberman (Eds.), *Teacher Education around the World* (pp. 22–43). New York: Taylor & Francis.

Goodwin, A. L. (2014). Perspectives on high performing education systems in Finland, Hong Kong, China, South Korea and Singapore: What lessons for the US? In *Educational Policy Innovations* (pp. 185-199). Singapore: Springer Publisher.

Hojo, M. (2012, October). A nonlinear class-size effect in Japan. In *13th International Convention of the East Asian Economic Association, Singapore* (pp. 19-20).

Hojo, M., & Oshio, T. (2012). What factors determine student performance in East Asia? New evidence from the 2007 Trends in International Mathematics and Science Study. *Asian Economic Journal*, *26*(4), 333-357.

IEA. (2015). TIMSS and PIRLS International Study Center. Retrieved from http://timssandpirls.bc.edu/

Jürges, H., & Schneider, K. (2004). International differences in student achievement: An economic perspective. *German Economic Review*, *5*(3), 357-380.

Köller, O., Baumert, J., Clausen, M., & Hosenfeld, I. (1999). Predicting mathematics achievement of eighth grade students in Germany: An application of parts of the model of educational productivity to the TIMSS data. *Educational Research and Evaluation*, *5*(2), 180-194.

Lee, W. O. (2014). Comparative Analysis of high performing education systems: Teachers, teaching and teacher education as factors of success. In *Educational Policy Innovations* (pp. 217-229). Singapore: Springer Publisher.

Masters, G. N. (2005). International achievement studies: Lessons from PISA and TIMSS. *Research Developments*, *13*(13), 2.

Mourshed, M., Chijioke, C., & Barber, M. (2011). How the world's most improved school systems keep getting better. Chicago, IL: McKinsey& Company.

OECD (2009). PISA Data Analysis Manual: SPSS, Second Edition, Paris, France, OECD Publishing.

Prais, S. J. (1997). How did English schools and pupils really perform in the 1995 international comparisons in mathematics? *National Institute Economic Review*, *161*(1), 53-68.

Ramírez, M. J. (2006). Understanding the low mathematics achievement of Chilean students: A cross-national analysis using TIMSS data. *International Journal of Educational Research, 45*(3), 102-116.

Reddy, V. (2010) The citation in the text says 2010. Please confirm either way. Cross-national achievement studies: learning from South Africa's participation in the Trends in International Mathematics and Science Study (TIMSS). *Compare: A Journal of Comparative and International Education, 35*(1), 63-77.

Rolfsman, E., Wiberg, M., & Laukaityte, I. (2013). School effectiveness in the Nordic countries in relation to PISA and TIMSS. *Paper presented at IEA International research conference, Singapore, June 26-28, 2013*.

Schmidt, W. H., Wang, H. C., & McKnight, C. C. (2007). Curriculum coherence: An examination of US mathematics and science content standards from an international perspective. *Journal of Curriculum Studies*, *37*(5), 525-559.

Wang, J., & Lin, E. (2005). Comparative studies on US and Chinese mathematics learning and the implications for standards-based mathematics teaching reform. *Educational researcher*, *34*(5), 3-13.

Wößmann, L. (2005). Educational production in East Asia: The impact of family background and schooling policies on student performance. *German Economic Review*, *6*(3), 331-353.

Wu, M. (2005). The role of plausible values in large-scale surveys. *Studies in Educational Evaluation, 31*(2), 114-128.

ASSESSING AND PROMOTING STUDENT-CENTERED TEACHING AND LEARNING PRACTICES USING A QUANTITATIVE EDUCATIONAL PLANNING TOOL: RESULTS OF 2016 INDIANA CASE STUDY

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ABSTRACT

This article provides information about an Indiana regional quantitative research study conducted in 2016 as part of a comprehensive national study designed to promote reflections about contemporary teaching-learning practices using a discrepancy survey instrument. This Indiana case study contained data about the differences between the desired instructional practices of 111 contemporary classroom teachers and their actual practices related to differentiating instruction. The objective of the national research project is to promote educators' recognition and appreciation of the fact that many differentiation strategies, techniques, and activities are implemented on a frequent basis in several different teaching-learning contexts. The survey instrument used in this study serves as a valuable tool to measure the specific level of implementation and to assist educators in their respective planning activities for instructional improvement in diverse contexts. This Indiana case study provides valuable quantitative reference information to facilitate the promotion of greater differentiation in micro-local contexts as well as in regional and global settings.

INDIANA CONTEXT

This quantitative case study was conducted in one Indiana county during the Fall 2016 semester. This county, like much of Indiana, is structured as a unitary school district, with elementary, middle, and high schools under the leadership of one set of district level administrators. The county population is slightly under 40,000 and the largest city, also the county seat, consists of less than 20,000 people. The rest of the population of this county lives in one of several smaller towns or unincorporated rural areas. The primary economic drivers in the county are farming, some small manufacturing operations, a small private university, and the school system itself.

There are about 5,000 students in this Indiana school district. According to the Indiana Department of Education (DOE) (2016) COMPASS website, the ethnic representation of this school district is almost identical to the surrounding rural counties, but somewhat less diverse than the overall state population (Stats Indiana, 2013). Both the county and the school system have experienced significant declines in population in recent years, as several manufacturers have either closed or relocated. Approximately 45% of students in the school district receive free or reduced lunch. The district boasts a 96% attendance rate, which is remarkably consistent from kindergarten through high school. The student scores on the ISTEP+ (Indiana Statewide Testing for Educational Progress) for this district have exceeded the state average by about 2-4% over the last 5 years and are typically in the 75% range (Indiana DOE, 2013).

Teachers from ten different schools in the school district returned completed surveys. The total number (N) for this case study was 111 participants. Five of the schools (high school, two middle schools, and two elementary schools) are located within the city limits of the county seat, whereas, three schools are located in one of the small towns in the county and two schools are located in unincorporated rural areas. According to the Indiana DOE (2016) COMPASS website there are about 375 teachers in the district with about 35% having 20 or more years of experience in the classroom. Each of the five-year career increments: 0 to 20+ years, consistently represents between

15-20% of the teaching force of this school district. The overall distribution between newer and experienced teachers is similar to the distribution of teaching experience in other Indiana school districts (Education Next, 2015). Therefore, this sample may be considered a representative sample of the typical Indiana school district that is not located in a major metropolitan region of the state.

The survey was distributed only to full time instructional teachers; therefore, no administrators, counselors, other classified employees, or paraprofessionals were included in this study. Of the 311 surveys distributed, 50% went to elementary teachers and 50% went to secondary (middle and high school) teachers. The overall return rate of about 36% was achieved by delivering hard copies of the survey to each school for distribution in teacher mail boxes and completed surveys were individually submitted in a secure confidential collection box located in each school main office. Return rates from individual schools varied from a high of almost 73% to a low of 21%.

Conceptual Framework and Research Background

Meeting the individual needs of students has been a key consideration of Indiana teachers and a major orientation of the Indiana public school system since its formation in 1852 (Natali, 2007). However, Indiana educators, similar to their peers in other states, have been exposed to a variety of models, programs, strategies, techniques, and activities designed to facilitate constructivist student-centered teaching and learning such as the differentiation of instruction to meet the learning needs of their students (Johnson, Collins, Duperes & Johansen, 1991; Tomlinson, 2009). The researchers involved in the national study of differentiation contend that most educators are literally and figuratively attracted to two diametrically opposed poles related to the teaching-learning process. One pole is the learner-centered approach and the diametrically opposite pole is the teacher-centered approach (Polka, Van Husen, Young, & Minervino, 2016). Figure 1, originally developed by Polka (2002) illustrates these polar magnetic pulls on the philosophical and practical orientations of contemporary educators. It also highlights the belief of the national research team that most current teaching practices occur somewhere between both of those poles depending on current local, state, and federal educational policies as well as teacher perspectives regarding the nine behaviors associated with the teaching-learning process conceptual framework: 1) teacher objectives; 2) teacher planning and preparation; 3) teacher communication and messages; 4) teacher behaviors; 5) student objectives; 6) student planning and preparation; 7) classroom expectations of students; 8) student communication and messages; and 9) student evaluations (Heathers, 1967).

The significance of this conceptual framework initially enumerated by Heathers and the nine specific teaching-learning behaviors associated with it has been intensively and extensively analyzed for several decades by numerous researchers including: Armstrong, Henson & Savage, 2005; Brooks & Brooks, 1993; Danielson, 2002; Darling-Hammond, 1997; Eggen & Kauchak, 2001; Ernest, Heckaman, Thompson, Hull, & Carter, 2011; Foote, Vermette & Battaglia, 2001; Gillies, R., 2011; Koh, Tan, & Ng, 2012; Marzano, Pickering & Pollock, 2001; Ornstein & Levine, 2008; Polka et al., 2016; Slavin, 2006; Sternberg & Williams, 2002; Tomlinson, 2009; Tomlinson, 2014; Tomlinson, Brimijoin & Narvaez, 2008; Tomlinson & Imbeau, 2011.

The researchers involved in this study, similar to their colleagues in other regions of the United States, believe that promoting practicing educators to reflect about their desired as well as their actual teaching-learning behaviors using Figure 1 as a key reference is an important first step in helping educators comprehend the degree of differentiation of instruction that they would like to employ with their students and the degree of differentiation that they currently do. An analysis of the discrepancy between those desired teaching-learning practices and their actual practices provides an opportunity for each participating professional to reflect about those differentiation approaches that are most congruent with their current practices as well as those approaches that are most non-congruent (Polka et al., 2016).

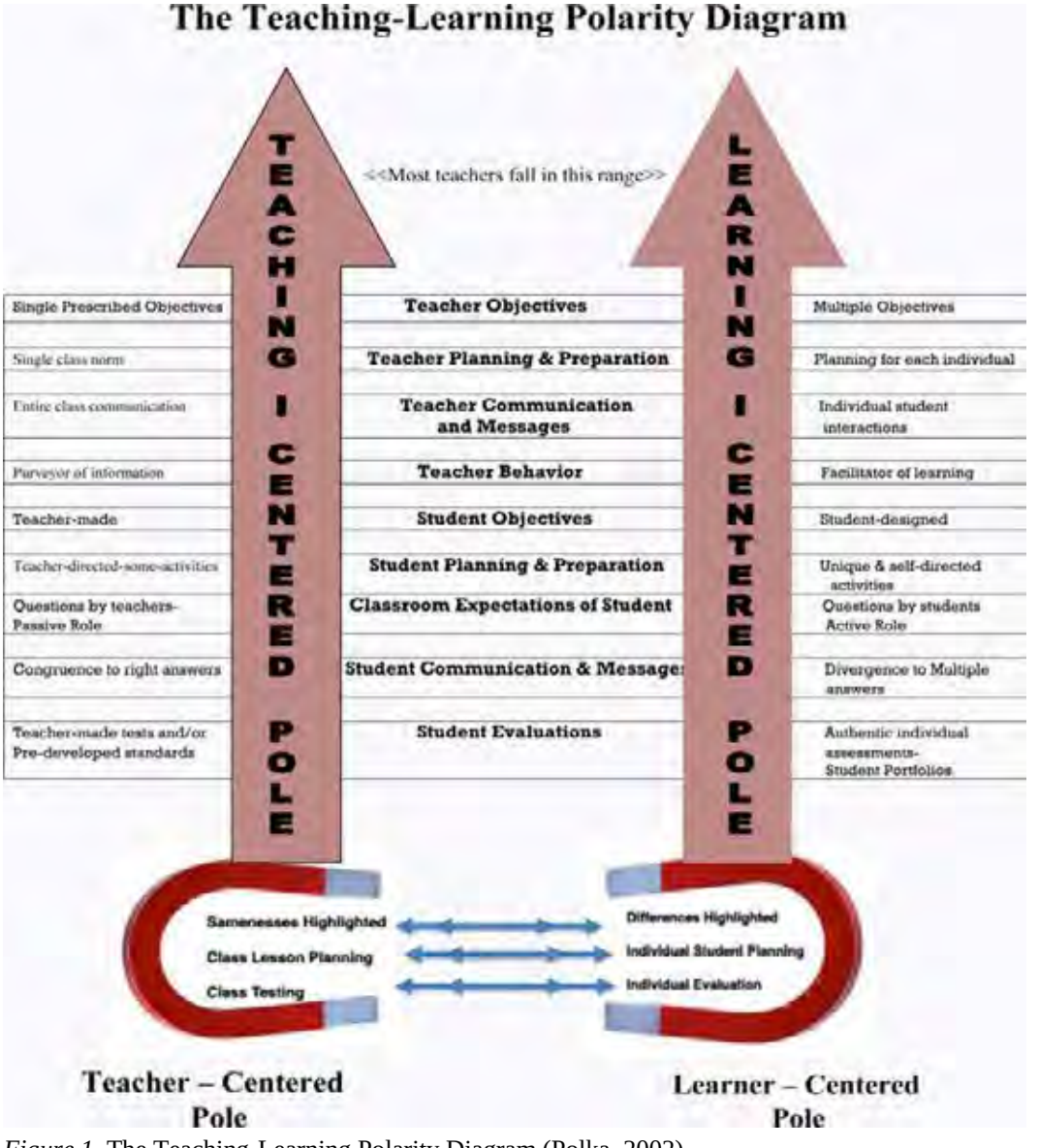

Figure 1. The Teaching-Learning Polarity Diagram (Polka, 2002)

SURVEY INSTRUMENT

The survey instrument used to collect the data for this Indiana study was initially developed in 2007 by a research team of practicing Georgia educators. The instrument titled, *Desired and Current Use of Constructivist Activities and Techniques*, utilizes a discrepancy approach to determine the degree of difference between the "desired" frequency of use of those instructional activities, techniques, and strategies identified in the above Figure 1 and the "actual" use of those instructional approaches in Georgia classrooms similar to other discrepancy research models (Denig, 1994; Polka, 2007, 2010; Polka & Van Husen, 2014;). The survey instrument consists of following three components:

Part I. *Demographic data* – collects information about participants' current educational experiences.

Part II. *Frequency of Instructional Use and Desired State* – designed to collect information about participants' desired frequency of use and their respective actual frequency of use of the various learner-centered approaches as identified in Figure 1

Part III. *Personal Responses* – designed to provide participants the opportunity to respond to the following open-ended questions: 1. What do you feel needs to be done to make individualized instruction and customized learning or differentiation practices more common in today's classrooms? 2. Please provide any additional comments you may wish regarding individualizing instruction and customizing learning in contemporary contexts

Each of the 25 statements in the survey instrument includes both a "desired" and an "actual" component. Thus, participants in this case study were asked to respond to a total of 25 survey statements (see Table 1) that included two response components: "desired" teaching-learning behaviors and "actual" teaching-learning experiences. Each of these statements are also correlated to the nine teaching-learning behaviors initially articulated by Heathers (1967) similar to other differentiation studies conducted using this instrument (Polka, 2010; Polka & Van Husen, 2014). The results of the Part III *Personal Responses* component of this research instrument are not reported in this article so as to focus exclusively on the quantitative data.

Reliability and Validity of Survey Instrument

The survey instrument used in this case study has high reliability based on the result of the Cronbach Alpha reliability test (Coladarci, Cobb, Minium, & Clarke, 2008) that was applied to survey instrument data collected from over 500 practicing teachers in Georgia and New York and the results were as follows: Questions 1-25 (Desired) R=.942; Questions 1-25 (Actual) R=.922 (Polka et al., 2016). The survey instrument also has content validity based on a meta-analysis of the research and literature associated with those nine teaching-learning behaviors and their impact on student-centered instruction during the past 6 decades as previously referenced. Subsequently, the teaching-learning statements included in this survey instrument are valid and reliable to assess participant desired frequency of use as well as their actual frequency of use of those specific teaching-learning activities, techniques, and techniques associated with constructivism and differentiation. Therefore, collecting this data from practicing teachers establishes a valid and reliable "snapshot" of their respective placement on Figure 1: The Teaching-Learning Polarity Diagram.

RESEARCH FINDINGS

As a result of collecting, tabulating, and analyzing the data from the 111 practicing Indiana teachers who completed the survey instrument during the Fall of 2016 the following descriptive statistics about the Indiana case study participants are presented in the following tables.

Table 1.

Descriptive statistical information of sample demographics

Total teaching experience	Total	Percentage	Present teaching level	Total	Percentage
1-4 years	17	15.3%	Elementary school	69	62.2%
5-10 years	16	14.4%	Middle school	21	18.9%
11-15 years	14	12.6%	High school	21	18.9%
16-21 years	17	15.3%			
21+ years	47	42.3%			
Totals	111	100%	Total	111	100%

Accordingly, participants in this Indiana case study were a very experienced group of educators with over half of the sample (57.6%) having 16 or more years of teaching experience and with most of this group (42.2%) having over 21 years of teaching experience. However, there were

also 57.6% of the teachers who had 21 years of teaching experience or less and the teachers in this category were fairly evenly distributed in each of the four teaching experience sub-groups of this category. Most of the teachers in this sample were elementary teachers (62.7%) but 37.8% of the sample was secondary teachers who were evenly divided between middle school and high school teachers. Therefore, this sample of teachers represented educators at all levels of teaching experience but with the overwhelming predominance of teachers being well-experienced professionals and over half of them being elementary teachers. In addition, nearly half of the sample (41.4%) reported teaching all subjects which is consistent with the elementary orientation of the sample. But, the next highest percentage (18%) of subjects taught was Language Arts/English.

Table 2.

The current average number of students within the classes taught by the sample

Number of students	Total	Percentage of sample
10 or less	7	6.3%
11-15	3	2.7%
16-20	16	14.4%
21-25	61	55.0%
26-30	21	18.9%
Over 30	3	2.7%
Totals	111	100%

The above data illustrates that over half of this sample (55%) had an average class size of 21 to 25 students in their classes. Whereas, 21.6% of the sample identified that they had an average class size over 26 students. Thus, this Indiana sample had average class sizes that may be typically found in schools throughout the United States (National Center for Education Statistics, 2012). The teachers with smaller average class sizes (<16) were special education teachers whose class size averages are traditionally less than those of regular classroom teachers (United Federation of Teachers, 2017). Thus, the demographic data from Part I of the survey instrument confirms that this Indiana sample is fairly representative of the general teaching population of Indiana and the United States.

Table 3 provides an overview of the 25 statements contained in the research study instrument: Part II *Individualization and Customization in the Classroom.* The specific teaching-conceptual framework related to each survey statement is identified in column 1 and the specific statement number from the survey instrument is identified in column 2, whereas the specific survey instrument statements are listed in column 3 of the table for reference. Columns 4, 5, and 6 identify the degrees of differences between the *Desired* and *Actual* practices of the 2016 Indiana sample (column 4) and the 2007-2010 baseline sample (column 5), whereas, column 6 identifies the difference between the samples for each statement. Column 7 presents the discrepancy category of each statement based on the initial baseline categories or quartiles developed to analyze similar research studies (Polka & Van Husen, 2014). Column 8 identifies significant differences, using asterisks, within the Indiana sample as a result of applying various statistical procedures to the data.

The following are the category classifications used in column 7 of Table 3 and based on the 2011 analyses and generally confirmed by this 2016 Indiana sample with some slight differences:

Category A**.** These are the differentiation teaching-learning approaches that have the greatest degree of congruency between desired and actual use. Most teachers in the Indiana sample already use these various differentiation strategies and techniques.

Category B. These are the differentiation teaching-learning approaches that have the second most degree of congruency between desired and actual use. Several teachers in this sample already use them in their classrooms.

Category C. These are the differentiation teaching-learning approaches that have a greater degree of difference between desired and actual use than those approaches in the previous two quartiles according to this sample.

Category D. These are the differentiation teaching-learning approaches that have a greatest degree of difference between desired and actual use according to this Indiana sample.

Accordingly, the Indiana sample reflected no categorical changes from the baseline sample for 11 of the survey statements. However, four of the statements: 1, 19, 21, 8 reflected a one category positive change. Whereas six statements: 3, 8, 15, 18, 23, 25 had a one category negative change. But the actual degree of numerical difference between the two samples, positive or negative, was minimal (<0.22) or less than a 4.4% change in the discrepancy between desired practices and actual teaching-learning practices as identified on Table 3, column 6.

In addition, three statements: 17, 11, 22 had a more meaningful change in categorical ranking as they moved up two categories with a range of difference between 0.35 and 0.42 or a positive change of 7% or greater. Whereas, one statement, 5, *Different students, when working on a unit of instruction, use different materials, resources, and equipment*, had a negative change of two categories from baseline *Category B* to Indiana sample rating of *Category D.* This negative change may be attributable to the inclusion of more convergent materials, resources, and equipment used by Indiana teachers because of implementation of the Common Core Curriculum over the past five years.

Table 3.

Ranking of survey instrument statements according to 2016 Indiana sample differences between desired and actual teaching-learning practices compared to baseline sample with differences between both data sets cited, category ranking listed (top = Indiana; middle = baseline; bottom = changes) and significant differences within the Indiana sample identified (Desired and ** Actual).*

Conceptual framework category	Survey number	Survey instrument statement	Indiana sample	Baseline sample	Difference between samples	Discrepancy category Indiana/Baseline/ Category changes	Indiana sample significant differences *Desired **Actual
3). Teacher communication & messages	14	The personal problems or learning exceptionalities of students are accepted with consideration, understanding, and empathy.	0.36	0.46	0.10	A A	
3). Teacher communication & messages	20	The teacher communicates individually with students or in small groups, as opposed to *total* class discussion.	0.48	0.52	0.04	A A	* **
2). Teacher planning and preparation	17	Diagnostic elements, such as IQ, reading level and math ability are used to plan individual activities.	0.50	0.85	0.35	A C +2	
6). Student planning and preparation	24	Students are offered instructional assistance and guidance individually rather than in a large group setting.	0.51	0.65	0.14	A A	 **
2). Teacher planning & preparation	21	Different instructional techniques are used with different students	0.56	0.78	0.22	A B +1	* **

8). Student communication & messages	1	The teacher practices the use of open-ended questioning rather than focusing on the *right* answer syndrome.	0.57	0.57	0.0	A B +1	
4). Teacher behaviors	11	The student and teacher respect the diverse opinions of others and come to agreements in a collegial fashion.	0.57	0.89	0.42	A C +2	
9). Student evaluations	16	Formal evaluation and marking are based on authentic assessment principles.	0.58	0.66	0.08	A A	
2). Teacher planning and preparation	25	The teacher varies the type and degree of difficulty of questions to assure that each student understands.	0.61	0.65	0.04	B A -1	
7). Classroom expectations of students	3	Cooperative learning experiences are used so that students often receive instructional assistance from one another.	0.62	0.56	0.06	B A -1	**
1). Teacher objectives	2	Classroom objectives focus on cultivating and facilitating social skills, cooperation, idea exchange, and shared-problem-solving, as opposed to memorizing.	0.62	0.70	0.12	B B	
5). Student objectives	19	Pretests and other similar diagnostic instruments are used to determine the parts of a unit that individual students need.	0.72	0.90	0.18	B C +1	
6). Student planning & preparation	22	Students play an active role of contributing to the direction or content of the lessons in their learning experiences.	0.74	1.16	0.42	B D +2	

9). Student evaluations	13	Divergent ideas are encouraged by the teacher in evaluating student work, as opposed to expecting convergence in exams and other evaluations.	0.75	0.83	0.08	B B		
2). Teacher planning & preparation	23	A variety of diverse learning assignments are designed to meet individual student interests and needs.	0.80	0.83	0.03	C B	-1	*
8). Student communication & messages	15	Information is presented in a manner that promotes authentic inquiry and students are encouraged to consider questions for which a *right* answer may not exist.	0.83	0.82	0.01	C B	-1	
3). Teacher behaviors	8	The role of teacher is that of a facilitator of learning or resource *guide on the side*	0.87	0.82	0.05	C B	-1	
1). Teacher objectives	10	Knowledge of each student including life outside of school is used to plan instructional activities.	0.87	0.88	0.01	C C		*
7). Classroom expectations of students	7	Students conduct a major part of their learning on a self-directed basis.	0.88	0.94	0.06	C C		
8). Student communication & messages	4	Sufficient time is allocated for students to think, play with ideas, manipulate objects, and experiment in learning without pressure to get the *right answer* at the *right time*.	0.89	0.97	0.08	C D	+1	
1). Teacher objectives	12	The time that students have to complete or master a given concept or skills varies based on individual differences.	0.90	1.00	0.10	D D		*

1). Teacher objectives	5	Different students, when working on a unit of instruction, use different materials, resources and equipment.	0.92	0.83	0.09	D B -2	*	**
9). Student evaluations	9	Student evaluations are based on individual learning growth instead of a fixed standard all are expected to learn.	1.01	1.06	0.05	D D	*	
2). Teacher planning & preparation	18	Lesson planning is done for individual students rather than for the entire class.	1.02	0.94	0.08	D C -1		
9). Student evaluations	6	Students are evaluated individually and move on to another task once they have mastered the objectives on a unit.	1.10	1.12	0.02	D D	*	**

In order to further analyze the collected data from this Indiana sample, One-way ANOVAs were conducted to examine the impact of teaching experience on survey results. Significant results were found for the following groups regarding their responses to the identified survey statements:

- A significant difference was found (F (4, 106) = 2.637, $p < .05$) between teachers with 16-21 years of experience and teachers with 5-10 years of experience regarding their responses to statement 3 A (*actual*). Teachers with more experience (16-21) identified more frequent use (m= 3.82, sd = .728) than their counterparts with 5-10 years of experience (m = 3.00, sd = .730) in terms of the following teaching-learning approach: *Cooperative learning experiences are used so that students often receive instructional assistance from one another*
- A significant difference was found between teachers with over 21 years of experience and teachers with 1-4 years of experience regarding their responses to statements 9A (*actual*) (F (4, 106) = 4.106, $p < .05$): *Student evaluations are based on individual learning growth instead of fixed standards all are expected to learn*; and 10D (*desired*) (F (4, 106) = 2.686, $p < .05$) and 10A (*actual*) (F (4, 106) = 3.374, $p < .05$): *Knowledge of each student, including life outside of school, is used to plan instructional activities*

Tukey's HSD was used to determine the nature of the differences between the two groups described above. Teachers with 1-4 years of experience had higher scores in response to the following survey statements when compared to their counterparts with over 21 years of experience:

- 9. *Student evaluations are based on individual learning growth instead of fixed standards all are expected to learn - Actual* frequency responses (m = 3.65, sd = 931) of teachers with 1-4 years of experience compared to those with 21+ years (m = 2.74, sd = 1.113).
- 10. *Knowledge of each student, including life outside of school, is used to plan instructional activities - Actual* frequency responses of teachers with 1-4 years of experience (m = 4.18, sd =.883) compared to teachers with 21+ years (m = 3.02, sd = .989). *Desired* frequency responses of teachers with 1-4 years of experience (m = 4.53, sd = .800) compared to teachers with 21+ years (m = 3.87, sd =.900).

In addition, for the *Actual* use frequency of statement 10, further significant differences were found between teachers with 1-4 years of experience and those with 11-15 years of experience and 16-21 years of experience. Similar results were found for teachers with 21+ years of experience. The teachers with 1-4 years of experience scored higher frequency of actual use when compared to teachers with 11-15 years of experience and 16-21 years of experience. These results identify that educators with less experience were more likely to use individual student information within assessment and instructional planning, as opposed to instructors with more experience.

One-way ANOVAs were also conducted with the survey data regarding the respondent's present teaching level as identified as either: elementary school, middle school, or high school as reflected in the following Table 4:

Table 4

Results of one-way ANOVAs regarding teaching level and responses to actual frequency that yielded significant Tukey HSD results

		df	F	Sig.
Q3Actual. Cooperative learning experiences are used so that students often receive instructional assistance from one another.	Between Groups	4	1.555	.038
	Within Groups	106		
	Total	110		
Q5Actual. Different students, when working on a unit of instruction, use different materials, resources and equipment.	Between Groups	2	5.128	.007
	Within Groups	107		
	Total	109		
Q6Actual. Students are evaluated individually and move on to another task once they have mastered the objectives on a unit.	Between Groups	2	6.904	.002
	Within Groups	108		
	Total	110		
Q20Actual. The teacher communicates individually with students or in small groups, as opposed to "total" class discussion.	Between Groups	2	8.175	.000
	Within Groups	106		
	Total	108		
Q21Actual. Different instructional techniques are used with different students.	Between Groups	2	6.745	.002
	Within Groups	107		
	Total	109		
Q24Actual. Students are offered instructional assistance and guidance individually rather than in a large group setting.	Between Groups	2	4.177	.018
	Within Groups	106		
	Total	108		
	Total	108		

Specific conclusions were drawn as a result of applying Tukey's HSD to the Indiana sample's responses regarding their *Actual* frequency of use of each of the following survey instrument statements in relationship to their respective teaching levels:

- *3. Cooperative learning experiences are used so that students often receive instructional assistance from one another* - high school teachers scored themselves higher in their *Actual* frequency of use of this teaching-learning approach than middle school teachers.
- *5. Different students, when working on a unit of instruction, use different materials, resources and equipment* - elementary school teachers scored themselves higher than their middle school colleagues regarding their *Actual* frequency of use regarding this teaching-learning approach.
- *6. Students are evaluated individually and move on to another task once they have mastered the objectives of a unit* - elementary school teachers scored themselves higher than their middle school colleagues regarding their *Actual* frequency of use regarding this teaching-learning approach.
- *20. The teacher communicates individually with students or in small groups, as opposed to "total" class discussions* - elementary school teachers scored themselves higher than their middle school colleagues regarding *Actual* frequency of use regarding this teaching-learning approach.

- *21. Different instructional techniques are used with different students* - elementary school teachers scored themselves higher than high school teachers in regards to their *Actual* frequency of use regarding this teaching-learning approach.
- *23. A variety of diverse learning assignments are designed to meet individual student interests and needs* - elementary school teachers scored themselves higher than their middle school colleagues regarding *Actual* frequency of use regarding this statement.

Table 5

Results of one-way ANOVAs regarding teaching level and responses to desired frequency that yielded significant Tukey HSD results

		df	F	Sig.
Q5Desired. Different students, when working on a unit of instruction, use different materials, resources and equipment.	Between Groups	2	5.702	.004
	Within Groups	107		
	Total	109		
Q6Desired. Students are evaluated individually and move on to another task once they have mastered the objectives on a unit.	Between Groups	2	3.622	.030
	Within Groups	108		
	Total	110		
Q9Desired. Student evaluations are based on individual learning growth instead of a fixed standard all are expected to learn.	Between Groups	2	7.063	.001
	Within Groups	108		
	Total	110		
Q10Desired. Knowledge of each student including life outside of school is used to plan instructional activities.	Between Groups	2	3.808	.025
	Within Groups	108		
	Total	110		
Q12Desired. The time that students have to complete or master a given concept or skills varies based on individual differences.	Between Groups	2	5.297	.006
	Within Groups	108		
	Total	110		
Q20Desired. The teacher communicates individually with students or in small groups, as opposed to "total" class discussions.	Between Groups	2	4.460	.014
	Within Groups	107		
	Total	109		
Q21Desired. Different instructional techniques are used with different students.	Between Groups	2	6.480	.002
	Within Groups	107		
	Total	109		
Q22Desired. Students play an active role of contributing to the direction or content of the lessons in their learning experiences.	Between Groups	2	3.667	.029
	Within Groups	105		
	Total	107		
Q23Desried. A variety of diverse learning assignments are designed to meet individual student interests and needs.	Between Groups	2	3.751	.027
	Within Groups	106		
	Total	108		

Accordingly, the data included in Table 5 enabled the researchers to conclude that elementary school teachers scored themselves higher regarding their *Desired* frequency of use when compared to high school teachers for the following teaching-learning approaches:

- *5. Different students, when working on a unit of instruction, use different materials, resources and equipment.*
- *6. Students are evaluated individually and move on to another task once they have mastered the objectives of a unit.*
- *9. Student evaluations are based on the individual learning growth instead of fixed standards all are expected to learn.*
- *10. Knowledge of each student including life outside of school is used to plan instructional activities.*
- *12. The time that students have to complete or master a given concept or skill varies based on individual differences.*
- *21. Differential instructional techniques are used with different students.*
- *23. A variety of diverse learning assignments are designed to meet individual student interests and needs.*

In addition, elementary school teachers scored themselves higher when compared to their middle school counterparts in regards to the *Desired* frequency of the following survey instrument statement*: 20. The teacher communicates individually with students or in small groups, as opposed to "total" class discussions.*

The results of this Indiana case study show that, when compared to high school and middle school teachers, the elementary school teachers within the study would ideally like to integrate information about each student and his/her individuality within lesson planning and curriculum development. The elementary school teachers would also prefer to customize instructional techniques and provide a range of required tasks for students.

DISCUSSION

Teachers in this Indiana case study consistently, across all demographics, feel like they generally do a good job of treating students with empathy and understanding as evidenced by their self-identification of their actual teaching-learning practices. In addition, according to this sample, survey statements showing the greatest degree of congruency between teachers' desired practices and actual practices tend to be associated with more traditional best practices such as: small groups, open-ended questions, different instructional strategies, etc. Whereas, those survey statements showing the most discrepancy between teachers' desired practices and actual practices tend be practices that would align with more "aggressive" differentiation strategies such as differentiation by content, differentiation by time, different kinds of evaluations, differentiated lesson planning, etc.

The Indiana results are, in most cases, what might be expected. The greater focus in recent years in teacher preparation programs on differentiation could be seen as influencing younger teachers (1-4 years) to actually put into practice more individualized evaluations and to plan more individualized instructional activities. It is also not surprising that elementary teachers tend to see themselves as using more significant differentiation than colleagues who work with older students. In many cases, the nature of the curriculum and instructional guidelines essentially require them to do so. It is somewhat surprising that the youngest teachers (1-4 years) were more likely to base evaluations on the growth of individual students rather than fixed standards (Survey statement 9). Surprisingly, these are the teachers who have grown up in the era of high stakes standardized testing and have gone through educator preparation programs that, most likely, require them to base lesson objectives on state and/or content area standards. One might anticipate that they would be the most comfortable applying fixed standards.

The survey instrument survey used in this case study is a powerful tool to promote the personal identification of current professional practices about differentiation compared to desired professional practices. In addition, the survey instrument and the analysis of case studies like this

Indiana case study reinforce that a number of teachers desire to use and currently employ various differentiation techniques and strategies to various degrees in their teaching-learning settings and with some additional reflection and minimal professional assistance they may move further along the teaching-learning continuum toward the student-centered pole.

Consequently, the survey instrument serves as a key professional development activity within schools, as teachers share their actual and desired outcomes with one another since it provides a system to rank current practices into categories that are context-based yet norm referenced. The use of the survey instrument promotes a "baby-steps" progressive professional approach to greater differentiation based on what is and what should be within a specific context based on comprehensive research data that is also applicable to similar contexts.

Subsequently, this quantitative approach encourages short-term and long-term goal setting and strategic planning for greater differentiation based on current practices and professional reflections. This article is a key reference component of the nationwide research project currently being conducted by research teams in the following states: Arkansas, Georgia, Idaho, Kansas, Mississippi, Missouri, New York, Ohio, South Dakota, Texas, Vermont, and Virginia using the same survey instrument to further build baseline information regarding the desired use and actual use of differentiation approaches with the goal of helping more educators move along the continuum to greater student-centered differentiated education.

REFERENCES

Armstrong, D., Henson, K. & Savage, T. (2005). *Teaching today: An introduction to education.* Upper Saddle River, NJ: Pearson Publications.

Brooks, J., & Brooks, M. (1993). *In search of understanding: The case for constructivist classrooms.* Alexandria, VA: Association for Supervision and Curriculum Development.

Coladarci, T., Cobb, C., Minium, E., & Clarke, R. (2008). *Fundamentals of statistical reasoning in education* (2nd ed.). Hoboken, NJ: Wiley & Sons.

Danielson, C. (2002). *Enhancing student achievement: A framework for school improvement*. Alexandria, VA.: Association for Supervision and Curriculum Development.

Darling-Hammond, L. (1997). *The right to learn: A blueprint for creating schools that work.* San Francisco, CA: Jossey-Bass Publishers.

Denig, S. (1994). *The self-regulated behavior of teachers and its relationship to autonomy, decision deprivation, and pupil control ideology*. Ed.D. Dissertation, Rutgers The State University of New Jersey: New Brunswick, New Jersey.

Education Next. (2015). *Percentage of teachers by experience levels* (Full-time, public schools only). [Webpage]. Retrieved from http://educationnext.org/files/ednext-june15-aldeman-state-chart.jpg

Eggen, P., & Kauchak, D. (2001). *Educational psychology: Windows on classrooms.* Upper Saddle River, NJ: Prentice-Hall, Inc.

Ernest, J., Heckaman, K., Thompson, S., Hull, K., & Carter, S. (2011). Increasing the teaching efficacy of a beginning special education teacher using differentiated instruction: A case study. *International Journal of Special Education, 26*(1), 191-201.

Foote, C., Vermette, P., & Battaglia, C. (2001). *Constructivist strategies: Meeting standards and engaging adolescent minds.* Larchmont, NY: Eye on Education.

Gillies, R. (2011). Promoting thinking, problem-solving and reasoning during small group discussions. *Teachers and Teaching: Theory and Practice, 17*(1), 73-89.

Heathers, G. (1967). *Organizing schools through the dual progress plan: Tryouts of a new plan for elementary and middle Schools.* Danville, ILL: The Interstate Publishing Co.

Indiana Department of Education (DOE). (2013). Huntington Co Com Sch Corp Enrollment. ISTEP+2013-2014. *DOE Compass.* Retrieved from http://compass.doe.in.gov/dashboard/istep.aspx?type=corp&id=3625

Indiana Department of Education (DOE). (2016). Huntington Co Com Sch Corp Enrollment. *DOE Compass.* Retrieved from http://compass.doe.in.gov/dashboard/overview.aspx?type=corp&id=3625

Johnson, J., Collins, H., Duperes, V. & Johansen, J. (1991). *Foundations of American education.* Boston, MA: Allyn & Bacon Co.

Koh, K., Tan, C., & Ng, P. (2012). Creating thinking schools through authentic assessment: The case in Singapore. *Educational Assessment, Evaluation and Accountability, 24*(2), 135-149.

Marzano, R.; Pickering, D. & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Natali, B. (2007). *The Impact of Caleb Mills on the Hoosier Education Debate: An Edition of Two Unpublished Addresses*. Masters thesis, Indiana University-Purdue University Indianapolis, Indiana.

National Center for Education Statistics. (2012). Table 7. Average class size in public primary schools, middle schools, high schools, and schools with combined grades, by classroom type and state: 2011–12. *Schools and Staffing Survey (SASS).* Retrieved from https://nces.ed.gov/surveys/sass/tables/sass1112_2013314_t1s_007.asp

Ornstein, A., & Levine, D. (2008). *Foundations of education.* Boston, MA: Houghton Mifflin.

Polka, W. (2002). Facilitating the transition from teacher centered to student-centered instruction at the university level via constructivist principles and customized learning plans. *Educational Planning, 13*(3), 55-61.

Polka, W. (2007). *Managing in the effective change zone: A synthesis of contemporary research conducted in Georgia about factors that facilitate school administrators in improving student achievement*. Presentation Georgia Educational Research Association's 32nd Annual Meeting (Savannah, GA).

Polka, W. (2010). Facilitating instructional differentiation via teacher reflections about desired constructivist practices and current realities: A pragmatic research model (Chapter 8). In E. Pultorak (Ed.), *The purposes, practices, and professionalism of teacher reflectivity: Insights for 21stcentury teachers and students* (p.163-188). New York: Rowman & Littlefield Publications.

Polka, W., & Van Husen, M. (2014). Applying teacher reflection strategies to promote greater differentiation of instruction: A practical research model and procedural guide. In E. E. Pultorak (Ed.). *Reflectivity and cultivating student learning: Critical elements for enhancing a global community of learners and educators.* (p. 111-135). Lanham, Maryland: Rowman & Littlefield Education Publications.

Polka, W. S., Van Husen, M. J., Young, W. M., & Minervino, K. J. (2016). Facilitating greater instructional differentiation via research-based teacher reflections and site-based procedural guidelines. *Educational Research: Theory & Practice, 28*(1), 37–52.

Slavin, R. (2006). *Educational psychology: Theory and practice.* Upper Saddle River, NJ: Pearson Education, Inc.

Stats Indiana. (2013). *Population*. [Webpage]. Retrieved from http://www.stats.indiana.edu/stats_dpage/dpage.asp?id=72&view_number=1&menu_level=&panel_number=

Sternberg, R., & Williams, W. (2002). *Educational psychology.* Boston, MA: Allyn and Bacon.

Tomlinson, C. (2009). *The parallel curriculum: A design to develop learner potential and challenge advanced learners, a multimedia kit for professional development* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Tomlinson, C. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). Alexandria, VA: ASCD.

Tomlinson, C., Brimijoin, K., & Narvaez, L. (2008). *The differentiated school: Making revolutionary changes in teaching and learning* (Online- ed.). Alexandria, VA.: Association for Supervision and Curriculum Development.

Tomlinson, C., & Imbeau, M. (2011). *Leading and managing a differentiated classroom*. Alexandria, VA: ASCD.

United Federation of Teachers (2017). *What are the class size limits for a self-contained special education class?* [Webpage]. Retrieved from https://nces.ed.gov/surveys/sass/tables/sass1112_2013314_t1s_007.asp

UNDERSTANDING THE EFFECT OF AN INTERVENTION PROGRAM ON HIGH SCHOOL GRADUATION RATES: THE ACCESS AND OPPORTUNITY PROGRAM IN ST. CLOUD, MINNESOTA

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ABSTRACT

Facing a continuing racial high school graduation gap, the state of Minnesota is emphasizing the importance of offering resources and opportunities to close this gap to prepare young adults to be adequately ready for success at the post-secondary level, that is, college and career. With this in mind, it is important to evaluate educational programs that offer resources such as targeted mentoring and a supportive learning environment and to estimate their impact on high school retention and graduation rates. We extend our analysis to a longitudinal study of 4-year-cohort graduation and retention rates across years using student-level administrative data from a school district in Central Minnesota on Access and Opportunity Program participants from 2008 to 2013. The combination of different cohorts allows us to disentangle cohort specific characteristics that could be correlated to rapid demographic changes that could impact students' success rates but are not related to the program itself. For instance, the entrance of new English learners in the system may bias educational outcome rates, underscoring the short-run effect of educational programs in the district. On the other hand, educational programs evolve across time and looking across the years would allow us to identify the intensity of the program and its evolution. We correct for selectivity and attrition issues based on observable characteristics and design a quasi-experimental analysis with information before and after the program started. We use as a control group most similar non-participant students. Furthermore, students who have been identified as eligible participants, but who elected not to participate, serve as another form of control. Our results show that compared to eligible non-participants, students of color participating in the program have higher odds to graduate from high school and, across cohorts, there is an increase in retention rates.

INTRODUCTION

High school graduation is of great national interest and significance. For example, President Obama has emphasized the importance of students studying hard, working to overcome challenges, and completing high school to go on to other facets of their lives. (Obama's speech on importance of education, 2009). Obama's administration has called for a redesigning of the high school experience to better prepare young people for the challenges of the 21st century (Next Generation High Schools, n.d.).

National data indicate that the high school graduation rate is increasing. However, high school completion varies by factors such as race or ethnicity, socioeconomic status, English language learner status, geography, gender among other conditions. (National Center for Education Statistics, 2016). Nationally, there have long been calls for efforts to improve educational opportunities and outcomes for underserved and at risk groups. Some examples of more recent efforts of the past three decades include the National Commission on Excellence in Education's 1983 report, "A Nation at Risk: The Imperative for Educational Reform," (A Nation At Risk, 1983); the No Child Left Behind Act (NCLB); Race to the Top (Fundamental Change, 2015); and the pending Every Student Succeeds Act (Hinrichs, 2016).

In Minnesota, similar efforts focus on improving educational outcomes for at risk students groups. The research reported in this paper comes from one such initiative. The Minnesota State Colleges and Universities system (MnSCU), now called Minnesota State, developed an initiative

stressing research, demonstration and service to address these problems, funding three centers for this purpose. The St. Cloud Center for Access and Opportunity was designed to identify, implement and document the effectiveness of intervention practices, approaches and models to improve success among underrepresented and underserved students. This center focused its work primarily at the secondary level to address the issues of college readiness of underserved and underrepresented students.

LITERATURE REVIEW

A solid body of research supports the idea that precollege preparation is essential to higher education success. For example, Bowen and his colleagues (2009), in their study of almost 125,000 students in public universities, state that "Late-stage outcomes depend enormously on the qualifications that entering high school students bring with them from the eighth grade and on immutable personal attributes such as race/ethnicity, gender, and family background" (p. 111). They further note that high school grades are strong predictors of college graduation rates. Adelman (2006), in his analysis of a national longitudinal study of eighth graders also emphasized the importance of the pre-college experience. In an executive summary of his work, he argues that "The academic intensity of the student's high school curriculum still counts more than anything else in precollegiate history in providing momentum toward completing a bachelor's degree" (n.d.). Research from Chicago public schools provides additional evidence that the high school experience is crucial in attaining college success. Roderick and her colleagues (2006), in a report examining Chicago Public School graduates' college enrollment, college preparation, and graduation from four-year colleges, found that improved qualifications in high school represent an important strategy to increase college-participation rates, access to the most selective colleges, and college graduation rates of low-income, minority, and first-generation college students. This conclusion is based on their findings that Chicago public schools graduates fare poorly in higher education because of poor preparation, low grades, and low ACT test scores.

A Minnesota non-profit think tank, Growth & Justice, convened a group of experts to review strategies for increasing college graduation in Minnesota that are based on empirical research and cost-effective. Several of these scholars identify the strong correlation between achievement and high-school graduation at the pre-college level (Perna, 2007; Levin and Belfield, 2007). Levin and Belfield, for example, provide a quantitative estimate of this relationship for Minnesota students, stating that "an increase in 8th grade achievement of one standard deviation is associated with a 48% lower probability of dropping out of high school" (p. 57). This group of scholars sought to identify promising interventions and strategies for Growth & Justice that would help the state of Minnesota increase its overall college graduation by 50 percent by the year 2020.

In addition to the national-level body of literature on intervention as a factor in educational reform and student success, the Minnesota Department of Education is advocating and implementing a system for high school dropout and prevention in order to enhance high school graduation through intervention actions. The Minnesota Early Indicator and Response System (MEIRS) is designed to be an early warning system that identifies students at risk of dropping out by monitoring known risk factors and targeting resources to the students in middle and high school. (Minnesota Department of Education, n.d.).

The Access and Opportunity Program (AOP) has as its mission and plan of operation the improvement of the secondary performance of underrepresented students in key areas deemed to be important in gaining college access and success, namely course-taking, grades, and achievement tests (as indicators of academic achievement), and ultimately high school graduation. Beyond the secondary level, the program emphasizes college readiness and workforce preparation. Success beyond the secondary level entails postsecondary enrollment, persistence and completion.

The purpose of this paper is to examine program impact on high school graduation and, secondarily, persistence. Persistence is measured by considering the likelihood that students consistently stay in the system. Students who are rotating across different schools and school systems are less successful at school and have lower graduation rates (Perna, 2007).

RESEARCH DESIGN, DATA AND METHODOLOGY

A quasi experimental design (within District 742) is employed in this project utilizing program participation (AOP participants compared to AOP non-participants) as the primary independent variable condition. District 742 students most similar to students served, in terms of pre-project indices have been assigned as control participants. With the availability of data on all students in the secondary grades, we also compare program participants with students from the general population who do not share their academic and demographic characteristics. Further, students who have been identified as eligible participants, but who elected not to participate, serve as another form of control.

The primary sources of data are student school records maintained by the school district in its student information systems, information gathered by data collection forms completed by program staff, and information on file with the Minnesota Department of Education available for public access. The information covers the academic years from 2005-2006 to 2012-2013 and all registered students in this particular district. We take advantage of the longitudinal information provided by the district to evaluate the program impact across five four-year student cohorts. We also use detailed participation information from the Access and Opportunity Program dating from its beginning in the 2008-2009 academic year.

We evaluate the impact of AOP on the students' retention and graduation rate. To do so, we incorporate evaluation techniques of non-randomized programs to incorporate the bias created by the self-selection of students into becoming participants in a program. In addition, we take into account the issue of attrition bias when evaluating the impact on retention and graduation rate.

Bias is introduced in this design because students were assigned to the program by school personnel, often counselors and administrators, based on the characteristics of the target population, namely low income, first-generation, immigrant status, and/or a member of a group traditionally underrepresented in higher education, generally members of racial or ethnic minority groups. After the program started, teachers and parents referred students. And some students sought admission to the program on their own.

Because of the lack of randomization in the assignment of students to the treatment conditions, we employ an advanced quantitative technique to evaluate treatment effects, propensity score analysis (Guo & Fraser, 2010; Murnane & Willett, 2011; Holmes, 2014). Program evaluation theory has evolved in recent years. This evolution is driven, in part, by the high costs of randomized experiments in education. Apart from the ethical issues involved in randomized public education research, the application of randomized interventions generally entails expensive operational costs that divert resources away from the program itself. With non-randomization, however, the process of evaluating programs is more complex. Yet, the need for data-driven and research-based solutions calls for methods that can improve causal inferences in observational studies. Our analysis would then use these new techniques to evaluate the impact of the program on students' retention and graduation rate.

Our methodology follows a two-step approach (Heckman correction technique, 1979). We are interested in understating the impact in both steps. The first step uses the full sample of students in the district and estimate the probability of a student being in the district during the 4-year cohort (from 9^{th} grade to 12 grade) conditional on observable characteristics such as sex and

sociodemographic background proxy by student's participation in Free Reduced Lunch Program and/or English Learner Program. This first step approximates to the analysis of students' retention rate during the period of study. We use this information to account for the effect of attrition rate on our 4-year cohort sub-sample. This rate would be used as a weighting mechanism that would account for the systematic attrition rate based on observable characteristics. For instance, if students of color are more likely to change districts and this likelihood is based on their gender and background, our 4-year cohort sample would then be composed of a biased smaller sample of students of color that would bias our estimated results. Using this likelihood rate, we move to our second step. The second step concentrates the analysis on students within the 4-year cohort group graduation rate. Now, we use the sample of students who has remained in the district during their four final years of school.

For our first step of the analysis, we use a multivariate probit model clustered at school level. Using the appropriate functional form, we estimate the individual matching probability based on observables.

$$P(match = 1|X)_{it} = \Phi(\beta_0 + \beta_1 Female_{it} + \beta_2 FRL_{it} + \beta_3 EL_{it} + \beta_3 Race_{it} + \varepsilon_{it}) \quad (1)$$

Equation (1) formally presents our first-step model where 'i' represents a student and 't' time represented here by a within 4-year cohort period. Our analysis contains five 4-years cohort groups: 2006-2009, 2007-2010, 2008-2011, 2009-2012, and 2010-2013. Figure 1 offers a visual presentation of each cohort. *P(match=1|X)* is the probability of matching that would be estimated assuming a standard normal distribution. That is, the probability a student is at the beginning of cohort 't' in 9th grade and later appears at the end of the cohort 't' in 12th grade assuming a standard normal distribution. *Female* represents a dummy variable that is 1 if student is female. *FRL* and *EL* are dummy variables for whether a student participates in a Free Reduced Lunch program and is an English Learner, respectively. *Race* is a dummy variable that is 1 if the student is a student of color. The reference group is White, male students who do not participate in neither a Free Reduced Lunch Program nor an English Learner Program. ε_{it} are robust and clustered standard errors. The estimated coefficients β's would give us information on the estimated impact of each variable on the likelihood a student remains in the school during the 4-year cohort group.

Our second step of the analysis considers a multivariate logistic model clustered at school level. The non-linear dependent variable is the dichotomous variable Graduate (1 if student graduate, 0 otherwise). For this section, we consider different versions of comparison groups to evaluate the impact of the program on student's graduation rate. For each type of analysis, we look at each cohort separately and the aggregate sample with all cohorts. First, we consider the groups of AOP participants and student's race separately. With this representation, we can evaluate the graduation rate between participants and non-participants by race (White versus students of color). Equations (2.A) and (2.B) show the formalization of our model when the groups are aggregated by AOP participation and Race.

$$P(Graduate = 1|X)_{it} = \mathrm{F}(\beta_0 + \beta_1 B_{it} + \beta_2 AOP_{it} + \beta_3 Race_{it} + \beta_4 Race_{it} * AOP_{it} + \beta_5 Cohort_{it} + \varepsilon_{it}) \quad (2.A)$$

$$P(Graduate = 1|X)_{i} = \mathrm{F}(\beta_0 + \beta_1 B_{i} + \beta_2 AOP_{i} + \beta_3 Race_{i} + \beta_4 Race_{i} * AOP_{i} + \varepsilon_{i}) \quad (2.B)$$

In the Equations (2.A) and (2.B), *AOP* represents a dummy variable that accounts for program participation, *B* is a vector that represents the variables Female and socioeconomic background, and *Cohort* identifies an individual's 4-year cohort group. Equation (2.B) is estimated by each cohort separately. The estimated coefficients that we would consider relevant are β_2 and β_4. β_2 would compare the impact on graduation rate of White participants verses White non-participants, meanwhile the sum of β_2 and β_4 represents the effect on students of color who are participants versus

White Non-participants. β_4 alone captures the effect on students of color who participate in the program versus those students of color who do not participate.

Given the structural issues regarding the selection on participants and the non-random distribution on program participation, we would expect that non-participant White students are not the right comparison group. The idea is that we need to compare the effect of the program using a potential outcome approach. That is, we would need to compare the group of participants to the hypothetical case of what would have been their outcome if the program would have not been implemented. If we follow this logic, assuming that the group would have reached an outcome similar to non-participant White students would be inadequate. The motivation for the creation of such program was mainly focused on the disparity on educational achievement between these groups. Therefore, we decided to create a more appropriate group to compare against and to evaluate the evolution of this impact from the period where the program was half in place to more recent years. We then defined a new variable that identifies "eligible students". These are students who meet the eligibility criteria to be a participant in the program but they do not participate. Using this new category, we can compare AOP participants to those who although eligible did not participate in the program. For this analysis, we cannot include the variables related to free reduce lunch and English learner. These two variables are used to identify 'eligibility', hence the high correlation between these variable and our new definition of "eligible" students. Equations (3.A) and (3.B) show the formal representation of our models.

$$P(Graduate = 1|X)_{it} = \mathrm{F}(\beta_0 + \beta_1 Female_{it} + \beta_2 GROUP_{it} + \beta_3 Cohort_{it} + \varepsilon_{it}) \quad (3.A)$$

$$P(Graduate = 1|X)_{it} = \mathrm{F}(\beta_0 + \beta_1 Female_{it} + \beta_2 GROUP_{it} + \varepsilon_{it}) \quad (3.B)$$

All the variables are defined as before. The new variable introduced in these representations is *GROUP*. This variable represents a vector of dummy variables listed as: White non-participants, White participants, White eligible, Non-White non-participants, Non-White eligible, and Non-White participants. The models represented in Equations (3.A) and (3.B) are estimated using the entire sample for all groups and by each group separately compared to Non-White participants. All errors are estimated in clusters and robust.

ANALYSIS OF RESULTS

We follow the methodology detailed in the previous section to analyze the impact of the program. This paper focuses on two major components of the goal of the educational program: graduation rate and retention rate. We explain in detail the results for each particular comparison group.

Table 1 shows the distribution of the matched data by cohort and aggregate. On average, the distribution of type of students is similar across cohorts, except for participation rate. The low participation rate in the first cohort is reasonable given that Access and Opportunity Program started late in the year 2008 and students in the 2006-2009 cohort were already in the later years of schooling. White and non-White participants were only 4% and 7% of their cohort. For those students who we find at the beginning and at the end of their particular cohort, the graduation rate was between 77% and 88%. There is a clear trend of downward graduation rate overall across cohorts, with the most recent cohort being more than 10 percentage points below the earliest cohort in our dataset. Two other elements are important to highlight from this table. First, the proportion of Free Reduced Lunch participants increases across the cohorts. The significant increase is larger than 10 percentage points. Second, the proportion of English learners also increases, although not as dramatic as the other group. However, the combination of these two trends could be affecting overall graduation rate. Our goal is to consider these elements in our analysis and disentangle the potential

impact of the intervention program that maintain as one of its goal student success through graduation rate.

Targeted goal: Graduation Rate

One of the primary goals of this program was offering the support needed to increase students' likelihood to graduate from high school. As mentioned before, the evaluation of this goal is complex given the non-random assignation into the program. In this section, we would evaluate the likelihood to graduate from high school and compare it through the different groups. During the period of analysis, there are also other economic components that may have affected these rates. The years during the starting of the program the country faced the Great Recession, during that period we can also see an increase in the number of students participating in Free Reduced Lunch (Figure 2).

Tables 2 and 3 show the odds ratios of model represented in equation (2) with a change in the reference group. In the first table, we compared Student of Color AOP participants (SOC AOP) and Non-AOP participants (SOC Non-AOP) against Non- AOP participant White students (WHITE Non-AOP). Overall, being a student of color lowers the odds of graduation compared to white students, but having been a program participant overcomes part of this reduction by almost half, after we take into consideration the likelihood of staying during the 4 years of school. When we combine all cohorts, we can increase the variation of the sample and be more effective in estimating the impact of participants versus non-participants. Nevertheless, non-participant white students have the highest likelihood of high school graduation compared to all the other groups. We consider that this is expected given the differences in background between participants and non-participants and white and student of color. As we previously mentioned, non-participant white students are then not the right comparison group to evaluate the impact of the program.

Table 3 shows a separate way to evaluate the impact of AOP participation. We consider now as the reference group SOC AOP. This presentation allows us to show the actual impact of program participation. The comparable groups that we turn our focus to are white and student of color who would be considered eligible to participate in the program but do not participate. These groups share more similar background to all participants in the program than those who are not eligible such as non-participant white students. Compared to SOC AOP, SOC and white eligible students have lower odds to graduate from high school. For 10 SOC AOP students, only 1 or 2 SOC and white eligible students graduate from high school. Because of the demographics and socioeconomic background in the area, most students of color are eligible. This is the reason behind not seeing a significant effect on SOC non-AOP. Nevertheless, among white students, those who would be eligible, we see a significant reduction in their graduation rates odds ratio almost similar to the one we see for eligible students of color. Table 4 confirms our findings (column 2 and 4) while separately evaluating each group against students of color who participate in the program. AOP participant students of color (SOC AOP) have significantly higher odds to graduate from high school than eligible white students and eligible students of color.

Unintended consequence: Retention Rate

Primarily, the program was designed to assist students in need along their high school education. However, in this process the program was also able to reduce the attrition rate of students of color. Although, SOC participant are less likely than White Non-Participants to stay within a 4-year cohort, this difference is smaller across cohorts.

Table 5 shows the estimated probability of staying in school from the first year to the fourth year for each cohort. Because we are comparing the rates against the group with the highest retention rate, the estimated value is negative across all groups and cohorts. We focus on the absolute value of

the number to evaluate the increase in retention rates. Compared to eligible students of color, eligible white students, and student of color who are not participants, AOP participants, white and non-white, see a reduction in their attrition rates, which can be read as an increase in retention rates. AOP participant students of color show the largest change from 40% to 28% less likely to white non-AOP to remain in school. It is almost half of a reduction on the rate. White students who are eligible but do not participate do not see any meaningful change in this rate across cohorts. Eligible students of color show a small reduction but still maintain a large likelihood of attrition compared to white non-AOP students. In fact, the rate changes from 40% to more than 33%. Overall, the group with the largest change across cohort is the students of color participating in the program.

CONCLUDING REMARKS

Programs targeting students in need are important, especially in Minnesota where the on-time high-school graduation rate for students of color are some of the lowest in the country (Minnesota Public Radio, 2016). For many years, in states like Minnesota, this gap has been overlooked because of the growing increase in the total high school graduation rates. Our goal in this paper has been to show the evaluation of a long-standing program that provides extra academic resources to students in need and to compare the performance of this group versus other groups who have not participated in the program. Educational programs like this one are difficult to evaluate given the non-randomization of the selection of participants. Therefore, we used more sophisticated methodologies to be able to analyze the performance of the relevant groups.

At this point, programs like the Access and Opportunity Program allow us to evaluate the feasibility of using them to reduce the gap that currently exists among diverse groups. Considering the effect that we find in our research, it is worthwhile to promote such programs.

REFERENCES

A Nation at Risk. (1983). Retrieved from https://www2.ed.gov/pubs/NatAtRisk/risk.html

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, D.C: U.S. Department of Education.

Adelman, C. (n.d.). *The Toolbox revisited: Paths to degree completion from high school through college, executive summary*. Retrieved October 2010, from Ed.Gov U.S. Department of Education : http://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html

Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2009). *Crossing the finish line: Completing college at America's public universities.* Princeton, New Jersey: Princeton University Press.

Fundamental Change: Innovation in America's schools under race to the top (2015). Retrieved from http://www2.ed.gov/programs/racetothetop/rttfinalrptfull.pdf

Guo, S., & Fraser, M. (2010). *Propensity score analysis: Statistical methods and applications*. Thousand Oaks, CA: Sage Publications, Inc.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica, 47*(1): 153–61. doi:10.2307/1912352.

Hinrichs, E. (2016). *Cautious optimism, and a lot of questions, about what the new federal education law will mean for Minnesota*. Retrieved from https://www.minnpost.com/education/2016/07/cautious-optimism-and-lot-questions-about-what-new-federal-education-law-will-mean

Holmes, W. (2014). *Using propensity scores in quasi-experimental designs*. Thousand Oaks, CA: Sage Publications, Inc.

Levin, H. M., & Belfield, C. R. (2007). Investments in K-12 for Minnesota: What works? *Smart Investments in Minnesota Students* (pp. 29-38). St. Paul, Minnesota: Growth & Justice.

Minnesota Department of Education. (n.d.). *Minnesota early indicator and response system.* Retrieved from http://education.state.mn.us/MDE/dse/drop/MEIRS/050418

Minnesota Public Radio. (2016, March 7). *Minnesota's graduation gap: By the numbers*. Retrieved from https://www.mprnews.org/story/2016/03/07/graduation-gap-by-the-numbers

Murnane, R. J. & Willett, J. B. (2011). *Methods matter: Improving causal inference in educational and social science research.* New York, NY: Oxford University Press.

National Center for Education Statistics. (2016). Retrieved from http://nces.ed.gov/programs/coe/indicator_caa.asp

Next Generation High Schools: Redesigning the American high school experience. (n.d.) Retrieved from http://www.ed.gov/highschool

Obama's speech on importance of education. (2009). Retrieved from http://www.upi.com/Obamas-speech-on-importance-of-education/21501252429738/

Perna, L. W. (2007). Improving the transition from high school to college in Minnesota: Recommendations based on a review of effective programs. *Smart Investments in Minnesota's students* (pp. 57-72). St. Paul, Minnesota: Growth & Justice.

Roderick, M., Nagaoka, J., Allensworth, E., Coca, V., Correa, M., & Stoker, G. (2006, April). *From high school to the future: A first look at Chicago Public School graduates' college enrollment, college preparation, and graduation from four-year colleges.* Chicago, Illinois: Consortium on Chicago School Research, University of Chicago.

Figures and Tables

Figure 1
4-year Student Cohort

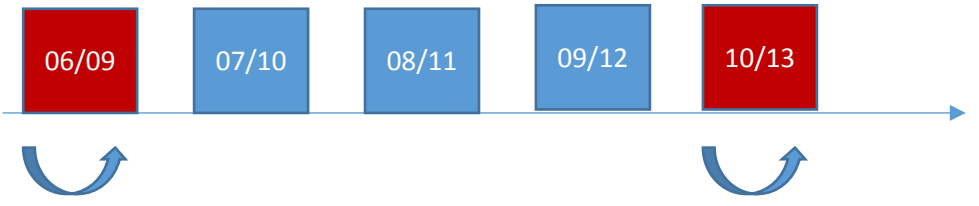

Figure 2
Free and Reduced Lunch and English Learner Status of Samples

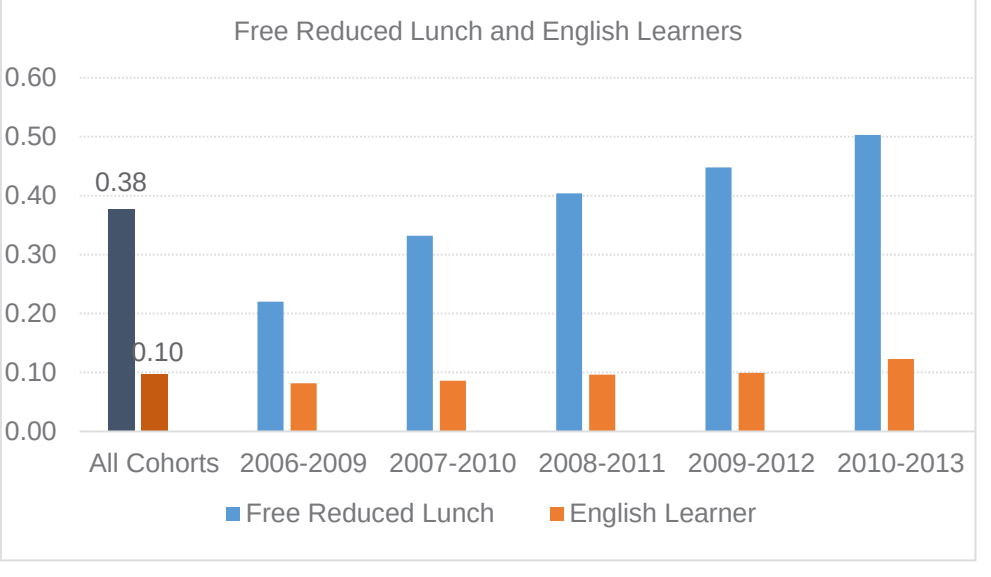

Table 1
Summary Statistics

	All Cohorts	
VARIABLES	**mean**	sd
White Non-Participant	**0.55**	*0.50*
White Eligible	**0.18**	*0.39*
White Participant	**0.07**	*0.26*
SOC Participant	**0.13**	*0.33*
SOC Eligible	**0.04**	*0.20*
SOC Non Participant	**0.02**	*0.15*
Graduated	**0.83**	*0.37*
Non-White	**0.19**	*0.40*
White	**0.81**	*0.40*
Non- Participant	**0.80**	*0.40*
Participant	**0.20**	*0.40*
Female	**0.48**	*0.50*
Male	**0.52**	*0.50*
Free Reduced Lunch	**0.38**	*0.49*
English Learner	**0.10**	*0.30*
4-year Cohort (% of full cohort)	**0.73**	*0.44*
N. Observations	**3184**	

Table 1 (continued)

Cohorts	06-09		07-10		08-11		09-12		10-13	
VARIABLES	**mean**	sd	**mean**	sd	**mean**	sd	**mean**	sd	**mean**	sd
White Non-Participant	**0.68**	*0.47*	**0.59**	*0.49*	**0.55**	*0.50*	**0.49**	*0.50*	**0.43**	*0.50*
White Eligible	**0.13**	*0.34*	**0.17**	*0.38*	**0.19**	*0.39*	**0.23**	*0.42*	**0.21**	*0.41*
White Participant	**0.04**	*0.21*	**0.07**	*0.25*	**0.06**	*0.24*	**0.08**	*0.28*	**0.12**	*0.32*
SOC Participant	**0.07**	*0.26*	**0.11**	*0.31*	**0.15**	*0.35*	**0.13**	*0.34*	**0.19**	*0.39*
SOC Eligible	**0.04**	*0.20*	**0.04**	*0.21*	**0.04**	*0.19*	**0.05**	*0.22*	**0.04**	*0.20*
SOC Non Participant	**0.03**	*0.18*	**0.02**	*0.15*	**0.02**	*0.13*	**0.02**	*0.16*	**0.01**	*0.10*
Graduated	**0.88**	*0.33*	**0.85**	*0.36*	**0.86**	*0.34*	**0.79**	*0.41*	**0.77**	*0.42*
Non-White	**0.15**	*0.36*	**0.18**	*0.38*	**0.20**	*0.40*	**0.21**	*0.41*	**0.24**	*0.43*
White	**0.85**	*0.36*	**0.82**	*0.38*	**0.80**	*0.40*	**0.79**	*0.41*	**0.76**	*0.43*
Non- Participant	**0.88**	*0.32*	**0.82**	*0.38*	**0.79**	*0.41*	**0.79**	*0.41*	**0.70**	*0.46*
Participant	**0.12**	*0.32*	**0.18**	*0.38*	**0.21**	*0.41*	**0.21**	*0.41*	**0.30**	*0.46*
Female	**0.48**	*0.50*	**0.46**	*0.50*	**0.49**	*0.50*	**0.46**	*0.50*	**0.51**	*0.50*
Male	**0.52**	*0.50*	**0.54**	*0.50*	**0.51**	*0.50*	**0.54**	*0.50*	**0.49**	*0.50*
Free Reduced Lunch	**0.22**	*0.41*	**0.33**	*0.47*	**0.40**	*0.49*	**0.45**	*0.50*	**0.50**	*0.50*
English Learner	**0.08**	*0.27*	**0.09**	*0.28*	**0.10**	*0.30*	**0.10**	*0.30*	**0.12**	*0.33*
4-year Cohort (% of full cohort)	**0.70**	*0.46*	**0.78**	*0.42*	**0.76**	*0.43*	**0.74**	*0.44*	**0.70**	*0.46*
N. Observations	**674**		**629**		**644**		**645**		**592**	

Note: Total number of observations identifies the number of students in each and all cohorts. Each column cohort column only considers the sample of students who are identified as part of that particular cohort. The means in the table can be interpreted as percentages when multiplied by 100.

Table 2

Odd Ratios/ Logistic Regression Graduation Rate – Compared to White Non-AOP

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All COHORTS	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Female	1.408***	1.582*	1.329	1.773**	1.073	1.416*
	(0.143)	(0.407)	(0.309)	(0.440)	(0.220)	(0.291)
Ever AOP	2.171*	7.094	38.55**	8.972	3.367	1.570
	(0.879)	(10.81)	(66.98)	(16.93)	(3.498)	(1.235)
Student of Color	0.301***	0.202***	0.478*	0.350**	0.269***	0.336***
	(0.0496)	(0.0669)	(0.193)	(0.158)	(0.0872)	(0.139)
SOC*Ever AOP	2.113***	2.915	1.674	1.625	1.899	2.348
	(0.538)	(2.206)	(1.069)	(1.069)	(0.963)	(1.238)
Cohort						
2007-2010	0.882					
	(0.147)					
2008-2011	1.010					
	(0.169)					
2009-2012	0.672**					
	(0.108)					
2010-2013	0.693**					
	(0.121)					
Constant	7.316***	7.786***	6.025***	8.281***	5.558***	4.198***
	(0.962)	(1.473)	(1.047)	(1.613)	(0.910)	(0.698)
Observations	3,184	674	629	644	645	592

Note: The results show the estimated coefficient from each regression. First column aggregates all cohorts; consecutive columns are results from regressing each cohort separately. The sample considers only those students who are matches at the beginning and at the end of the 4-year cohort group. Propensity scores are estimated in a first regression and used as weights to compute the likelihood of matching. The variables used on this first regression include sociodemographic background variables such as gender and Free/Reduced Lunch, and program participation. The reference group is white, male, non-participant student. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 3

Odd Ratios/ Logistic Regression Graduation Rate – Compared to Students of Color AOP

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All Cohort	C-1	C- 2	C- 3	C- 4	C- 5
Female	1.441***	1.628*	1.331	1.863**	1.071	1.417
	(0.149)	(0.418)	(0.321)	(0.477)	(0.226)	(0.304)
White AOP	1.574**	1.704	1.249	1.761	1.954*	1.269
	(0.305)	(1.159)	(0.621)	(0.846)	(0.763)	(0.413)
White AOP eligible	0.236***	0.118	0.0121***	0.0638	0.285	0.282*
	(0.0902)	(0.167)	(0.0202)	(0.110)	(0.288)	(0.212)
SOC non-AOP	0.482	0.0597*			0.725	0.850
	(0.241)	(0.0865)			(0.904)	(1.108)
SOC AOP eligible	0.133***	0.0426**	0.0094***	0.0432*	0.0957**	0.221*
	(0.0544)	(0.0614)	(0.0161)	(0.0765)	(0.101)	(0.187)
White non-AOP	1.181	0.304	0.0560*	0.576	1.033	2.815
	(0.450)	(0.423)	(0.0937)	(1.004)	(1.048)	(2.190)
2007-2010	0.989					
	(0.172)					
2008-2011	1.216					
	(0.211)					
2009-2012	0.837					
	(0.142)					
2010-2013	0.903					
	(0.163)					
Constant	10.17***	31.74**	185.7***	41.60**	9.581**	5.192**
	(3.736)	(44.03)	(310.3)	(71.44)	(9.526)	(3.818)
Observations	3,184	674	615	633	645	592

Note: The results show the estimated coefficient from each regression. First column aggregates all cohorts; consecutive columns are results from regressing each cohort separately. SOC stands for student of color and AOP stands for Access and Opportunity Program. The sample considers only those students who are matches at the beginning and at the end of the 4-year cohort group. Propensity scores are estimated in a first regression and used as weights to compute the likelihood of matching. The variables used on this first regression include sociodemographic background variables such as gender and Free/Reduced Lunch, and program participation. The reference group is student of color, male, participant student. Robust standard errors in parenthesis. For cohorts 2 and 3, the sample size of SOC non-AOP is perfectly identified by gender and socioeconomic background. This forces the observations to be excluded from the estimation. *** p<0.01, ** p<0.05, * p<0.1.

Table 4
Odd ratios/ Logistic Regression for Graduation Rate – by AOP and NON-AOP groups

	(1)	(2)	(3)	(4)	(5)
VARIABLES	vs. White Non-AOP (ALL COHORTS)	vs. White elig. (ALL COHORTS)	vs. SOC elig. (ALL COHORTS)	vs. SOC NON-AOP (ALL COHORTS)	vs. WHITE AOP (ALL COHORTS)
Female	1.506***	1.349**	1.135	1.427*	1.206
	(0.225)	(0.195)	(0.210)	(0.301)	(0.218)
SOC AOP	1.347	3.869**	1.401	3.442**	0.656
	(0.669)	(1.784)	(0.296)	(2.278)	(0.126)
2007-2010	1.098	0.721	0.970	1.847	1.046
	(0.257)	(0.203)	(0.334)	(0.734)	(0.403)
2008-2011	1.410	0.722	0.624	1.423	0.888
	(0.325)	(0.196)	(0.201)	(0.558)	(0.352)
2009-2012	0.919	0.631*	0.429***	1.339	0.896
	(0.219)	(0.172)	(0.136)	(0.581)	(0.378)
2010-2013	1.539	0.589*	0.521**	2.086	1.188
	(0.431)	(0.166)	(0.163)	(1.042)	(0.551)
Constant	10.29***	3.431***	2.173***	3.665***	20.77***
	(1.874)	(0.821)	(0.645)	(1.619)	(9.677)
Observations	2,157	994	545	478	642

Note: The results show the estimated coefficient from each regression. Each column separately analyses each group. The sample considers only those students who are matches at the beginning and at the end of the 4-year cohort group. SOC stands for student of color and AOP stands for Access and Opportunity Program. Propensity scores are estimated in a first regression and used as weights to compute the likelihood of matching. The variables used on this first regression include sociodemographic background variables such as gender and Free/Reduced Lunch, and program participation. The reference group in each model is student of color, male, participant student. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 5

Probability of Matching/ Retention Rate – by cohort all groups (AOP and NON-AOP)

VARIABLES	(1) 06-09	(2) 07-10	(3) 08-11	(4) 09-12	(5) 10-13
SOC AOP	-0.401***	-0.274***	-0.270***	-0.238***	-0.283***
	(0.00419)	(0.00283)	(0.00402)	(0.00502)	(0.00427)
White eligible	-0.126***	-0.0981***	-0.139***	-0.102***	-0.136***
	(0.00340)	(0.00243)	(0.00365)	(0.00418)	(0.00400)
White AOP	-0.0393***	-0.0529***	-0.106***	-0.0688***	-0.102***
	(0.00643)	(0.00395)	(0.00619)	(0.00640)	(0.00545)
SOC eligible	-0.400***	-0.280***	-0.333***	-0.310***	-0.333***
	(0.00358)	(0.00357)	(0.00508)	(0.00607)	(0.00523)
SOC NON-AOP	-0.283***	-0.163***	-0.170***	-0.228***	-0.198***
	(0.00540)	(0.00529)	(0.0109)	(0.00876)	(0.0112)
Constant	0.806***	0.857***	0.867***	0.833***	0.829***
	(0.00146)	(0.00124)	(0.00199)	(0.00250)	(0.00248)
Observations	969	811	848	878	850
R-squared	0.955	0.945	0.900	0.831	0.888

Note: The results show the estimated coefficient from each regression. Each column corresponds to a particular cohort. The sample considers only those students who are matches at the beginning and at the end of the 4-year cohort group. Estimated probability is estimated using equation (1). SOC stands for student of color and AOP stands for Access and Opportunity Program. The variables used on this first regression include sociodemographic background variables such as gender and Free/Reduced Lunch, and program participation. The reference group in each model is white, male, non-participant student. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

THE DISCONNECT BETWEEN HERALDED BUSINESS CONCEPTS AND EFFECTIVE SCHOOL LEADERSHIP

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ABSTRACT

Education and business, as professional disciplines, seem, at first glance, to be linked. Both are social enterprises involving relationships and processes derived to accomplish a particular set of tasks. However the track record of injecting business methodology into school communities has been poor. Historically the introduction of management practices borrowed from parallel industries and inserted into school systems has been a matter of routine. Any lack of success in implementing new management techniques in educational operations is always explained as a good idea poorly executed. The suitability of the tool is never questioned. This paper examines the operational and strategic issues that separate business ideology and school management in an attempt to describe why the marriage has been unsuccessful. In particular, the reductionist methodology of business management is compared to the systemic nature of educational enterprises. The contrast in the fundamental characteristics of the two disciplines may serve as a cautionary tale for school leaders who are encouraged to use modern business management tools to improve the efficiency of their operations. Given the lack of convergence as described in the paper, it is interesting to contemplate how we train educational leaders and consider what tools are provided for school-level administrators to help them lead their communities.

INTRODUCTION

I have been reflecting on how we train educational leaders. When taking courses in Educational Leadership, the students note several contradictions between the concepts espoused in textbooks and the daily practices of school leaders. Concepts borrowed from the business world have been co-opted to facilitate the implementation of the many imperatives and projects required of educational administrators. Given a perceived lack of execution in K-12 schools, it is appropriate to scrutinize these management practices to determine if they have been effective in improving school outcomes.

The vernacular of business administration is pervasive in the education industry. Strategic planning, forecasting, marketing, and project management, which began as business school topics, have found their way into the syllabus for training educational administrators (National Policy Board, 2015). In 2011, the University of Virginia started a joint graduate degree in *Curriculum and Instruction* leading to both a M.B.A. and an M.Ed. Other universities have followed suit (University of Virginia, 2016). The justification for the joint degree underscores the current belief that difficult problems are to be faced in the field of education and those issues can best be addressed by leaders with a solid foundation in business management.

The linkage between school operating concepts and business management concepts is intuitive. In social enterprises, many of the skills taught in business school seem to be of obvious benefit in a K-12 school environment. However, schools are unique enterprises and I would argue that many of the techniques learned in formal business training either do not apply or need to be modified before being implemented in schools. At the very least, it may be valuable to challenge the basic assumption that business acumen can be successfully applied in school leadership.

I am not the first to suggest that school and business processes are incompatible. Businessman Jamie Vollmer famously relates a story where a teacher confronts him during a lecture outlining the benefit of using business processes in schools (Cuban, 2007). The teacher asks what Mr. Vollmer would do in his ice cream business when confronted with imperfect raw materials, in this instance, subpar blueberries. He replies that he would throw them out. Hence the tension between Mr. Vollmer's message and the realities of teaching are obvious. In the business of education, teachers cannot simply discard the students as imperfect raw materials. Yet while I agree with the inherent contradiction I feel the comparison is somewhat trite. Yes, in education there are constraints;

however, there are constraints in many enterprises. In fact business training demonstrates that often it is the constraints that lead to the most superior innovations. Why does this sensibility not apply in the field of education?

Another observation from the education community is that innovation itself must occur closer to the ground. Teachers often argue that only innovation born from those closest to the students is sustainable (Hallgarten, Hannon & Beresford, 2015). Hence, innovators must have a background in curriculum and instruction not business management. I would argue that business management principles would not be in opposition to this claim. Software innovations likely need to come from programmers, new choreography from those with a background in dance, and novel designs from architects etc. It makes sense for teachers to play an integral role in school level innovation. Leaders simply create the conditions for people to solve problems. The CEO of an automobile company need not be a welder. Is it possible to learn from leaders in other fields, namely business administration, and apply business methodology in schools?

Therefore, with these questions the roundabout continues. Obvious parallels between commercial sensibilities and school leadership are evident and therefore the disciplines continue to converge. It is just the way we try to solve problems. The problem today is the injection of management techniques into K-12 education has not been successful.

THE SOCIAL EFFICIENCY MOVEMENT

The first hint of the link between education and the principles of scientific management occurred in the first three decades of the twentieth century. James Phinney Munroe, a businessman, author and faculty secretary at Massachusetts Institute of Technology, wrote: *The New Demands of Education* in 1912, calling for an industrial perspective in the field of Education. He wrote,

> "The fundamental demand in education as in everything else is efficiency – physical efficiency, mental efficiency, moral efficiency. The potential economic worth of each school pupil to say nothing of his moral value as a householder and as a citizen is enormous, provided he be so educated by his family, by his environment and by his schools as to become an efficient member of society." (Munroe, 1912, pp. v.)

Munroe's contemporary, Professor Franklin Bobbitt of the University of Chicago used a systematic approach born from Munroe's philosophy to optimize curriculum development, which is described in his publications, *The Curriculum* (Bobbitt, 1918) and *How to Make a Curriculum* (Bobbitt, 1924). Bobbitt borrowed heavily from Frederick Winslow Taylor's ideas on improving the efficiency of American manufacturing, outlining the need to channel students based on their abilities. He saw schools as a way to equip young people with the skills, knowledge and beliefs required to contribute in an increasingly urban, industrial and heterogeneous American society. This ideal implied that the curriculum itself could be used as a method of social control using the principles of economics and manufacturing for efficient design. As a free market optimizes the utilization of resources it follows that the best thing that business can do for education, is to make education a business (Abrams, 2016).

The history of the social efficiency movement simply illustrates our tendencies in times of "crisis" to inject business principles into the educational realm. A similar phenomenon occurred in 1983 when a National Commission on Educational Reform presented their findings to the American Public entitled, *A Nation at Risk: The Imperative for Educational Reform* (National Commission, 1983). After 33 years, we have seen successive legislative attempts to address the findings of the report. The common thread running through the programs born from *A Nation at Risk* has been to infuse the educational system with more businesslike accountability, to rely on data and metrics to drive success. Once again, it's the way American leaders try to solve problems.

The progression from the social efficiency movement, through a *Nation at Risk* and towards today's hyper preoccupation with accountability and test scores can be seen as a continuum. Steve Denning, in his 2011 *Forbes* article, outlined the epidemic integration of business ideology in education and ponders if, in fact, the amalgam has been successful. Denning concludes that the factory model of management has proven to be a dispiriting failure. However, he claims that rather

than acknowledge the poor fit, system leaders simply double down with stronger, tougher, and more objective management ideas. Denning explains,

> "When the problems have been caused in the first place by introducing the practices of management, then a more rigorous pursuit of this type of management only makes things worse. It is like medieval doctors trying to cure patients by bloodletting, using leeches, which only made the patients worse." (Denning, 2011, para. 6)

The spectacular realization when reflecting on the history of applying management principles to improve education is the consistency of good intentions. The problem in education is not a consequence of a destructive presence driven by members of society with evil intentions; rather, it is an imperfect understanding of the system itself and the implementation of control mechanisms that do not support the structure as a whole.

THE PROBLEM WITH STRATEGY

The 1980's, in a time of great National debate in the realm of education, Michael Porter published his landmark treatise *"Competitive Strategy"*. The models used in this publication continue to dominate the conversation in business school on strategic planning (Porter, 1983). Porter articulated the challenges of corporations as they navigate the many forces they face in their attempt to grow and change. Porter's work influenced a generation of business managers; many of whom were the same analysts called in to solve the problems facing education as outlined in: *A Nation at Risk*. In an industry such as education, which is labeled as needing urgent reform the first step is to look for a strategy that allows schools to prioritize their actions and become more competitive.

Porter's strategic planning model is one based on positioning. Organizations choose generic strategies based on external conditions and the extent of their industry rivalry. Businesses set themselves up as low cost solutions (cost leadership), like Walmart, or niche providers, such as LuLu Lemon (focused differentiation), and market themselves accordingly. This kind of strategizing has very little merit in a public school environment. Public school students do not choose schools and schools are mandated to provide a broad curriculum. The marginal cost to the parents is low, given that there is no tuition and expenses such as school supplies and field trips are fairly consistent across school systems. Therefore, Porter's strategic ideas alienate public schools that, as of 2011, made up 90% of the Education industry in the United States (Simba Information, 2017, para 1)

One could argue that Porter's strategic logic still applies to charter schools that are free public school options in the United States. These schools offer slightly more mobility and may be classed as low, medium or high in terms of market strata. At the charter school level, student results and school continuity have been dismal. A case study that exemplifies these poor results is *Edison Schools*, a charter school management company. Edison assumed that schools failed because they were run inefficiently. They used a cost leadership strategy based on the assumption that a more businesslike approach to K-12 education would free up resources, which could both lead to improved student outcomes and profit. However, Edison quickly learned that charter schools are enormously under resourced. With no fat to cut, charter schools (all schools) survive on the magnanimous spirit of individual teachers and school leaders. Soon it became obvious to Edison that no profit would be forthcoming and that business systems such as activity based costing, which corrected other industries, were only an additional burden to harried teachers and administrators. The cautionary tale of Edison schools, their inability to turn a profit, precipitous decline in several jurisdictions and the remarkably poor results in student performance are outlined in *The Commercial Mindset in Education* (Abrams, 2016).

The final domain in which generic level business strategies may apply is in the realm of private education, where students' parents enter with a more obvious consumer approach. However, even in the private school world, business strategy is precarious. Business strategy must tie to the mission or purpose of the organization. On this basis, organizations choose their points of difference such as Southwest's desire to make commuter plane travel reliable or 3M's rigorous pursuit of innovation. By contrast, in my experience, every school in the world has at its core, a convergent purpose; to help children. School mission and vision statements from the smallest Montessori School

to the largest College Prep Academy are incredibly similar and as a result, schools are left to distinguish themselves not by their purpose, but on the basis of their techniques.

Hence, the notion of strategy in a school context as a competitive driver born from divergent purpose, may be a misnomer. If all schools have a convergent purpose and many have similar limited resources, perhaps strategic planning, a concept businesses have revered for decades, has limited use in a school setting. In business, strategic plans are generally set over a set period of time, often 3 years and school boards borrowing from business practice like to make similar plans. However, businesses and schools are fundamentally dissimilar. Businesses look at their results every quarter; they check sales and production and change course accordingly. Schools do not work that way. Instead, enrollment typically happens once a year, and learning is anything but linear. New programs that are set in motion can take a decade to evaluate properly. Reflection and program assessment are vital, but changing course in the midst of a child's education is foolish. In John Tanner's 2013 book, *The Pitfalls of Reform*, he argues that the entire notion of reform in education may be the essence of the problem; that education cannot be reformed by a galvanizing strategy but rather, more likely, it can simply be improved (Tanner, 2013).

CUSTOMER SERVICE

In his publication, *The Business Role in State Education Reform*, author R. Scott Fosler first characterized educational reform as a "change management issue" (Fosler, 1990). Shortly after, in his article in the *Harvard Business Review*, Nan Stone questioned if, in fact, business has any role in education (Stone, 1991). He argues, yes; using a demand side argument and encouraging parents to become deeply involved in school operations, as schools simply supply what parents want. Hence the customer service mentality in education was born, and fundamentals of microeconomics were now open for application in the educational sphere (Stone, 1991).

Modern business training relies on the fact that there is a customer. In K-12 education who is the customer? Is it the student, the parent, the institutions of higher learning, employers or society in general? Businesses are used to doing multi-stakeholder analysis; however, it is rare that there are so many different potential customers, and those who would be considered the primary stakeholders, are not the ones who actually pay for the service.

In my experience, when you are employed to operate a school you have signed up to be the single parent of a huge extended family. Your control of the ship is limited, but your influence is large. You must be consistent, act with dignity, and be kind. Well-founded policies are essential; however, do not try to control every action or manage every social contract with a replicable business system. You will win over far more community members with vulnerability rather than strength. A school leader also needs to remain steadfast in upholding the dignity involved in educating students. The tact is more like a sage than a sales representative.

SYSTEMS THINKING

Business training tends to be reductionist in its thinking. This is not a criticism; business leaders are experts at breaking down technical issues and driving process improvement. Organizations are reduced to programs (mainly linear relationships) such as supply and value chains. Inputs are measured, as are outputs and a single metric, profit (or share price), can be proffered as a comprehensive measure of business success. Each variable is seen to have a causal effect and the end game is to define the variables that matter most, so that strengths can be maximized, weaknesses minimized, and results optimized.

The reform movement in education has taken place since *A Nation at Risk* attempted to use the same reductionist ideology in the classroom. Test scores have taken the place of profit and data has been used to provide a causal relationship between input (classroom activities) and outputs (test scores). Items that intuitively do not produce value to the ultimate metric, such as band practice, recess and classroom socials, are minimized whereas activities that would seem to correspond more directly to ideal student outcomes, for example homework, class time and assessment, are maximized.

If schools were businesses this kind of reductionist methodology would work. However schools cannot be represented by linear chains. They are fundamentally systemic with multiple elements reinforcing one another to preserve the system. Due to this level of interconnectivity, activities such as recess and intermural activities hold a particular element of the system in balance. Eliminating these activities would cause stress on the system and may put the entire system at risk. A system succeeds by becoming resilient, by instituting hierarchy and by self-organization; education systems are no exception.

Donella H Meadows, in her book, *Thinking in Systems*, describes the phenomenon brilliantly:

> "I think of resilience as a plateau upon which the system can play. Performing its normal function in safety. A resilient system has a big plateau, a lot of space over which it can wander, with gentle elastic walls that will bounce it back, if it comes near a dangerous edge. As a system loses its resilience, its plateau shrinks and its protective walls become lower and more rigid, until the system is operating on a knife edge, likely to fall off in one direction or another whenever it makes a move. Loss of resilience comes as a surprise, because the system usually is paying more attention to its play than to its playing space. One day it does something it has done a hundred times before and crashes." (Meadows, 2008, pp. 78)

This lack of understanding of the systemic nature of schools has been the failure of the reform movement in education. By reducing student outcomes to very narrow measures of success it has limited the natural experimentation that has caused the school system to be resilient. School principals used to try things on the fly – now they shake in fear of violating a policy. This fear detracts from the system's natural resiliency, making its plateau narrower and the education system more fragile.

For generations, schools have developed hierarchical administrative structures that have sustained the efforts of the teachers and the students. Private companies such as Edison interfered with those natural structures and the results have been poor. Like any enduring system, schools do a wonderful job of self-organization. If a particular strategy isn't working, staff could feel it and use reliable checks and balances to diversify, learn, and evolve. To an outsider (one who has not spent decades inside the education system), this makes school structures incredibly difficult to decipher. Interlopers wonder why a school would have evolved a guidance function or certain structures for exam taking or timetabling. These mechanisms were bottom up designs that evolved naturally in a self-organizing system. Systems structure themselves; reform brings artificial restructuring which can be a danger to a self-organizing system. Imagine a school superintendent who decides to add one more standardized assessment to a school system to measure the effectiveness of the jurisdiction. The win for the superintendent is (+1), the imposition of over-testing (-1) is shared over the entire school system. Therefore any rational superintendent would conclude that adding the assessment is prudent. Then another is added and then another using the same logic. This is the tragedy of bounded logic. Each actor chooses a course of action over time that will stress the system to failure. The solution is a timely system wide feedback loop that provides leading indicators of the impending challenges. Too often these indicators are ignored.

An understanding of the systemic nature of schools does not imply that systems cannot be improved, they certainly can be. A new goal, changing a feedback loop, reducing delays or building buffers are all positive ways to intervene and make a system stronger, but none of these processes are driven from a reductionist protocol. Rather, they are the result of refocusing the system and allowing it, over time, to organize itself to a better structure given new goals or new constraints. In general, policies are particularly ineffective at repurposing systems. For example, if policies that focus on test scores are created, teaching to the test becomes inevitable. This creates a hyper focus that comes at the cost of student wellbeing that is a key element in student performance.

Policy driven approaches, which work well in businesses, have limited benefit in complex systems. I would rather see the paradigm of education broadened and a more complex definition of student development be embraced. To accomplish this shift, systems analysis would suggest that the first step is to step back from the approach that is causing harm. To many this tact seems like inaction

and therefore it is not always a popular course, but it is likely the correct pathway. For example, consider the parallels between education reform and Prohibition. Education reform based on policies driven by the aspiration of test score improvements has had similar effects to the policy criminalizing the use of alcohol in the 1920's. Alcohol use is a system and therefore, as with education, a top down policy driven reform led to a multitude of unforeseen issues. In the case of Prohibition, eventually policy makers realized that the solution's effects on the system were worse than the problem. The first sign of a similar phenomenon has occurred in education as seen by the number of parents opting out of standardized testing across a number of educational jurisdictions. The first step in remedying the unintended consequences of policy intrusion on a system may be to dismount.

LEADING INDICATORS

The limitations of managerial methodology in improving education do not imply that we must disregard all ideas on school improvement from the business world. In thinking about school improvement we must choose the correct elements and use the system to our benefit. For example, if test scores are indeed one important measure of student success, then rather than becoming obsessed with the results, schools could instead measure all of the activities that produce the desired effects, however incidental they may seem. School leaders should be measuring classroom observations, student participation, software and device downtime, teacher professional development effectiveness, parent engagement, preparation time and school climate, as these are all leading indicators of student success, yet they are rarely measured. If they were monitored carefully, they could provide valuable feedback to the system and allow it to adapt and self-correct. This is a more holistic view of process improvement and one that business schools are now embracing (Stroh, 2015). Curiously this change in business education has developed from the study of systems with a realization that standard business practices were falling short of the mark when faced with complex issues.

CONCLUSIONS

When considering the training of school administrators it would seem that school leadership is still a game without a playbook. So many of the skills required, as articulated by national standards, make the job seem unimaginably complex for anyone to begin contemplating accepting such a post. Most long time school leaders are almost Zen-like when reflecting on their careers. They capture the essence of what it was to be a school leader in a few brief statements but leave little in the way of day-to-day methodology. In the absence of such an orientation, school leaders look to parallel industries to discover the science of management. Overall there is nothing wrong with this approach and ultimately I would argue that the best schools develop when the teachers and administrators are passionate learners themselves, constantly exploring new ways of operating. However, I caution the application of strict business processes in a school setting. Strategic Planning processes based on market position are rarely effective in moving a school towards its purpose. Customer service protocols are limited in their application as they ignore the multifaceted dimensions of school investment. Policy driven changes hyper-focuses a system causing unintended consequences. School Administrators must appreciate the entire school organism and eschew reductionist logic born most notably from business management ideology.

At the heart of the matter, I return to the convergent purpose of schools and the altruistic tendencies of even the most accountability driven school reformer. In the end we all want to help children. Everyone that participates in education soon realizes that teaching is, at its core, an act of love. It is a gift from one person to another and is offered simply because we care enough to provide it, asking for nothing in return. Learning, as a system, requires that we understand the nuance of the education process and we are careful not to apply principles that do not fit. When I asked a venerable School Administrator for wisdom on the preparation of school leadership candidates he reminded me of the legendary words of Diana Ross, *"You can't hurry love"*. These wise words continue to hold true for educational leaders today.

REFERENCES

Abrams, S. (2016). *Education and the commercial mindset*. Cambridge, MA: Harvard University Press.

Bobbitt, F. (1918). *The curriculum*. Boston, MA: Houghton Mifflin Company.

Bobbitt, F. (1924). *How to make a curriculum*. Boston, MA: Houghton Mifflin Company.

Cuban, L. (2007). *Blackboard and the bottom line: Why schools can't be businesses*. Cambridge MA.: Harvard University Press.

Denning, S. (2011). The single best idea for reforming K-12 education. *Forbes*. Retrieved from: https://www.forbes.com/sites/stevedenning/2011/09/01/the-single-best-idea-for-reforming-k-12-education/#21657ec06b40

Fosler, R. (1990). *The business role in state education reform*. Washington, DC: The Business Roundtable.

Hallgarten, J., Hannon, V., & Beresford, T. (2015). *Creative public school leadership: How school system leaders can create the conditions for system wide improvement*. World Innovation Summit for Education. Qatar Foundation.

Meadows, D., & Wright, D. (2008). *Thinking in systems: A primer*. White River Junction, VT.: Chelsea Green Publishing.

Munroe, J. (1912). *New demands in education*. Garden City, New York: Doubleday.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: U.S. Government Printing Office.

National Policy Board for Educational Administration. (2015). *Professional standards for educational leaders 2015*. Reston, VA: Author.

Porter, M. (1980). *Competitive strategy: Techniques for analyzing industries and competitors*. New York: The Free Press.

Simba Information (2017). *K-12 market research reports and industry analysis*. Retrieved from: marketresearch.com/Public-Sector-c93/Education-c233/k-c817/

Stone, N. (1991). Does business have any business in education? *Harvard Business Review*, *69*(2), 46-62.

Stroh, P. (2015). *Systems thinking for social change: A practical guide to solving complex problems, avoiding unintended consequences, and achieving lasting results.* White River Junction, VT.: Chelsea Green Publishing.

Tanner, J. (2013). *The pitfalls of reform: It's incompatibility with actual improvement.* Lanham, MD.: R&L Education.

University of Virginia. (2016). *MBA/MEd in Curriculum & Instruction: Innovation in Education Reform.* Retrieved from: http://curry.virginia.edu/academics/degrees/dual-degree/mba-med-in-innovation-in-education-reform

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ORGANIZATION

The Society was founded December 10, 1970 in Washington, DC. Over 50 local, state, national, and international planners attended the first organizational meeting.

Since then its continued growth demonstrates the need for a professions organization with educational planning as its exclusive concern.

PURPOSE

The International Society for Educational Planning was established to foster the professional knowledge sand interests of educational planners. Through conferences and publications, the society promotes the interchange of ideas within the planning community. The membership includes persons from the ranks of governmental agencies, school-based practitioners, and higher education.

MEMBERSHIP IN THE SOCIETY

Membership in the society is open to any person active or interested in educational planning and the purposes of the Society. To join the Society or renew a membership please complete and submit the enclosed form.

Please forward check/money order/PO to:

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