

The Tale of Two Type of Schools: The Comparison of Teacher Competencies and Graduation Rate between Vocational High Schools and High Schools in Buffalo Metropolitan Area, New York

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Abstract—This paper aims at describing the current status of Technical and Vocational Education Trainings (TVET) in the Buffalo Metropolitan Region by highlighting the stark contrast between teacher competencies and school performance in vocational high schools and high schools. The case study area is the Buffalo Metropolitan Region, Erie County, New York. There are 16 vocational and 41 high schools, making the proportion of vocational high schools is 30% of the total high schools available in the study area. All vocational high schools are located in the inner city of Buffalo, which is infamous for its concentrated poverty, segregated city, and declining urban quality. Efforts have been made to leverage the quality of vocational schools and their graduates in the city of Buffalo by improving teacher competencies (technical and didactical competencies). This study utilizes independent T-test, comparing the means of several variables of interest between vocational and regular high schools. The result of the comparison of means using independent sample t-test highlights the stark contrast of teacher competencies between the two types of high schools. There are statistically significant differences between them in the variable of the percentage of teachers with no valid certificates, out of certification, and no appropriate certificates. In addition, there is also a significant difference in the school performance measured by graduation rate, more specifically the percentage of graduates attaining Regent diploma with advanced design (New York State standards) and local diploma. These results are related to the fact that there is a significant difference in student enrolment between vocational and regular high schools. Vocational high schools' students are disproportionately poor (economically disadvantaged) indicated by receiving free lunch (FRL), a higher percentage of Black and Hispanic, with more students with limited English proficiency (LEP). In conclusion, despite the current efforts to improve vocational high schools, concerted efforts needed to leverage TVET teacher competencies to improve vocational high school graduates' quality, and remedy the inequity between the two types of high schools in Buffalo.

Keywords—*vocational high schools; teacher technical competencies; teacher certification; high school graduates quality; independent sample T-test*

I. INTRODUCTION

The development in vocational education and training cannot be examined by solely delving into the inner educational aspects within technical and vocational education (TVET) or career and technology education (CTE) in the United States (US). It should be analyzed also in comparison to its counterpart, general secondary education. The discrepancy between vocational high schools and general high schools in terms of students' socioeconomic status, teacher competencies, and school performance are among salient problems occur in the current secondary level of education in the United States. In US liberal market economies, vocational education is often seen as an alternative education path into which pupils with lower educational achievement can conveniently be shunted [1].

The gap in school performance between vocational and high school has been visible for the past decades, making high schools are more favorable to attend compared to vocational high schools. Attending general high schools also seen as a pathway for opportunities to access college and white-collar work. On the contrary, vocational secondary education in high schools often seen as the end of schooling and gateway to blue-collar employment. This made the difference between the two types of schools more pronounced. By bringing forward the argument that vocational education (such as CTE program in high schools) has contributed in helping youth get employment and reducing unemployment rate [2], vocational education in high school level should not be considered as the last option of education besides high school.

For the context of Buffalo metropolitan area in New York State, there are 16 vocational and 41 high schools [3], making the proportion of vocational high schools is 30% of total high schools available in the study area. All vocational high schools are located in the inner city of Buffalo, which is infamous for its concentrated poverty, segregated city, and declining urban

quality. Inner city and its suburban counterparts are highly racially and socio-economically segregated. Downtown urban area of Buffalo is inhabited by disproportionately Black and immigrants with lower socio-economic status and low quality of schools. This is the place where vocational high schools are located in this study area. Therefore, vocational high schools serve students of the lower socioeconomic background and have lower school quality.

This study is important to address the widening gap between the two types of high schools in terms of teacher competencies and school performance. This is part of closing the gap between the two types of schools. This study contributes to the advancement of research on education outcomes gap in the high school context. This study filled the gap in the current literature in this secondary level education.

This paper aims at describing the current status of Technical and Vocational Education Trainings (TVET) in the Buffalo Metropolitan Region by highlighting the stark contrast between teacher competencies and school performance in vocational high schools and high schools. The case study area is the Buffalo Metropolitan Region, Erie County, New York.

The research questions of this study are: 1) is there any difference in teacher competencies between high schools and vocational high schools? 2) Is there any difference in students' demographics between high schools and vocational high schools? 3) Is there any difference in school performance (graduation rate) between high schools and vocational high schools?

II. LITERATURE REVIEW

A. *Students Demographics, Student Performance, and School Performance*

Vocational high schools in Buffalo serve students of the lower socioeconomic background. Prior studies have findings of the relationship between neighborhood demographics and school performance that the neighborhood with more percentage of racial minorities has lower school performance [4]. Evidence also shows that school racial and poverty contributed to students' achievement [5]. The students' racial and poverty composition in schools affect students' academic performance. This students' academic performance is reflected and aggregated in school performance. Prior studies show the larger the proportion of students from racial minorities and low-income groups will be materialized in lower school performance.

B. *Teacher Competence, Student Achievement, and School Performance*

Teacher competency is among important factors contributing to students' academic achievement and schools' performance in all education level. More specifically, vocational teacher professional competence is among important factors contributing to students' performance and schools' performance [6]. The standard for vocational teacher

competencies is deemed important to develop to improve the delivery of vocational education across the globe especially in the context of emerging economies such as in South East Asian countries [7]. In New York State, there had been policy to regulate an educational and legal aspect of in-service training and certification of the teacher [8]. In order to improve the teacher competence, teacher training has been reformed. In the US, teachers had been encouraged to enroll in the professional master's and doctoral courses to improve their academic qualifications. Teachers should have appropriate and valid certification in order to work. For the case of vocational education, teachers also had been required to have experience in the world of work or exposure to industrial apprenticeship prior to teaching in vocational secondary schools.

C. *Educational Outcomes and Graduation Rates*

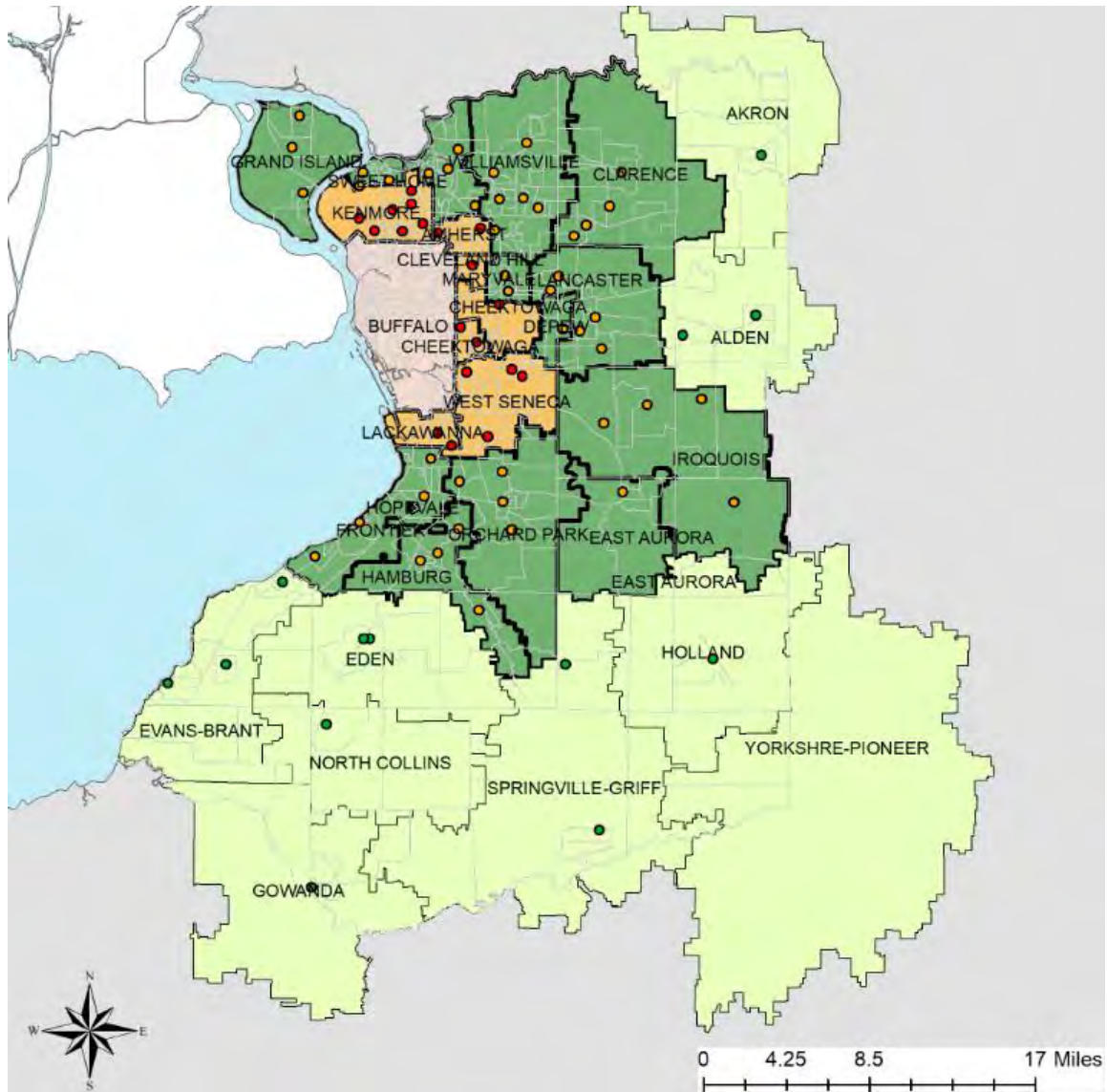
The graduation rate was one aspect of education outcomes utilized in this study as a proxy of school performance. High school graduates in New York State is granted with a diploma. According to New York State Higher Education Service [9], there are two levels of diploma for graduating high school in New York State, namely Regents Diploma and Regents Diploma with Advanced Designation. Each requires certain classes and exams. Regents Exam Requirements for Regents Diploma is a score above 65 on Comprehensive English, Mathematics (one of the three math's subject), Global History, US History, Science (one out of three science subject), and Language other than English. As for Regents Diploma with Advanced Designation - a score of 65 or better is required on Comprehensive English, Mathematics (all three), Global History, US History, Science (one physical and one life science), and Language other than English. Student's high school diplomas can be affixed by career and technical education (CTE) endorsement as long as they enrolled in a program approved by a school district or Boards of Cooperative Educational Services (BOCES) and have successfully completed all requirements.

For New York State, graduation rate was measured by various measurement, namely percentage of high school graduates, percentage of students attain Regent diploma, percentage of Regent diploma with advanced design specialization, percentage of students attain Regent diploma with CTE technical endorsement, percentage of students with local diploma, and percentage of graduates with commercial credentials.

III. METHODOLOGY

A. *Location of Study*

This study categorized the high schools based on the type of high schools and their location within BMA. Based on the type of high school, there are high schools and vocational high schools. Vocational high schools (VHS) are mostly located in the urban area, in the downtown of the city of Buffalo. Based on location, there were schools in the city of Buffalo and in the suburban area of BMA.



United States



New York State



Fig. 1. Buffalo metropolitan area.

B. Data Source

This study is quantitative research using secondary data retrieved from government agencies. The data was retrieved

from the School Report Card in the academic year of 2015-2016 made publicly available by New York State Department of Education [10]. The data of high schools in Erie County were filtered from the data source and used for the analysis.

C. Variables in the Study

Variables used in this study can be categorized into three groups, namely teacher competency, student demographics,

and school performance. Table 1 elaborated the operationalization of variables and abbreviation of variable names used for statistical analysis in IBM SPSS software.

TABLE I. OPERATIONALIZATION OF VARIABLES.

Variable	Description
Teacher competency	
Per no valid cert	Percentage of teachers with no valid certificates
Per teach out cert	Percentage of teachers without certificates
Per fewer 3yrs exp	Percentage of teachers with fewer than 3 years teaching experience
Per teach no approp cert	Percentage of teachers with no appropriate certificates.
Per teach mas plus	percentage of teachers with a master degree or plus
Student demographics	
Per free reduced	Students' socioeconomic status (percentage of students receiving free and reduced lunch at school)
Per free lunch	Students' socioeconomic status (percentage of students receiving free lunch at school)
Per ECDIS	Students' socioeconomic status (percentage of students from economically disadvantaged family)
Per White	Students' race (percentage of White student in school)
Per Black	Students' race (percentage of Black student in school)
Per Hisp	Students' race (percentage of Hispanic student in school)
Per Asian	Students' race (percentage of Asian student in school)
Per LEP	Percentage of students with Limited English Proficiency
School performance	
Per HSgraduates	Percentage of high school graduates
Per RegDipl	Percentage of students attain Regent diploma
Per RegDiplAdvDesignation	Percentage of Regent diploma with advanced designation
Per RegDiplCTE	Percentage of students attain Regent diploma with CTE specialization
Per LocDipl	Percentage of students with a local diploma.
Per_CommCred	Percentage of graduates with commercial credentials.

D. Analysis Method

Several comparisons between general high schools and vocational high schools were conducted using the comparison of means analysis (independent sample T-test) in IBM SPSS statistical software. First, the t-test measures the difference of means of teacher competencies between general high schools and vocational high schools. Secondly, independent T-test was also used to measure the difference of means of student demographic characteristics between general high schools and vocational high schools. Third, the t-test also used to measure the difference of means of school performance between the two types of high schools. School performance (measured by graduation rate) was also a proxy to measure school quality.

The defining group is group 1: general high schools and group 2: vocational high schools.

IV. RESULTS AND DISCUSSION

A. Comparison of Means: t-test Results

Independent sample t-test compared various variables pertinent to teacher competencies, student demographics, and school performance. The results of three t-test analysis are depicted in the following subsections.

1) Mean difference in teacher competencies: The result of the statistical analysis to compare the means of all schools in terms of teacher competency are depicted in table 2.

TABLE II. RESULTS OF INDEPENDENT SAMPLE T-TEST FOR TEACHER COMPETENCY VARIABLE

Variable	School category	N	Mean	Std. Dev.	t	df	Sig. (2 tailed)	Mean difference
Percentage of teacher with no valid certificate	High school	41	0.05	0.312	-2.501	15.071	0.024*	-2.514
	Vocational HS	16	2.56	4.016				
Percentage of teacher without certification	High school	41	3.51	5.528	-3.993	55	0.000*	-6.550
	Vocational HS	16	10.06	5.662				
Percentage of teacher with no appropriate certificate	High school	41	3.24	4.253	-4.756	55	0.000*	-6.756
	Vocational HS	16	10.00	6.077				
Percentage of teacher with <3 years' experience	High school	41	2.20	2.482	-2.032	15.715	0.059	-5.180
	Vocational HS	16	7.38	10.079				
Percentage of teacher with Master or doctoral degree	High school	41	20.78	14.381	-1.118	26.287	0.274	-4.907
	Vocational HS	16	25.69	15.085				

In 2016, VHS had a high percentage of teachers with Master or doctoral degree (25.69%), even higher than its HS counterpart (20.78%). This was an evidence of massive Perkin

Act efforts to improve teacher competencies in vocational education in New York State. However, in terms of teacher certification, seemed like VHS still lagged behind. In

comparison to HS, VHS had a higher percentage of teachers with no valid certification (2.56%), teachers without certification (10.06%), and teachers with no appropriate certification (10.00%). This is worthy of attention.

Based on the t-test result, it can be inferred that vocational high schools have a higher percentage of teacher with no valid certificate, with a mean difference of 2.514 points compared to general high schools. Moreover, vocational high schools have a higher percentage of teachers without certificates, with a mean difference of 6.550 points compared to general high schools.

Again, for the variable of the percentage of teachers without appropriate certificates, vocational high schools also have a higher percentage compared to high schools, and it was statistically significant with the mean difference of 6.756 lower. As for the variable of the percentage of teachers with less than 3-year experience, there was no significant difference between the two types of school.

2) *Mean difference in school demographics:*

TABLE III. RESULTS OF INDEPENDENT SAMPLE T-TEST FOR SCHOOL DEMOGRAPHICS VARIABLE

Variable	School category	N	Mean	Std. Dev.	t	df	Sig. (2 tailed)	Mean difference
Per_free_reduced	HS	41	37.20	20.965	0.18	-5.352	0.000*	-31.617
	VHS	16	68.81	17.337	5			
Per_free_lunch	HS	41	32.88	21.057			not sig.	
	VHS	16	65.88	16.161				
Per_ECDIS	HS	41	42.39	23.791	0.00	-7.513	0.000*	-37.172
	VHS	16	79.56	13.069	7			
Per_White	HS	41	71.61	28.437	0.00	11.007	0.000*	55.172
	VHS	16	16.44	9.295	1			
Per_Black	HS	41	16.02	23.009	0.31	-6.753	0.000*	-42.788
	VHS	16	58.81	16.802	6			
Per_Hisp	HS	41	5.80	6.210			not sig.	
	VHS	16	14.94	8.346				
Per_Asian	HS	41	3.68	5.773			not sig.	
	VHS	16	7.19	6.959				
Per_LEP	HS	41	3.41	11.198	0.06	-2.218	0.031*	-7.585
	VHS	16	11.00	12.607	7			

^a HS: High School, VHS: Vocational High School

Table 3 described the characteristics of student demographics that differed between general HS and VHS. VHS educated a higher percentage of students coming from economically disadvantaged families (79.56%), while general HS had the share of 42.39%. This is manifested in 68.81% of students of VHS received free and reduced lunch in school. Student demographics VHS also showed the disproportionate percentage of Black and Hispanic in the schools. This reality was clearly shown by 58.58% Black students enrolled in VHS, while only 16.44% of Black students enrolled in HS. Approximately 11% of students in VHS also categorized as

students with limited English proficiency who need further assistance.

Based on Table 3, this study inferred that VHS and HS had a statistically significant difference in students with economically disadvantaged status, racial proportion, and students with limited English proficiency. These differences were education input that contributed to educational outcomes and school performance, in this case, graduation rate.

3) *Mean difference in school performance (Graduation Rate):*

TABLE IV. RESULTS OF INDEPENDENT SAMPLE T-TEST FOR SCHOOL GRADUATION VARIABLE

Variable	School category	N	Mean	Std. Dev.	t	df	Sig. (2 tailed)	Mean difference
Per_HSgraduates	HS	41	96.53	15.508	0.846	55	0.401	4.604
	VHS	16	91.92	24.656				
Per_RegDipl	HS	41	90.34	17.418	1.631	21.698	0.068	10.591
	VHS	16	79.75	23.581				
Per_RegDiplAdvDesignation	HS	41	41.88	24.229	7.397	54.432	0.000*	34.691
	VHS	16	7.19	11.083				
Per_RegDiplCTE	HS	41	11.49	7.740	0.591	17.354	0.562	2.675
	VHS	16	8.81	17.448				
Per_LocDipl	HS	41	7.22	9.776	-2.282	55	0.026*	-6.780
	VHS	16	14.00	10.850				
Per_CommCred	HS	41	3.44	15.518	-0.861	55	0.393	-4.686
	VHS	16	8.13	24.652				

^b HS: High School, VHS: Vocational High School

Based on Table 4, this study inferred that VHS and HS had a statistically significant difference in graduation rate, in the aspect of the percentage of students graduated with Regent

Diploma with Advanced Designation status and Local Diploma. Many VHS educated graduates with only a local diploma (14.00%) and this number are significantly differing

from HS graduates who attained 7.22% local diploma. VHS produced graduates with commercial credentials at a higher rate (8.13%).

It is quite surprising to see that a higher percentage of graduates from HS attained Regent Diploma with specialization in Career and Technology (CTE), approximately 11.49% compared to VHS graduates who only about 8.81%. As a matter of fact, VHS students should get this percentage higher due to its nature of education in CTE. Although their mean difference is not statistically significant, this is worthy of attention from education policymakers in the field of vocational education.

B. Discussions

The results of several independent sample t-test analyses highlighted the stark contrast of teacher competencies between the two types of high schools. There are statistically significant differences between them in the variable of the percentage of teachers with no valid certificates, out of certification, and no appropriate certificates. Teacher certification status is proved to be crucial that contributes to the improvement in graduation rate and diploma attainment for high school graduates. Efforts to sustain the activities in granting, extending, and properly allocating teachers with certifications are important. In addition, there was also a significant difference in the school performance, measured by the percentage of graduates attaining Regent diploma with advanced design (New York standards) and local diploma.

These results were related to the fact that there is a significant difference in student enrollment between vocational and regular high schools. Vocational high schools' students are disproportionately poor (economically disadvantaged) indicated by receiving free lunch (FRL), a higher percentage of Black and Hispanic, with more students with limited English proficiency (LEP).

V. CONCLUSIONS AND RECOMMENDATION

The most important propositions of this paper are that there is a significant gap between vocational high schools and general high schools in BMA, teacher certification status have a positive contribution to the graduation rate, and CTE diploma designation for vocational high school graduates should be improved. The two type of schools apparently has a different tale. The difference between two types of high schools was more pronounced in terms of teacher competencies and students' demographic. These inputs were manifested in school performance (graduation rate). This is the field where teacher competencies play a role in leveraging the delivery of vocational education in CTE high schools in BMA.

The practical implication of the results of this study is related to structured effort to reduce the percentage of teachers without certification and percentage of teachers with no appropriate certification. Actions to grant certification of teachers can be intensified. Mapping teacher with no appropriate certification needs to be done and reallocate teachers with certification to its proper field of certification is an imminent need.

In conclusion, despite the current efforts to improve vocational high schools, concerted efforts needed to leverage TVET teacher competencies to improve vocational high school graduates' quality. This would remedy the inequity between the two types of high schools in the Buffalo metropolitan area. All an all, CTE secondary education delivery needs to be improved to be more compelling as good quality and occupational education towards employment.

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