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Curriculum Track and Its Influences on High School Dropout Likelihood

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Introduction/Need for Research

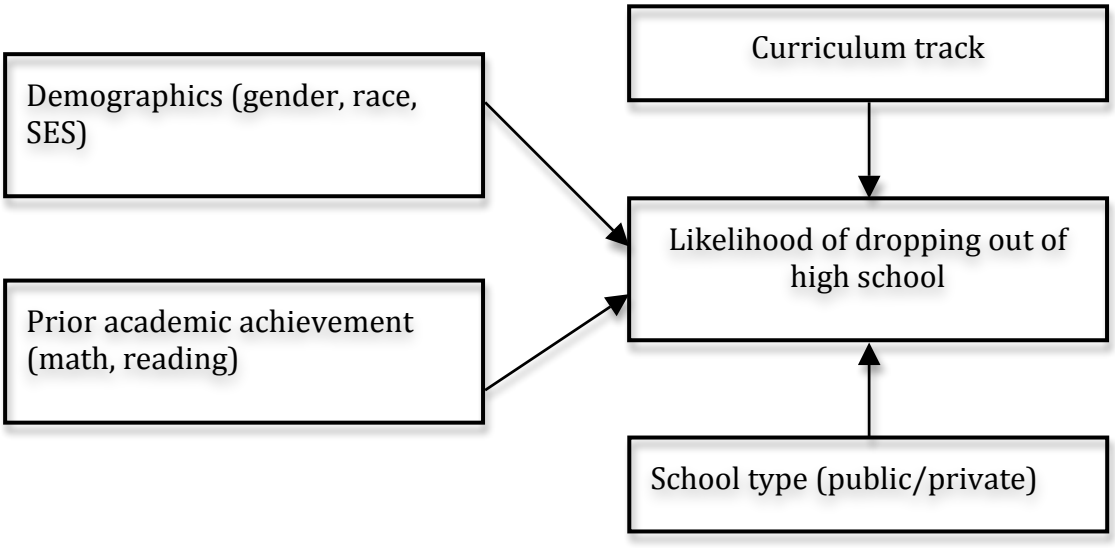
Among numerous studies conducted on the causes and remedies of high school dropouts, but very few relate to the curriculum. Plank, DeLuca, and Estacion (2008) reported the curriculum being a vital part of the school environment as "the combination of all courses taken throughout a high school career" (p. 346) significantly determines a student's path after high school.

Among factors constantly reported to predict high school dropout rates were race (Griffin, 2002; Silver, Sanders & Zarate, 2008), socio-economic status (Christle, Jolivette & Nelson, 2007), poor academic achievement (Plank, 2001; Silver et al 2008), and institutional environment (Christle et al, 2007; Knesting, 2008; Silver et al, 2008). Since curriculum defines a student's academic career (Plank et al, 2008), different curriculum tracks might produce different persistence outcomes. Therefore, the purpose of this study is to investigate any significant differences in dropping out of high school likelihood among students of different curriculum tracks.

Conceptual framework

Figure 1 illustrates the conceptual framework that guides this study.

Figure 1: Conceptual Framework



Methodology

The following research question was investigated:

1. To what extent does curriculum track affect the likelihood of dropping out of high school, after controlling for gender, socio-economic status, race/ethnicity, math and reading abilities, and institutional factors?

The National Center for Education Statistics' (NCES) Education Longitudinal Study of 2002 (ELS:2002) was used in this study. The analyses for this study were based on the ELS:2002 participants with transcript weight (N = 13,000). The dropout status and curriculum track variables were composites derived from transcript data.

A two-level hierarchical generalized linear model (HGLM) was fitted and a logistic regression model was constructed to compare the results with the HGLM model. The variables summary is shown in Table 1.

Any generalizations made have to be defined within appropriate contexts due to the absence of random assignments of students to the different curriculum choices defined. According to Oakes (1985), students either choose the curriculum, are placed by guidance counselors, or are enrolled based on certain circumstances that are dependent on individual characteristics and institutional environment.

Table 1: Variable Summary

Role	Variable name	Description
Dependent	F2EVERDO	Evidence of dropout episode
Independent	dFemale	Dummy variable for female
	MathAch	Grade 10 Math test standardized score (specifically designed for ELS:2002, administered by NCES)
	ReadAch	Reading test standardized score (specifically designed for ELS:2002, administered by NCES)
	dAcademic	Dummy variable for academic completer
	dDual	Dummy variable for dual completer
	dOccupation	Dummy variable for occupational completer
	dAsian	Dummy variable for Asians
	dBlack	Dummy variable for African/American
	dHispanic	Dummy variable for Hispanics
	dOthers	Dummy variable for other races categories excluding Asians, African/Americans, Hispanics, and Whites
	F1SES2QU	SES quartile

Curriculum Choice Definition

Table 2 shows the definitions for curriculum tracks.

Table 2: Curriculum Track Definitions (from ELS:2002 data manual)

Curriculum choice	Definition
Academic	A completer have completed the following: 1. Four Carnegie units of English 2. Three Carnegie units of mathematics 3. Three Carnegie units science 4. Three Carnegie units of social studies. A Carnegie unit is equivalent to completing a course that meets one period per day for an entire school year, of the equivalent instructional time (120 hours of classroom instruction) (Levesque, Wun, & Green, 2010).
Occupational	A completer have completed the following: 1. Three Carnegie units in a single Specific Labor Market Preparation (SLMP) career and technical education program area.
Dual	A dual completer fulfills both the requirements of academic and occupational completers.
General	Fulfill neither of the specified requirements for academic, occupational, or dual completer. Most likely, the students were working towards a standard high school diploma.

Results and Findings

Descriptive statistics

The descriptive statistics are shown in Figures 2 to 6 and Tables 3 and 4.

Figure 2: Dropout episodes and curriculum tracks

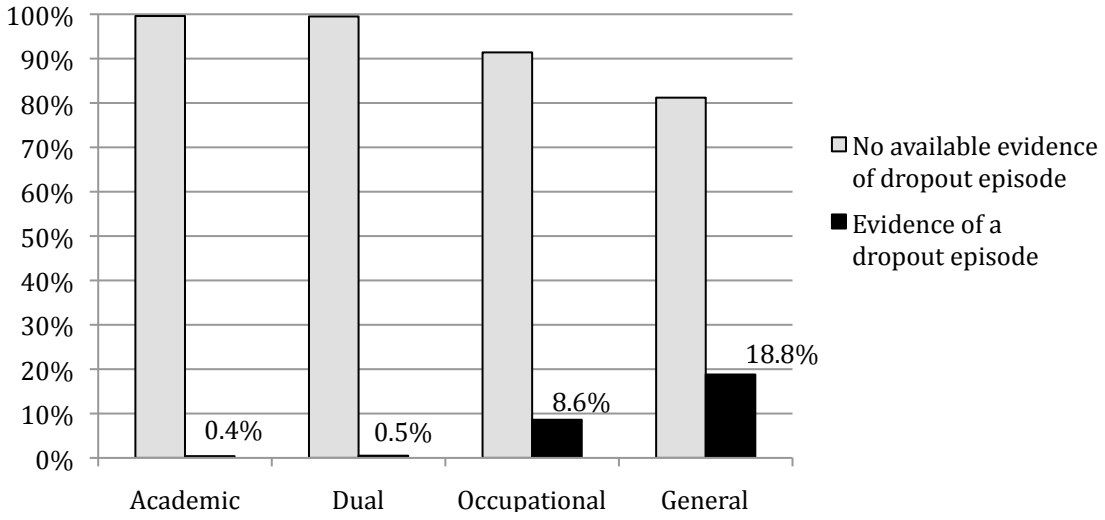


Figure 3: Dropout episodes and gender

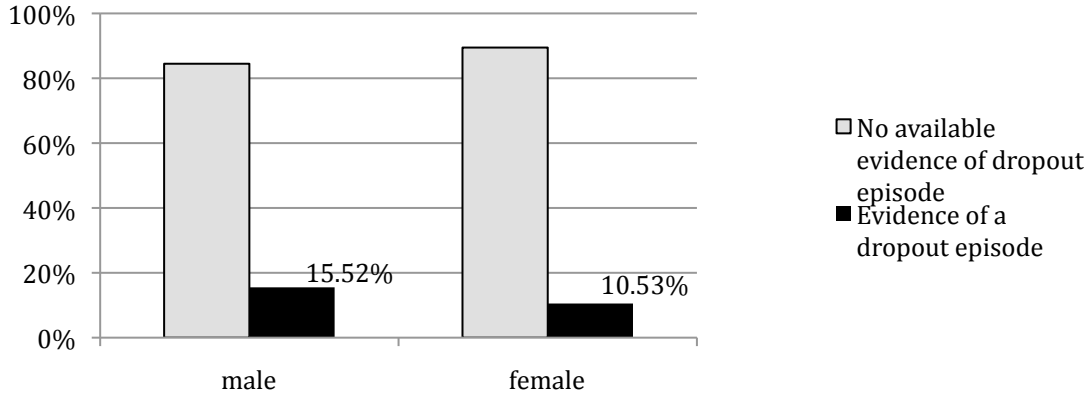


Figure 4: Dropout episodes and socio-economic status

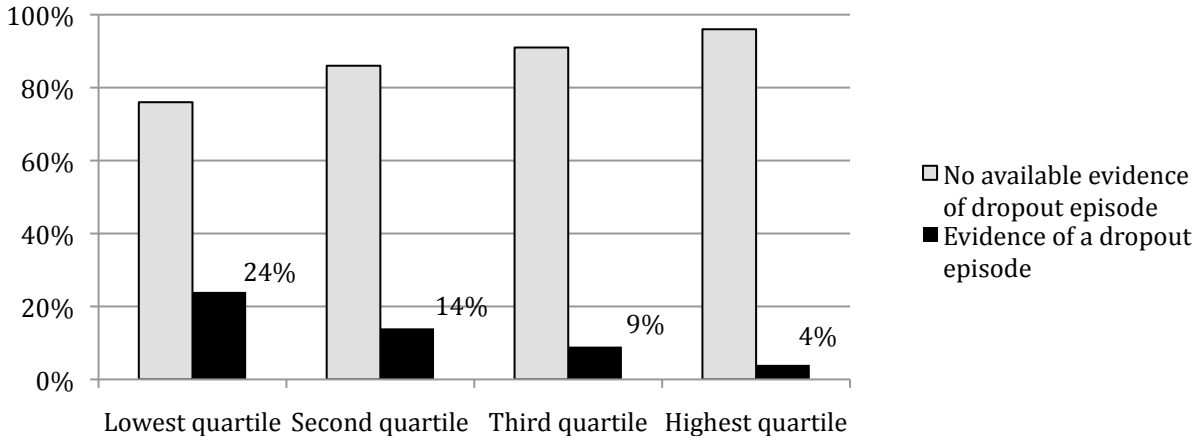


Figure 5: Dropout episode and race

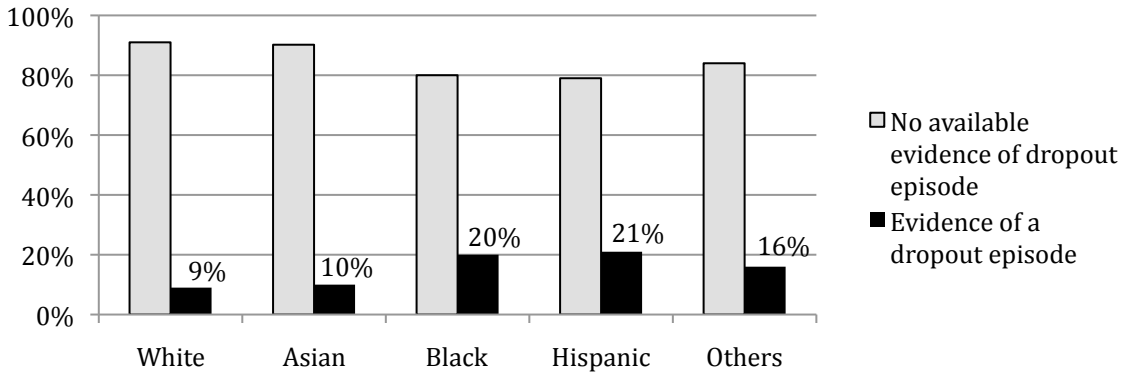


Figure 6: Dropout episode and school type

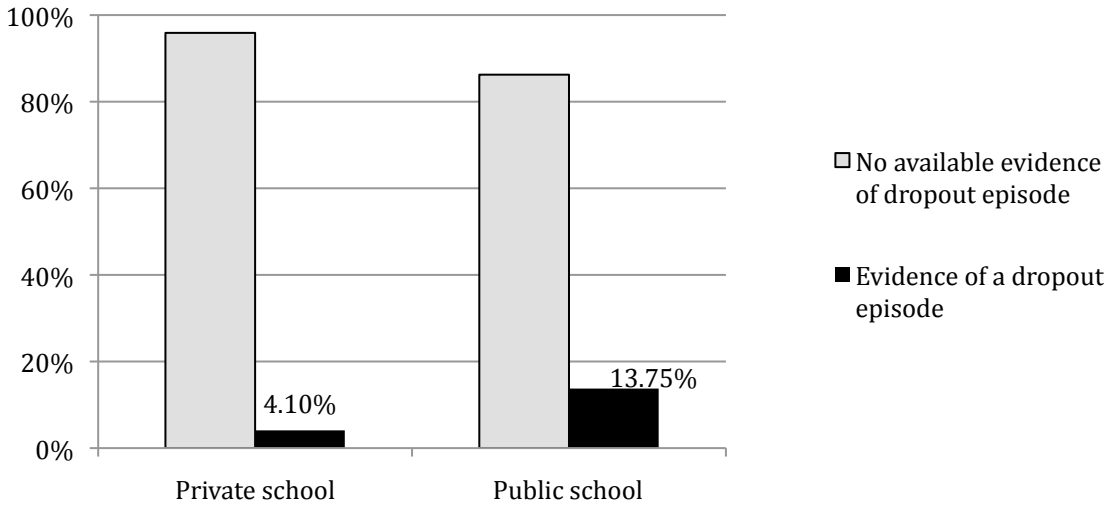


Table 3: Dropout episodes and academic achievement

Academic achievement		Evidence of dropout episode	No available evidence of dropout episode
Math test standardized score	Mean	41.96	50.07
	Standard deviation	12.75	12.85
Reading test standardized score	Mean	42.40	49.98
	Standard deviation	12.86	12.83

Table 4: ANOVA – Dropout episodes and academic achievement

		Sum of Squares	df	Mean Square	F	Sig.
Math test standardized score	Between Groups	2.535E7	1	2.535E7	1.538E5	.000
	Within Groups	5.613E8	3405895	164.803		
	Total	5.867E8	3405896			
Reading test standardized score	Between Groups	2.216E7	1	2.216E7	1.346E5	.000
	Within Groups	5.607E8	3405895	164.628		
	Total	5.829E8	3405896			

Logistic regression model

Results from the logistic regression analysis reflect significance of curriculum track in predicting dropout episodes, after controlling for other covariates included in the study (Table 5).

Table 5: Logistic regression predicting high school dropout episode

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	dFemale	-.424	.064	44.145	1	.000	.655
	MathAch	-.015	.005	10.235	1	.001	.985
	ReadAch	-.008	.005	2.581	1	.108	.992
	dAcademic	-3.496	.305	131.332	1	.000	.030
	dDual	-3.783	1.003	14.227	1	.000	.023
	dOccupation	-1.013	.106	91.322	1	.000	.363
	dAsian	-.157	.125	1.563	1	.211	.855
	dBlack	.379	.088	18.500	1	.000	1.461
	dHispanic	.390	.084	21.813	1	.000	1.477
	dOthers	.585	.119	23.990	1	.000	1.795
	F1SES2QU	-.272	.027	102.533	1	.000	.762
	Constant	-.022	.134	.026	1	.871	.978

Hierarchical Generalized Linear Model (HGLM)

The final HGLM model (Figure 7) included statistically significant predictor variables in estimating the log-odds of dropout episodes among high school students. Reading and school type (public/private school) were insignificant predictors at level-1 and level-2 respectively, thus were dropped from the model.

The HGLM analyses indicated statistical significance of the curriculum track variables in predicting dropout likelihood after controlling for other covariates in the study (Table 6). Students of specific curriculum tracks (academic, occupational, and dual completers) are less likely to drop out of high school compared to those in general curriculum (used as the reference group in this model). The final model variance component was found to be statistically significant (Table 7). Both population-average and unit-specific model values are in agreement with the logistic regression model results (Table 8).

Figure 7: HGLM Model Specification

Level 1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}(\text{dFemale}) + \beta_{2j}(\text{MathAchievement}) + \beta_{3j}(\text{dAcademic}) + \beta_{4j}(\text{dDual}) + \beta_{5j}(\text{dOccupational}) + \beta_{6j}(\text{dAsian}) + \beta_{7j}(\text{dBlack}) + \beta_{8j}(\text{dHispanic}) + \beta_{9j}(\text{dOthers}) + \beta_{10j}(\text{dSES})$$

where η_{ij} : log-odds that student i in school j has evidence of dropout episode.

Level 2 model:

$\beta_{0j} = \gamma_{00} + u_{0j}$; (average log-odds of dropout episode across schools)

$\beta_{1j} = \gamma_{10}$; (average log-odds of dropout episode across schools for females)

$\beta_{2j} = \gamma_{20}$; (average log-odds of dropout episode across schools for a student with average math achievement)

$\beta_{3j} = \gamma_{30}$; (average log-odds of dropout episode across schools for academic completers)

$\beta_{4j} = \gamma_{40}$; (average log-odds of dropout episode across schools for dual completers)

$\beta_{5j} = \gamma_{50}$; (average log-odds of dropout episode across schools for occupational completers)

$\beta_{6j} = \gamma_{60}$; (average log-odds of dropout episode across schools for Asians)

$\beta_{7j} = \gamma_{70}$; (average log-odds of dropout episode across schools for African-Americans)

$\beta_{8j} = \gamma_{80}$; (average log-odds of dropout episode across schools for Hispanics)

$\beta_{9j} = \gamma_{90}$; (average log-odds of dropout episode across schools for other races, non-Whites)

$\beta_{10j} = \gamma_{100}$; (average log-odds of dropout episode across schools for students with average SES)

Table 6: Final model - Final estimation of fixed effects

Fixed effect	Unit-specific model		Population-average model	
	Coefficient	P-value	Coefficient	P-value
INTRCPT1, BO; INTRCPT2, G00	-2.162514	0.000	-2.244568	0.000
DFEMALE slope, B1; INTRCPT2, G10	-0.340159	0.006	-0.333276	0.006
MATHAC slope, B2; INTRCPT2, G20	-0.022841	0.000	-0.022330	0.000
DACAD slope, B3; INTRCPT2, G30	-3.732993	0.000	-3.687269	0.000
DDUAL slope, B4; INTRCPT2, G40	-4.241670	0.017	-4.195212	0.015
DOCCU slope, B5; INTRCPT2, G50	-1.167774	0.000	-1.140394	0.000
DASIAN slope, B6; INTRCPT2, G60	0.320432	0.246	0.319390	0.210
DBLACK slope, B7; INTRCPT2, G70	0.779028	0.000	0.778052	0.000
DHISPAN slope, B8; INTRCPT2, G80	0.601637	0.001	0.594320	0.001
DOTHERS slope, B9; INTRCPT2, G90	0.704075	0.004	0.690834	0.004
SES slope, B10; INTRCPT2, G100	-0.234827	0.000	-0.229222	0.000

Table 7: Final unit-specific model – Final estimation of variance components

Random effect	Std deviation	Variance component	df	Chi-square	P-value
INTRCPT1, UO	0.61656	0.38014	737	1113.10499	0.000

Table 8: Expected probability of dropping out of high school comparisons between HGLM and Logistic Regression

Predictor	HGLM Unit-specific model Expected probability	HGLM Population-average model Expected Probability	Logistic Regression Expected Probability
Intercept	0.103	0.096	0.489
dFemale	0.416	0.418	0.372
dMathAch	0.494	0.495	0.494
dAcademic	0.023	0.024	0.027
dDual	0.014	0.015	0.028
dOccupational	0.237	0.242	0.270
dAsian*	0.579	0.579	0.497
dBlack	0.685	0.685	0.628
dHispanic	0.646	0.644	0.590
dOthers	0.669	0.666	0.605
dSES	0.442	0.443	0.438

Conclusions

Results reflect that following a specific curriculum track in high school as opposed to a general curriculum reduces the likelihood of dropping out, supporting Plank et al's (2008) argument, in which curriculum track influences high school persistence. Although CTE has been both lauded and criticized for its potential effects on educational outcomes, including dropping out (Plank et al, 2008), following an occupational curriculum rather than a general one reduces dropout likelihood when two similar individuals are compared. Interestingly, after controlling for curriculum tracks, school type was insignificant in predicting dropout likelihood.

Implications/Recommendations/Impact on profession

High school dropout studies need to be addressed with more emphasis on curriculum tracking. As suggested by the results, increasing a student's chances of graduating from high school may heavily depend on course placement methods.

In a study by Bridgeland, Balfanz, Moore, and Bryant (2010), students reported better family and school support could have increased their chances of

graduation. Choosing curriculum should be a collaborative effort between students, parents, and the school. Students should know their interests and strengths to decide on courses to enroll in. Parents should be aware of different graduation paths. Schools should provide necessary facilities to equip the students with alternatives to encourage persistence.

One important limitation of this study is the absence of curriculum track random assignment. More sophisticated statistical methods such as the propensity score matching method could be utilized to produce better conclusions on the influence of curriculum track in dropout studies.

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