

High School Academic and Socioeconomic Environment in the Field of Innovation an Entrepreneur Enters

Siyona Singh¹

¹Freeman High School

ABSTRACT

Entrepreneurship is central to economic development, wherein societies with more individuals with entrepreneurial attributes are better positioned to progress economically, as compared to those with a lower population of individuals with entrepreneurial attributes (Rengiah, 2013). Education has been found to be critical in fostering entrepreneurial activity (Peterman & Kennedy, 2003). As such, there has been a recent push in literature towards understanding the factors, both institutional and curricular, in tertiary education that can incubate entrepreneurial tendencies. However, less is known about the impact of *secondary* education in fostering entrepreneurial inclinations. Specifically, the purpose of this study is to determine the effect of academic rigor and the socioeconomic environment in high school on the category of innovation an entrepreneur enters. It is important to understand the patterns in educational environments that are more likely to influence entry into a specific field of entrepreneurship for two reasons: 1) to build better educational environments that promote entering diverse fields of entrepreneurship and 2) to help inform society on its innovation strengths and opportunities for improvement. To test this relationship, the researcher investigated where the nation's fastest-growing entrepreneurs from the 2021 Forbes Next 1000 list received their secondary education. Data on predefined factors of academic rigor and socioeconomic setting were pulled to uncover school profile trends within each entrepreneurship category. The researcher found that STEM entrepreneurs come from schools with a more academically rigorous culture and social entrepreneurs come from schools with less academic rigor and more socioeconomic diversity.

Introduction

Entrepreneurship is critical to economic development, employment creation, and improved standards of living at the national level (Ndofirepi, 2020). By allowing for innovation, market diversification, and competition, the undertakings of entrepreneurs are integral to socio-economic acceleration in market economies (Rengiah, 2013). As such, the development of entrepreneurial attitudes and capabilities in citizens to stimulate entrepreneurial activity is a subject of increasing importance in nations across the world (Commission of the European Committees, 2003), an objective many aim to accomplish through education. Preliminary studies have found education to play a prominent role in fostering attributes that could later contribute to entrepreneurial outcomes (Peterman & Kennedy, 2003). Peterman and Kennedy conducted a pre-test and post-test study in Australia with a group of secondary students in the Young Achievement Australia program and found that the completion of an entrepreneur education program increased both student interest in entrepreneurship and their perceptions in terms of both the feasibility of becoming an entrepreneur and the desirability of doing so. The topic has been a source of growing attention, namely the legitimacy and effectiveness of entrepreneurial education on a broader scale (Kuratko, 2005).

A substantial body of literature has analyzed and authenticated the centrality of education in modeling entrepreneurship behaviors in student populations (Ndofirepi, 2020). However, despite the overarching body of literature, the findings remain limited. Though researchers have found tertiary education as an important means for orienting students toward entrepreneurship, there is an evident lack of research on the role of secondary education in activating entrepreneurial thinking. As the secondary level of the education system acts as a crucial interface to institutions of higher education and professional training, and as key decisions on future professions are made during this phase, it appears crucial to conduct a deep dive into what promotes entrepreneurial thinking and action in this stage of a person's educational career (Hermann et al., 2005).

Specifically, this study attempts to understand the underlying role of institutional factors such as academic rigor, environment, and demographics in high school systems on entrepreneurial outcomes. Cognitive models do not usually incorporate environmental factors in their analyses of education as a motivator, as they assume that entrepreneurship stems from largely intrinsic motivation (Bartha et al., 2019; Cnossen et al., 2019). While this does have validity, studies have suggested that culture and environment in educational institutions are often more influential than intrinsic skills and motivation in students' entrepreneurial outcomes (Liavli et al., 2017; Taormina et al., 2007). The question of how we can maximize external conditions in high school systems to best foster inclinations towards specific fields of entrepreneurship is the primary focus of this study. The researcher finds it necessary to emphasize the external factors of a student's educational upbringing that may also contribute to the acquisition of psychological traits like achievement attitude, tolerance of ambiguity, and risk propensity that comprise the entrepreneurial spirit.

Generally speaking, entrepreneurship has been closely linked to the entrepreneur's character. The character of an individual is influenced by different factors, including the gender of the individual, their sociocultural background, and their education, all of which work to influence their motivations and impact the skills and behaviors acquired by the individual (Alexandre-Leclair, 2014). The more skills and behaviors a person has associated with entrepreneurship, the more likely the person to gravitate toward being an entrepreneur; however, whether a person can develop such skills, including leadership, risk-taking behaviors, negotiation, and so forth, is influenced by environmental factors (Alexandre-Leclair, 2014; Karlsson et al., 2021). To understand education's impact on entrepreneurship, the researcher utilized the category of entrepreneurship that one enters as a proxy. There is plenty of research into how the type of environment impacts someone's likelihood to become an entrepreneur (Alexandre-Leclair, 2014; Karlsson et al., 2021). However, we know little about the nuances behind that. Specifically, how do factors of childhood environments (region, gender, and socioeconomic diversity) shape people from a young age, and, more importantly, how do they shape the *type* of entrepreneur one becomes? The current body of literature paints a one-dimensional picture of entrepreneurship as a homogeneous pathway, even though a lot more variety exists in terms of outcomes and paths. By understanding these nuances in depth, we can optimize educational environments for the facilitation of necessary fields of entrepreneurship to fill market gaps. For example, if more academic rigor was found to translate to a higher likelihood of entrepreneurship in STEM fields, this can inform policymakers looking to create more medical innovators in the next generation of the workforce.

To this end, the researcher defined two core tenets of secondary educational environments: academic rigor and school setting. These were hypothesized to facilitate or impede entrepreneurial tendencies in youth. The first, academic rigor, is measured by the College Readiness Index (CRI), National Percentile on College-Level Exams, and Performance on State-Level Exams. The CRI accounts for the proportion of a school's 12th graders who took and earned a qualifying score on AP or IB exams. A higher CRI score translates to the breadth and depth of academic opportunities available in a certain school as well as the success of students in those environments, which is hypothesized to affect a student's inclinations towards more academic entrepreneurial fields like healthcare, science, and technology. This formulation is based on a study evidencing the presence of more interdisciplinary, higher-level classes as a prominent component of academic entrepreneurship (Modarresi, 2014). Academic rigor will also be tested by the

National Percentile on College-Level Exams, which measures the student performance on national college-level tests relative to other schools in the nation, and the Overall Performance on State-Level Exams, which is used to measure individual subject proficiencies in math and reading. Both student testing metrics will be used to incorporate data on relative student performance into an overall profile of the school's academic culture, as compared to other schools in the nation. Researchers have shown that learning in an initiative-taking culture intensifies risk-taking propensity and the need for achievement (Solesvik et al., 2014).

The second facet being tested as an entrepreneurial motivator within the current study is the socio-economic environment of the school. This will be tested by observing the percent of students economically disadvantaged, gender distribution, and demographic makeup. The diversity of an environment can be evaluated along the dimensions of race, ethnicity, gender, sexual orientation, socio-economic status, etc. (Baycan-Levent et al., 2003). It is theorized that a blend of economic, social, and environmental values developed through a particularly heterogeneous upbringing nurtures the personality traits (i.e. innovation, agreeableness, social responsibility) that comprise the entrepreneurial spirit, specifically that of social entrepreneurship. Research suggests a link between increased cultural intelligence, which is a by-product of a diverse educational upbringing, and the distinct characteristics of social entrepreneurs that are seen to influence behavior and intentions (Hwee Nga et al., 2010).

Each variable within the categories of academic rigor and socio-economic environment will be utilized to conduct assessments of the educational backgrounds of Forbes Next 1000 Entrepreneurs (sequentially by age from 20-42 years) to determine if there is a correlation between these contextual variables in high schools and entrepreneurial outcomes. In understanding the external conditions that stimulate entrepreneurship in different fields, we can learn how to maximize the environments in our secondary educational systems to create economic growth across industries.

Methods

The researcher started by identifying the high school education received by 116 entrepreneurs aged 20-42 years old from the 2021 Forbes Next 1000 list. In the absence of detailed information on each entrepreneur on the list, the high school information associated with the educational career of identified entrepreneurs was found mainly through secondary research, including information available on external biographies, social media accounts, and articles. With the list of high schools identified, each high school was then inserted into the US News High School Search, allowing the researcher to pull information on its socioeconomic and academic environment, all of which came entirely from third-party sources such as College Board, the US Department of Education, and International Baccalaureate. Included below, in Figures 1-4, are high-level splits of the characteristics of the data set.

The hypothesis for this study will be tested by means of data collection from outside sources and then data analysis in two forms: distributions and correlation analysis. First, to understand how two quantitative variables are correlated is important in determining whether specific factors within each grouping (socioeconomic or academic) can be categorized together accurately. The researcher then organized data on the averages of certain school factors, such as College Readiness Index or Percent Economically Disadvantaged, across each category of entrepreneurship into distributions to test the hypothesis. These distributions were aimed at understanding the spread of variables across the data set.

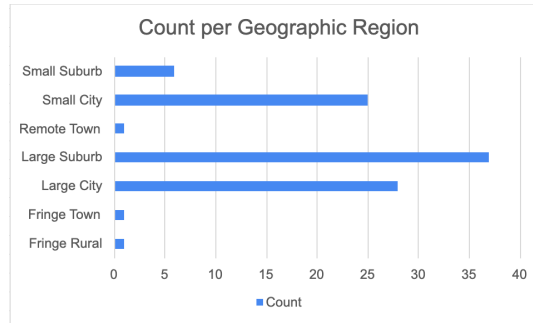


Figure 1. Count of Entrepreneurs in data set per Geographic Region.

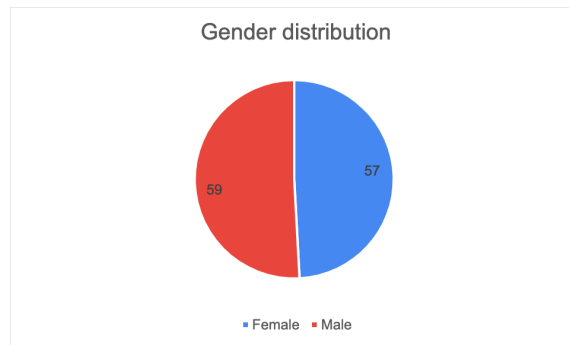


Figure 2. Gender Distribution of Entrepreneurs in data set.

Category	Count of Person
Art & Style	1
Consulting & HR	7
Consumer Technology	10
Education	6
Enterprise Technology	11
Finance	4
Food & Drink	7
Healthcare & Science	12
Manufacturing & Industry	3
Marketing & Advertising	11
Media & Entertainment	10
Real Estate	1
Retail & Ecommerce	24
Social Entrepreneurs	7
Sports & Games	2
(blank)	
Grand Total	116

Figure 3. Category of Entrepreneurs in data set.

Age	Count of Person
20	3
23	4
24	2
25	5
26	7
27	5
28	12
29	6
30	8
31	3
32	16
33	2
34	2
35	9
36	7
37	3
38	5
39	6
40	2
41	5
42	4
Grand Total	116

Figure 4. Age Distribution of Entrepreneurs in data set.

Results

Strength of Variable Grouping in Categories of Academic Rigor and Socioeconomic Environment

Table 1. Academic rigor variables

Variables	Correlation Coefficient
College Readiness Index & National Percentile	0.8749744
College Readiness Index & Overall Student Performance	0.6781034
Overall Student Performance & National Percentile	0.786722

The College Readiness Index and National Percentile on College-Level Exams were used to assess academic rigor. As displayed in Table 1, the variables exhibit a strong positive correlation, indicating that when the College Readiness Index of the school is increased in comparison to another, the average student performance on college-level exams tends to be higher as well. The same trend was found for the College Readiness Index and the Overall Student Performance on State-Required Tests. The National Percentile and the Overall Student Performance on State-Required Tests were also observed to display a strong positive correlation, meaning that a higher average National Percentile would likely correspond with a higher level of test performance on state tests.

Table 2. Socioeconomic environment variables

Variable	Correlation Coefficient
Student Diversity & Economically Disadvantaged	0.6090083

Student Diversity & ST-Ratio	0.3651793
Economically Disadvantaged & ST-Ratio	0.3642831

As shown in Table 2, the only statistically significant correlation in either the positive or negative direction was Student Diversity with Economically Disadvantaged. A strong positive correlation was found to exist between the two variables, implying that a school with a higher average student diversity also likely has a higher percentage of economically disadvantaged students. Student-Teacher Ratio was not observed to have any significant relationships with any other variables.

Table 3. Crossing academic rigor with socioeconomic environment

	Student Diversity	Economically Disadvantaged	Student-Teacher Ratio
CRI	0.08567151	-0.518995	0.1174762
National Percentile	-0.2103167	-0.6321268	0.07628464
Overall Student Performance	-0.4046204	-0.7129731	0.09256421

As shown in Table 3, the percentage of Economically Disadvantaged students in a given school was found to be related to lower AP/IB participation and test performance in general. There is a strong negative correlation between the percentage of Economically Disadvantaged students and the College Readiness Index, meaning that as the number of economically disadvantaged students, indicated as a percentage of the total school population, increases, the College Readiness Index, or the proportion of a school's 12th graders who took and earned a qualifying score on AP or IB exams, would trend lower. The data also validates this same pattern (a strong negative correlation) when Economically Disadvantaged is crossed with the National Percentile on College Level Exams and the Overall Student Performance. The Student-Teacher Ratio was not found to have a strong correlation (>0.5) with any of the three variables for Academic Rigor.

Variables on Category of Entrepreneurship¹

I. Understanding academic rigor

¹ Art/Style and Real Estate were barred from the analysis due to a limited dataset.

Category	Average of College Readiness Index
Art & Style	76.5
Consulting & HR	50.7
Consumer Technology	46.7
Education	34.6
Enterprise Technology	48.14444444
Finance (1)	41.53333333
Food & Drink	49.25
Healthcare & Science	55.21111111
Manufacturing & Industry	34.7
Marketing & Advertising	47.84
Media & Entertainment	42.03333333
Real Estate	42.3
Retail & Ecommerce	47.38571429
Social Entrepreneurs	28.3
Sports & Games	39.95
(blank)	
Grand Total	45.78478261

Figure 5. College Readiness Index as a Proxy for Academic Rigor

The College Readiness Index is, on average, the highest in the healthcare and science category of entrepreneurs at 55.21. The categories with the lowest average College Readiness Index are Education (34.6) and Social Entrepreneurs (28.3).

Row Labels	Average of Percentile on State-Level Tests
Art & Style	100
Real Estate	88.7
Marketing & Advertising	88.14
Consumer Technology	77.63333333
Food & Drink	76.71666667
Media & Entertainment	75.74444444
Consulting & HR	74.75714286
Enterprise Technology	72.86666667
Healthcare & Science	70.81
Retail & Ecommerce	69.81666667
Sports & Games	69.6
Education	66
Finance	57.8
Social Entrepreneurs	36.7
Manufacturing & Industry	16.36666667
Grand Total	69.44343915

Figure 6. Student Performance as a Proxy for Academic Rigor

The categories where the average student performance was highest were predominantly clustered in the areas of science and technology, except for Food & Drink. The categories where the average overall student performance was lowest were Social Entrepreneurship at 36.7 and Manufacturing & Industry at 16.37.

Category	Average of National Percentile on College-Level Exams
Art & Style	98.8
Consulting & HR	83.95714286
Consumer Technology	85.16666667
Education	73.18
Enterprise Technology	87.5
Finance	72.025
Food & Drink	88.43333333
Healthcare & Science	83.05
Manufacturing & Industry	77.9
Marketing & Advertising	86.42
Media & Entertainment	82.86666667
Real Estate	77.8
Retail & Ecommerce	81.09375
Social Entrepreneurs	57.68
Sports & Games	79.55
(blank)	
Grand Total	81.67113402

Figure 7. National Percentile on College-Level Exams as a Proxy for Academic Rigor

The highest average of 88.43 was in the Food & Drink category, with the averages in the Technology categories, Consumer Technology and Enterprise Technology, respectively, in a close second place. Art & Style was removed from the analysis due to the limited data set. Social Entrepreneurs were found to have, by a large gap, the lowest average National Percentile on College-Level Exams at 57.68.

II. Understanding Socioeconomic Environment

Category	Average of Student Diversity
Art & Style	62.7
Consulting & HR	39.5
Consumer Technology	45.55555556
Education	64.76
Enterprise Technology	55.15777778
Finance	44.175
Food & Drink	45.85
Healthcare & Science	60.082
Manufacturing & Industry	77.9
Marketing & Advertising	42.22
Media & Entertainment	34.92222222
Real Estate	21.7
Retail & Ecommerce	37.43333333
Social Entrepreneurs	79.51666667
Sports & Games	60.5
Grand Total	48.8584

Figure 8. Student Diversity as a Proxy for Socioeconomic Environment

The highest average of student diversity, 79.52, was in Social Entrepreneurship. The lowest average, 21.7, was in Real Estate (but it is important to note the sample size was only 1 for this category), and the second lowest average student diversity, 39.5, was in Consulting & HR.

Category	Average of Economically Disadvantaged
Art & Style	25
Consulting & HR	19.33333333
Consumer Technology	31.7
Education	52.2
Enterprise Technology	23.63636364
Finance (1)	62
Food & Drink	24.14285714
Healthcare & Science	24.5
Manufacturing & Industry	47.5
Marketing & Advertising	17.09090909
Media & Entertainment	26.2
Real Estate	16
Retail & Ecommerce	21.08695652
Social Entrepreneurs	45.66666667
Sports & Games	43
(blank)	
Grand Total	27.26605505

Figure 9. Percent Economically Disadvantaged as a Proxy for Socio-Economic Environment

The Social (45.67) and Educational (52.2) entrepreneur categories had the highest average number of economically disadvantaged students. Barring categories that had a sample size of 1, the category with the lowest average of percent economically disadvantaged was Marketing & Advertising at 17.09.

Discussion

Strength of Variable Grouping in Categories of Academic Rigor and Socioeconomic Environment

The College Readiness Index accounts for the proportion of a school's 12th graders who took and earned a qualifying score on AP or IB exams. In Table 1, the College Readiness Index (CRI) and the National Percentile on College-Level Exams, the relative performance of a school's students on national college-level exams, showed a strong positive correlation likely due to the fact that both measure student performance on a similar rigor and scale of exams. The College Readiness Index and the Overall Student Performance, the average percentile score of the school student body on state-required tests, also displayed a positive correlation — though not as strong as the CRI and the National Percentile correlation. Since the CRI score is a combination of participation and performance in a course, it's more a reflection of the school's rigorous environment and collective performance versus the Overall Student Performance which is focused on the average individual score. Combined with the fact that the Overall Student Performance variable's metric is state tests whereas the College Readiness Index has only a national exams component, the strength of grouping the two variables as similar measures of academic culture is comparatively weaker. Both measures are still important to understand a school's student achievement on different scales and standards. The Overall Student Performance on State-Required Tests and the National Percentile on College-Level Exams showed a weaker positive correlation likely because there is a mismatch between student performance on state testing and national-level testing due to differences in curriculum and standardization. These findings show the relative interrelatedness and points of difference of the metrics used to assess schools' academic culture.

In Table 2, a positive correlation was found between the percentage of minority students and the percentage of economically disadvantaged students in a total school population, which is in line with a body of literature establishing low-income communities as disproportionately minority-inhabited (Population Reference Bureau, 2015). Further, slightly positive correlations exist between the Student-Teacher Ratio and both the Student Diversity and Economically Disadvantaged variables, meaning that the whole issue of more students per teacher is sometimes linked to a greater proportion of minority and economically disadvantaged students. The researcher hypothesizes that this finding is because teacher shortages are more common in schools with a higher proportion of students with lower socioeconomic status because of low resource accessibility and compensation.

In Table 3, Student Diversity had weaker correlations with each of the three variables for academic rigor but did slightly trend in the negative direction. These findings highlight that the demographics of a school do impact student outcomes on state- or national-level exams, but only to a certain extent. There is a strong negative correlation between the percentage of Economically Disadvantaged students and the College Readiness Index, likely because high-poverty schools are less likely to have the financial capacity for more breadth in course offerings, which then impacts students' overall college readiness. There was also a negative correlation between the percentage of Economically Disadvantaged students and the National Percentile on College-Level Exams, which may be due to the smaller proportion of students in low-income schools taking advanced classes. The negative correlation of Economically Disadvantaged to Overall Student Performance is comparatively stronger, likely because the number is more reflective of every student in the school since it takes into account mandatory/state-required testing.

Variables on Category of Entrepreneurship

Figure 5 shows that the College Readiness Index is, on average, highest in the healthcare and science category of entrepreneurs. This compels the researcher to identify a possible connection between strong standards in academia and those pursuing entrepreneurship in the more academic STEM fields, supporting the initial hypothesis. The categories with the lowest average College Readiness Index are Education and Social Entrepreneurs. The researcher posits that the low academic rigor and achievement in secondary systems for the majority of educational and social entrepreneurs may contribute to their desire to identify and design solutions for the academic challenges they experienced firsthand.

The Overall Student Performance is a variable critical to extracting a more comprehensive picture of academic rigor in a school. The highest average percentile, or highest student performance, was in Art & Style, yet it is important to note that there was only one subject within this category being analyzed. The other categories where the average was highest were usually clustered in science and technology, except for Food & Drink, as shown in Figure 6. This validates the claim made prior about the more prominent role of a high-standards education in facilitating interest in STEM fields. The categories where the average Overall Student Performance was lowest were Social Entrepreneurship and Manufacturing & Industry. These results further the hypothesis of a less rigorous academic culture facilitating social entrepreneurship.

The National Percentile on College-Level Exams, measuring the performance of the student body on national standardized tests relative to other schools in the nation, is also an important indicator of the school's academic culture. The highest average in Figure 7 was in the Food & Drink category, with Technology in a close second. These findings further evidence how high/rigorous academic standards may develop a propensity in individuals for hard sciences that translates to entrepreneurial outcomes concentrated in those areas. Social Entrepreneurs were found to have, by a large gap, the lowest average of the National Percentile on College-Level Exams. Again, it is seen how deficient academic culture and class offerings may play a large part in defining those in social and educational entrepreneurship, proving the researcher's hypothesis.

In Figure 8, the highest average of student diversity, 79.52, was in Social Entrepreneurship. This validates the researcher's hypothesis, recognizing a link between high levels of diversity in high school and an entrepreneur's inclination toward social entrepreneurship. This is likely due to increased cultural awareness and intelligence that breeds certain characteristics of social entrepreneurs.

Figure 9 allowed for the presentation of data on the percentage of Economically Disadvantaged students as a proxy for the socio-economic environment. The social and educational entrepreneurship categories had the highest average of Economically Disadvantaged students. This validates the hypothesis posed by the researcher in that lower SES environments are seen to have an impact on efforts to improve their circumstances using entrepreneurship.

Limitations and Future Research

The largest limitation was in the fact that not all data could be pulled from every entrepreneur on the Forbes Next 1000 list since some information regarding their high school education could not be determined. Especially for private schools, no information on the academic rigor (college readiness, academic performance, etc.) was available for use. A further limitation was that the research did not take into account entrepreneurs' perceptions of the academic and socioeconomic environment of their high school, which may be more positive or negative than what the numbers suggest. Understanding how they perceived their institution would help the researcher more accurately conclude how their education affected their internal motivations toward specific fields of entrepreneurship. Overall, expanding the dataset to possibly include surveys to understand the internal drives of the entrepreneurs as well as more subjects from

different types of schooling (i.e. private, charter) would increase the validity and range to which these results can be applied.

Implications

These results may prove important to society because they highlight the institutional factors that either strengthen or weaken a student's impetus towards a specific career. This could help inform education policy to find ways in which we can facilitate better student outcomes (Karlsson et al., 2021). The analysis of the findings underlines the importance of socioeconomic diversity in schools for social and educational entrepreneurship and the value of high rigor and breadth of course offerings for entrepreneurship in STEM disciplines. Policymakers and educators can put these results in the broader context of facilitating economic growth by prioritizing college readiness programs and diversity initiatives. By fostering entrepreneurial inclinations as early as high school, we can promote innovation on a larger scale and in turn, economic development.

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