A Case Study of the Correlation Between SAT Scores and Future Incomes

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Abstract: With the acceleration of globalization, the role of education in economic and social development has become increasingly prominent. The SAT, as a measure of students' learning ability and potential achievement, has gained widespread attention and recognition around the world, and SAT scores, as an important indicator of students' academic performance, have a significant impact on students' future development and income levels. Previous research on the SAT has focused on factors that can influence SAT scores, such as family socioeconomic factors and high school academic performance, but there is a lack of research on whether SAT scores are effective in predicting an individual's future income level. In this paper, a correlation analysis was conducted using the questionnaire method and Pearson's coefficient, using data on the job position level and SAT scores of employees of Company A with a confidentiality agreement. The results show a significant positive correlation between SAT scores and future incomes. This finding emphasizes the importance of academic performance in high school to an individual's long-term economic prospects, enriches existing research, and provides new perspectives on return on investment analysis in higher education with theoretical implications. In addition, educational policymakers can thus focus more on improving students' SAT scores, which is of practical significance.

Keywords: SAT, Future income, Correlation analysis, Higher education.

1. Introduction

1.1. Research Background

Given the present state of globalization and informatization, the correlation between educational achievements and future job success has become an important area of study in the domains of education economics and data science. The SAT, a widely recognized and utilized assessment test, holds significant importance as an indicator of students' academic proficiency. It serves as a crucial factor in the college admissions process, both within the United States and internationally. The SAT evaluates students' preparedness for higher education and offers colleges a standardized metric to compare candidates.

Research on SAT scores and the socioeconomic status of students' families is well-documented, with many studies showing a positive correlation between the two. Harvard Law professor Lani Guinier proposed that, in the interest of truth in advertising, the SAT should simply be called a "wealth test" [1]. Test critic Alfie Kohn suggested that the verbal section of the SAT merely measures

"the size of students' houses" [2], and journalist Peter Sacks claimed that "one can make a good guess about a child's standardized test scores simply by looking at how many degrees her parents have and at what kind of car they drive" [3].

Research conducted by the College Board has indicated that kids hailing from more affluent households tend to achieve greater scores on the SAT. According to data from the College Board, students from households with an annual income beyond $200,000 had a notably better average SAT score compared to students from homes with an annual income below $20,000.

Nevertheless, there is considerable controversy and ample need for additional investigation regarding the efficacy of SAT scores in forecasting an individual's future income level. Further research is needed to explore the extent to which SAT scores can predict long-term income and how other factors, such as college major, networking opportunities, and personal skills, might interact with educational outcomes to influence career success.

1.2. Research Significance

The investigation of this paper about the correlation between SAT scores and students' future wages holds substantial theoretical and practical importance. The SAT (Scholastic Assessment Test) is an examination designed to evaluate one's intellectual aptitude. Its primary purpose is to assess the academic readiness of high school students as a point of reference for college admissions evaluations. Hence, comprehending the SAT and its significance is crucial for students, education policymakers and society. Furthermore, it is a relatively unexplored area with limited existing research material. In this study, we will utilize correlation analysis to advance the research on the relationship between educational outcomes and future employment performance. This will lay the foundation for later research on the correlation theory in this field and the significance of this work can be demonstrated through the following crucial elements:

(1)Comprehending the correlation between SAT scores and prospective income can assist students in elucidating their educational objectives and career strategizing. It motivates students to efficiently manage their time and effort, raise their academic performance, and increase their competitiveness in the job market. For instance, students have the ability to establish precise objectives for both immediate and long-lasting educational achievements by utilizing the analysis findings derived from their SAT scores. Additionally, they have the ability to arrange their learning tasks in order of significance and immediacy according to learning objectives. Give priority to actions that are most beneficial in enhancing SAT results, such as engaging in extensive training for subjects in which one is poor.

(2)Simultaneously, This paper enhances the theoretical framework of educational economics by examining the correlation between SAT scores and students' future income. It also deepens the understanding of the return on investment in education, such as the resources (time, money, teachers, etc.) that families and schools allocate to students' education and how these investments manifest in SAT scores. The results assist in quantifying the return on investment in education and offer a more precise understanding of how educational resources are transformed into economic outcomes. This is essential for policymakers and educational institutions to optimize education plans and allocate financing effectively.

(3)This research also highlights the significance of ensuring equal access to education. It promotes the idea of equal educational opportunities by highlighting the disparities in access to education based on socioeconomic status. This includes supporting the allocation of public education resources to benefit disadvantaged groups and opposing any educational advantages that hinder equal opportunities.

1.3. Research Objectives and Issues

The objective of this study was to further investigate the relationship between students' SAT scores and their future income. Nevertheless, there is presently a dearth of comprehensive investigation about the extent to which elevated SAT scores can genuinely correlate with future job performance and a substantial income. Examining this correlation not only aids in comprehending the connection between investment and yield in higher education, but also holds significant implications for students' individual growth, enhancing the distribution of educational resources, and fostering educational fairness. Therefore, the objective of this study is to address this deficiency by elucidating the correlation between SAT scores and individuals' future earnings via a survey conducted within a prominent U.S. technology corporation.

The research will be conducted by following these steps: Begin by doing a comprehensive examination of the pertinent literature and existing research on the theory and correlation of the association between SAT scores and other variables. This will serve as the foundation for the issue to be addressed in this paper. Subsequently, the philosophical principles and investigative method are established. This study employs empirical and quantitative research methods to gather statistics and analyze pertinent data, such as SAT scores and employment positions, of employees at a prominent global technology corporation, referred to as Company A. Next, the Pearson correlation coefficient is computed to analyze the link between SAT scores and the number of employee job levels.

Based on the model results, this article will offer a fresh viewpoint on analyzing the return on investment in higher education and provide targeted recommendations for students, education leaders, and policymakers on the optimal use of SAT scores. Through this study, we not only hope to reveal the relationship between SAT scores and future income but also hope to provide a new reference for education investment and provide practical guidance for the formulation of education policies and career planning.

2. Literature Review

The use of SAT scores as a crucial factor in the admissions process for American schools and universities has been prevalent for a significant period of time. This practice has significant consequences for students' future academic trajectories and professional endeavors. Research on the SAT and its related components has been extensive, and AJ Alvero from Stanford University [4]has observed a significant correlation between essay content and style, family wealth, and SAT scores. Similarly, In their study on social capital and academic accomplishment, Caldas and Bankston showed that family socioeconomic status exerts a substantial influence on students' academic performance, including their SAT scores[5]. Furthermore, Kohn contended that standardised test scores, such as the SAT, are significantly impacted by students' socioeconomic status, indicating a robust association between family income and SAT scores[6].

However, the study "Parents' Income is a Poor Predictor of SAT Score" (2014, P. 7) found that there was not enough statistical evidence to support the prediction of state SAT scores based on annual parental income, even when controlling for other variables. Ezekiel J. Dixon-RomÁN (2013, p. 3) from the University of Pennsylvania proposes a complex relationship between SAT scores and several factors. According to his research, the influence of family income on SAT results, although not as significant as high school scores, is substantial, non-linear, and nearly twice as impactful for black kids. Koretz also criticized the reliability of standardized tests, such as the SAT, in his book "The Testing Charade: Pretending to Make Schools Better"[7]. He argued that these test scores can be influenced by various factors, not just family income, indicating that the connection between family income and SAT scores is not definite.

Regarding content, the majority of researchers' studies on SAT scores concentrate on examining the influence of various factors on SAT results. These elements are treated as independent variables, while SAT scores are considered dependent variables for analysis. Researchers have undertaken a new study by integrating several contributing elements, including family economic position, high school academic performance, and race. However, the overall assessment of the efficiency of SAT scores in forecasting students' future income and the factors influencing these outcomes has seldom been thoroughly investigated. The lack of study in this area hinders our comprehensive understanding of the impact and importance of SAT scores on students' long-term career progression and overall quality of life. This chapter does a thorough examination of the relationship between SAT scores and factors such as family background, economic status, race, and culture by reviewing existing literature.

The research aims to determine the degree to which SAT results can accurately forecast the future income of students. Do SAT scores have disparate impacts on children from varying income brackets? Furthermore, it is important to consider the potential influence of additional mediating factors, such as the level of education and the choice of employment, in relation to this matter.

3. Methods and Methodology

3.1. Research Methods

This paper embraces the philosophical principles of positivism. Positivism prioritizes the utilization of observable and quantifiable empirical facts for the establishment of knowledge. Researchers acquire a comprehension of phenomena through field observation, experimentation, and data collecting, rather than depending on subjective opinions or theoretical speculation[8]. The research aims to investigate the correlation using quantitative research methods. Quantitative research is a systematic and structured approach to collecting and analyzing data that may be described in numerical terms[9]. Quantitative research typically gathers a substantial number of samples and employs statistical techniques to precisely analyze the data, uncover the relationships and impacts of variables, and present them visually through charts, etc., to enhance people's intuitive understanding of the research findings and data patterns[10]. Hence, the use of quantitative research in this paper has the potential to significantly enhance the objectivity and precision of the analysis, leading to a generally dependable and universally applicable result.

The data utilized in this study is sourced from a technological company. Company A is a prominent multinational technology corporation that employs individuals from diverse educational and socioeconomic backgrounds. With a substantial workforce, the sample's diversity enables a more comprehensive reflection of the correlation between SAT scores and income. Information obtained from major corporations can offer comprehensive insights into the correlation between SAT scores and income, aiding researchers in determining the general applicability of this relationship across various educational backgrounds and professional trajectories. This research obtained pertinent data from Company A by means of a questionnaire and the data contained precise details such as employees' SAT scores, work experience, and job level. The data processing was conducted with a focus on maintaining anonymity and privacy and the collection of data was carried out with the explicit agreement and assistance of Company A.

This questionnaire consists of 15 objective questions that require participants to select choices based on their comprehension. These inquiries encompass a wide range of topics, such as: What is your educational background and academic performance? What is the degree of correlation between SAT scores and an individual's future earnings...The questionnaire will be distributed to all employees of the organization via email, with the expectation that they will complete it during their leisure hours.

3.2. Sample Selection

This research employed a diverse sample of individuals with varying educational backgrounds, work experience, and job levels. Additionally, a sizable sample size was chosen to ensure the statistical analysis results were stable and reliable. A sample of 200 employees from various departments in the company who fit the specified criteria was chosen for this study to achieve a diverse and representative sample. We excluded questions that were incomplete and kept 165 questionnaires that were deemed meaningful for statistical analysis.

This study evaluated and controlled the following variables to reliably measure the association between SAT scores and future salaries while eliminating the impact of other potential factors: (1) Academic background refers to the greatest educational attainment of an employee. (2) Work geography refers to the specific location where a person works inside firm A, such as their workplace or office area. (3) Work experience is quantified as the duration of work with the company. Finally, The data were brought into the SPSS program for correlation analysis.

4. Data and Modeling Analysis

Pearson correlation coefficient, which is used to measure the linear relationship between two variables, takes a value ranging from -1 to 1. The formula for calculating the Pearson correlation coefficient is as follows:

Formula Definition
1. Overall mean:
For the variable x:

$$E(x) = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{1}$$

For the variable y:

$$E(y) = \frac{1}{n}\sum_{i=1}^{n} y_i \tag{2}$$

Overall covariance:

$$\text{cov}(x,y) = \frac{1}{n}\sum_{i=1}^{n}\big(x_i - E(x)\big)\big(y_i - E(y)\big) \tag{3}$$

Overall Pearson correlation coefficient:

$$\rho xy = \frac{\text{cov}(x,y)}{\sigma_x \sigma_y} \tag{4}$$

σ_x, σ_y are the overall standard deviations of x, y, respectively:

$$\sigma_x = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\big(x_i - E(x)\big)^2} \tag{5}$$

$$\sigma_y = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\big(y_i - E(y)\big)^2} \tag{6}$$

The Pearson's correlation coefficient takes values from -1 to 1:

A value of 1 indicates that the two variables are perfectly positively correlated, A value of -1 indicates that the two variables are completely negatively correlated, A value of 0 indicates that there is no linear relationship between the two variables. In this study, the correlation between SAT scores

(variable X) and job rank (income as measured by salary, variable *Y*) can be assessed by calculating the Pearson correlation coefficient.

A sample of 165 people (including 55 employees (position level 1), 55 supervisors(position level 2), and 55 managers(position level 3)) was taken through a survey, organizing relevant data, and producing the following SAT scores for the personnel of Company A:

Table 1: Results of correlation analysis between SAT scores and job grades in Company A

Correlation			
		SAT scores	position level
SAT scores	Pearson's correlation	1	
position level	Pearson's correlation	.355**	1
	Significance (double tail)	0.000	
	amount	165	165
**. At level 0.01 (two-tailed), the correlation was significant			

Observation of the table shows that the Pearson correlation coefficient of SAT scores for the number of people in Company A is 0.355 has a significant positive correlation and the significance is <0.01, which is statistically significant, indicating that SAT scores have a significant effect on the position level (future incomes) of employees.

5. Key Findings and Conclusion

This study investigates the correlation between students' SAT scores and their future income using empirical analysis and quantitative research approaches. The results demonstrate a substantial and favorable correlation between overall SAT scores and future income. Statistically speaking, students who achieve better SAT scores have a greater likelihood of attaining higher wages in their future professional endeavors, assuming all other factors remain constant. Specifically, Higher SAT scores are indicative of superior academic aptitude, which in turn leads to improved college grades and increased prospects for job advancement. Having high SAT scores is typically linked to the possibility of being accepted into prestigious institutions, securing well-paid jobs, and advancing in one's career. Therefore, students can increase their likelihood of future career success by diligently striving to improve their SAT scores. Simultaneously, gaining insight into this correlation can also assist students in recognizing that academic achievement is not merely a temporary scholastic obligation, but rather the bedrock for long-term professional advancement.

Meanwhile, This research has the potential to establish a theoretical foundation for educational leaders, allowing them to comprehend the educational outcomes that can be attained through educational resources and efforts. This discovery offers a measurable measure of the financial gain from investing in education and serves as a benchmark for policymakers to assess the impact of education.

In terms of educational equity, this correlation may prompt leaders to recognize the importance of providing equal educational opportunities to all individuals, as each student possesses potential and aspirations. The pace and methodology of education should be tailored to the unique characteristics of each student, ensuring educational equity by enabling students to acquire knowledge to the fullest extent possible and emphasizing their individual personalities to maximize their potential and achieve superior academic performance.

Nevertheless, this study is limited by data privacy concerns and the use of a single questionnaire distribution method, resulting in a relatively small sample size. As a result, the collected data can only

indicate the correlation trend between SAT scores and income, rather than providing a detailed understanding of the specific functional relationship.

Future research should select multiple different regions, different types of companies, and employees with different backgrounds for verification. The sample data collection should be larger to obtain the most accurate mathematical relationship. At the same time, case studies are also feasible. Through the investigation of individual experiences, it may be possible to analyze the reasons why SAT and future income are positively correlated. Furthermore, future research should broaden the analysis of the correlation between various academic performance indicators and professional achievement.

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