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A Model of the Correlation Between Education, the Labor Force, and Economic Growth

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ABSTRACT

Education has a long history in humankind. From the teachings of Confucius in China 2000 years ago to the compulsory education of Prussia (the precursor to modern Germany), both have had a profound impact on human civilization. Especially in the last 50 years, since World War II, the widespread adoption of free education has rewritten the course of human development. Since the implementation of free education worldwide, technological development has been rapid, progressing by leaps and bounds. Humanity's journey from the unreachable universe to exploring the world's greatest geographical areas, from nothing to something, has required the efforts of several generations, even spanning generations. Free education has played an indispensable role.

Keywords: EDU-S-ECO Model, EYT (Social) Matric, Social-Economics, Entrepreneur

Introduction:

To discuss universal free education, we must begin with the Prussian Empire. Prussia was the first country in the world to implement universal education, characterized by its emphasis on patriotic education and practical functions. Its aim was to train students to become "universal soldiers" to serve the unification of Prussia. This comprehensive vocational training institute, combining agriculture, industry, and military training, was not only one of the earliest institutions in the world to implement compulsory free education but also one of the earliest systematic vocational training institutes established globally. Most of its graduates later served the government (in the German unification movement) [1].

After World War I and World War II, countries worldwide desperately needed to rebuild. However, in order to learn from the lessons, all countries reached a consensus and unanimously decided to allocate funds for free education. As a result, in the late 1950s and 1960s, European

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and American countries, as well as Southeast Asia and other regions in the 1960s and 1970s, actively promoted free and universal education.

In 1972, Hong Kong implemented a nine-year free education system, providing compulsory free education from Primary 1 to Secondary 3. School-age children could apply for placement in the central government from the age of six to receive free education. This universal education system benefited families from all walks of life, especially those from grassroots backgrounds. Many family members went from being illiterate to becoming literate and knowledgeable intellectuals. The emergence of these educated youth provided ample nourishment and space for the economic transformation of the 1980s and 90s.

The universal education implemented in Hong Kong at that time also referenced the standard model of Germany, focusing on basic education. In the 1960s and 70s, Hong Kong's light industry was booming and full of vitality, and there was a great demand for labor. Child labor was everywhere (at that time, there was no perfect labor law and child labor was legal). Therefore, under such circumstances, the provision of universal free education was also given a period of 9 years (until the age of 15). In reality, the products of education (labor force) serve capitalists and provide an important foundation for economic upgrading and transformation. Of course, this is only one reason. Another reason is that after the 1960's incident, the British government realized that implementing large-scale colonial education was essential for regional stability. Therefore, in addition to education, free public housing was also a new form of policy reform.

This article focuses exclusively on the areas of economic logic that derive education serving the workforce and transformation. In practical terms, free compulsory education has a significant impact on the world and Hong Kong, especially in the transfer of technological knowledge, which has become an essential tool. Functionally, Hong Kong's inclusive education system of the 1970s indeed provided substantial support for Hong Kong's economic transformation, and the educational outcomes gave capitalists (entrepreneurs) a solid resource that can turn knowledge into economic competence. The workforce (not illiterate) also laid an important foundation for industrial upgrading and transformation.

Alongside with the new millennium, Hong Kong's education also underwent new changes. First, the Hong Kong government extended the nine-year free education to a 12-year universal education order, allowing students from Primary One to Form Six to enjoy compulsory free education. Second, it promoted liberal studies education, which was originally designed to cultivate students' independent thinking ability and enable them to become global citizens in the 21st century.

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But, following a series of events in the 2010s, the authorities realized the need for structural reforms to the curriculum. First, they abolished Liberal Studies (in 2022), and then established National Education, aiming to cultivate discerning and patriotic citizens. Patriotism became synonymous with the subject, and its compulsory nature made it a mandatory component of public examinations. This change in shift, the function of compulsory education not only brought about a qualitative change in the future service of the city's workforce, but also, in the long run, led to ideological alienation, shifting the city's future workforce from capitalist enterprises to patriots who prioritize the nation's interests [1].

Transformation of knowledge leads to the transformation of economics competency

According to Columbia University [2], the Economic Value of Social and Emotional Learning, Center for Benefit-Cost Studies of Education (SEL) were evaluated by the Columbia studies. Researchers found that improving education shows measurable benefits that exceed its costs, often by significant amounts. Specifically, for every dollar schools spend on Education, there will be an additional social return of almost nine dollars per student [3].”

Some International research [3][4] also indicates that every dollar invested in education projects generates six dollars in economic returns. However, when we discuss education, we invariably focus on its economic benefits. In a utilitarian society where efficiency and effectiveness are paramount, education is about results, and society is about benefits. Therefore, there are certain expectations regarding the returns from education. Utilitarianism and functionalism inevitably erode the essence of schools (e.g., performance evaluations, student outcomes). So, how to transform knowledge and skills into social income becomes a crucial issue in education and economics studies. Additionally, much research indicates that when facing economic transformation, diversified skills training is more effective at mitigating the impacts of such transformation compared to single-skill training [4]. For example, Chinese traditional businesses format usually in particular, tend to train employees at minimal cost, resulting in a workforce with limited, singular skills, in contrast to the diversified skills training prevalent in Europe, such as Germany. Therefore, European countries like Germany were able to smoothly navigate the trends of national social integration and economic transformation in the 1990s, successfully transitioning to the unified European Union system. As our paper suggested, which is mainly attributed to Germany's diversification with a unique domain style of education.

In the context of the ongoing transformation driven by the knowledge economy, the pivotal role of entrepreneurs in contributing to societal advancement cannot be overlooked. For instance, prominent technology corporations in the United States, such as Facebook, Google, and Apple, predominantly originated from small-scale university startups that emerged over the past decade or two. These entrepreneurial ventures were often initiated by university scholars or early-stage

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innovators, who subsequently expanded their operations into regional industrial clusters, exemplified by Silicon Valley. This process underscores the importance of entrepreneurial activity in fostering innovation ecosystems and regional economic development.

Suggestion for an innovative model assumption: (EDU-S-ECO Model)

We adopted the polynomial distribution as a methodological framework, specifically within the context of economic mathematics modeling. This approach elucidates that the success trajectory of startups is not purely stochastic; rather, it is influenced by a confluence of factors such as strategic educational investments, including national funding for education, the incubation of entrepreneurial knowledge and innovative ideas, and the rapid expansion phase characteristic of high-growth ventures. Consequently, the probability of startup success manifests a complex interplay between inherent randomness and deterministic elements driven by these underlying strategic and developmental parameters.

Education-Social-Economics-Model:(EDU-S-ECO-Model)

Under the maximum probability estimate:

$$Expect(Y|T) = e^{e'T}$$

$$Enterperneur$$

The probability density distribution is:

$$P(y|T:\theta) = \frac{[E_E(Y|T)]^y \times e^{-E_E(Y|T)}}{y!} = \frac{e^{y\theta'T} e^{-e\theta'T}}{y!}$$

this$E_E YT\ Model\ (Expectation\ Income\ Time\ (brewing) Model)$

Transform into: Let $T_i \leftarrow \mathbb{R}^{n+1}, i = 1, \dots \dots n\ \&\ T = 1, \dots \dots \infty$

Based on the highest probability estimation: $L(\theta|T,Y) = \frac{\prod n}{i=1} \frac{e^{y_1\theta'Ti} e^{\theta'Ti}}{yi!}$

Labour Time Income

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This implies that increased investment in educational resources, coupled with extended timeframes, enhances the likelihood of effectively developing highly successful entrepreneurs, vice versa. And when startup entrepreneurs are successfully nurtured, they can further self-develop through logarithmic pathways (e.g., Facebook, Yahoo, Google).

$$\log L(\theta|T,Y) = \sum_{i=1}^{n} \left(yi\theta' Ti + e^{\theta' Ti} + \log(y_i!) \right)$$

Therefore, a self-sustaining regulatory mechanism will form, optimizing its performance through iterative enhancement. This approach will incorporate by advanced terminology from professional education theories and economic models to ensure robustness.

$$\log E(\theta|T,Y) = \sum_{i=1}^{n} \left(yi\theta' Ti + e^{\theta' Ti} \right)$$

Our model of maximizing the logarithmic channel can be used to estimate an extension of economic competency: with more time, resources, and effort invested in education, greater innovative economic impact will be achieved. For example, Silicon Valley's development progresses from small factories to large factories and then to regionalization.

Technology is rapidly expanding to regionalization, Using Polynomial Model

$$Sub\ 1.2 + 2.3 + \cdots \ldots + n(n+1) \rightarrow for\ positive\ integern$$

$$constant\ ai, i = 0,1, \ldots \ldots n,$$

$$y = a_0 + a_1 x + a_2 x^2 + \cdots$$

As the nation continuously its investments in educational infrastructure and human capital development, the pivotal role of entrepreneurial activity, particularly within startup ecosystems, becomes increasingly evident in fostering regional industrial diversification and enhancing labor market resilience. Furthermore, the proliferation of successful entrepreneurial ventures and the strategic expansion of regional commercial chains significantly contribute to the structural evolution of the local workforce, with a pronounced impact in high-technology sectors. These

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dynamics underscore the interplay between entrepreneurial success, regional economic development, and human capital formation, reinforcing the importance of integrative policies that support innovation-driven growth.

Our Innovative Education-Income-Transformation Social Matric model can serves as a framework for elucidating the EYT (Social) Matric Model, systematically organized in a tabular format comprising four columns and three rows. This model integrates key socioeconomic and educational variables to analyze the interrelated processes of educational development and income transformation within a social context.

Ongoing Educational investment (time N)	$f_0 f_1 f_2$	EYT (Social)
$N+1$	$+++$	More than 3
1	$++$	2
N s	$+$	1

As our framework states, the ongoing educational investment (time N) will contribute to the potential entrepreneur's success, which in turn benefits the region's growth and its workforce more than the sum of its parts (1+1>2). This shows that the initial educational investment (in time N) has a strong correlation with the entrepreneur's success, leading to the growth and expansion of the enterprise and the development of the regional economy, which significantly improves the socio-economic situation, especially employment. The results indicate that continued large-scale investment in education is a key factor in the initial success of entrepreneurs, especially from the high-tech industry, that can establish a positive (+) relationship. Therefore, education plays a vital role in economic and regional growth.

Conclusion

Based on our study, we interpret the underlying mechanism linking investment in education to future economic growth. We found that successful transformation relies on substantial investment in the educational sector. In this research, we innovatively discuss this mechanism's success and have developed the EDU-S-ECO Model—an Education-Economics-Social Model. This model can project the economic and social efficiency benefits gained from every dollar invested in education. In addition, we innovatively develop an EYT framework, which can estimate the potential of persistence in educational investment in time N, can deliver additional social advantages.

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We hope this research can contribute to society and the world.

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