Educational Attainment: Success to the Successful

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Abstract: Systems archetypes are patterns of structure found in systems that are helpful in understanding some of the dynamics within them. The intent of this study was to examine educational attainment data using the success-to-the-successful archetype as a model to see if it helps to explain the inequality observed in the data. Data covering 1990 to 2009 was collected from the United States Census Bureau for the United States, as well as for the States of Georgia and Washington. Findings indicated that this archetype is useful in explaining the variation, and there are several other terms and concepts that are helpful as well as the terms / concepts: success-to-the successful, the rich get richer, Pareto's law, Zipf's law, and power law distributions are related and sometimes used interchangeably.

Keywords: School systems, systems archetypes, success to the successful archetype, educational attainment

Introduction

Systems archetypes are, as Senge (2006) noted, *patterns of structure* found in artificial, natural, and social systems. These archetypes, few in number, provide a toolkit for thinking about social systems such as corporations, government agencies, military organizations, and educational institutions, among others. These archetypes are helpful in understanding patterns of structure within systems. This article considers one specific archetype, success-to-the-successful (STS), to examine educational attainment level in the United States.

Meadows (2008) described STS as competition for resources. Whether in business, education, or even ecology; those who are successful attaining the most resources tend to expand their success further and further, sometimes at the expense of those who have minimal resources. In business, leaders use knowledge, experience, and organizational politics to expand their success. Meadows provides an example of the game of Monopoly that resembles business success where players compete to buy property and expand hotels that bring more and more success as the game continues. In education, how successful students are depends on availability of resources to expand knowledge, including availability of quality schools and teachers, personal desire to learn, financial status, and family and community

support. In ecology, animals compete for food and safety to determine which animal rises to the success of the successful status. All walks of life compete for resources and those who are the successful will have more resources to continue to be more and more successful.

Schools are Social Systems

Schools, from grade school to universities, are complex adaptive social systems, wherein a system is a set of components operating for a common purpose (Forrester, 1971), and complex adaptive systems are those exhibiting adaptation (altering behavior for survival), signal or information processing (Mitchell, 2009), competition / cooperation, and resilience, among other characteristics. Complex adaptive systems or *cas* exist in an environment that includes the economy, technology, society, government, and legal, and the physical environment wherein each of these five environmental elements is itself a complex adaptive system. *CAS* are perturbed by changes within and among these environmental elements. Thus, a *cas* is not at equilibrium, but is continually processing environmental signals or information, adapting to outside influences (threats, opportunities, or exhibiting resilience to disruptions), while *cas* components interact and adapt to other internal components.

Examining school systems through the lens of complexity is of interest as general systems' characteristics can be identified within specific systems and, thus, subsequently described. Consider the changing environment of a school system. Economic forces affect available funding, which affect school budgets for salaries, school supplies, and building maintenance. Hardware technology advances such as personal computers, tablets, and smart phones; communication technologies such as the Internet and wireless networks; and software products such as search engines, word processors, statistical packages, simulation packages, and academic courses; among other digital advances such as eBooks, offer new challenges to schools in terms of educational tools, techniques, and even the physical location. Emerging technologies such as robotics; 3D printing; virtual labs; and the digitization of biology, chemistry, and physics; simulation; and artificial intelligence will bring even more changes. Societal changes such as changing demographics; attitudes toward women, immigration, and sexual orientation; along with increased potential mobility affect school systems in various ways as well. Government tinkering with policy changes affects schools in having to adapt to a new policy *flavor* every few years. Finally, physical environmental changes affect school systems directly or indirectly given various societal responses. For example, Hoffman (2012) noted, while there is scientific consensus on climate change, there is little public consensus that the climate is changing. This notion of a culture war may well lead to some controversy over teaching methods in schools, not to mention the current conflicting discussion in public forums. Increasing traffic congestion and busing within major cities are other physical environmental changes affecting school systems. Taken together, these changes could appear to be more than challenging to a school system.

Primary components of schools include students, faculty, administrators, parents, and policy makers. These groups interact and adapt to each other, as well as to the external environment, as they process information in a changing world to make decisions today and for

tomorrow. For example, if some students have access to advanced technology, what should be done for those who do not have such access? This simple question becomes more interesting when grades are given as grades affect what students might do throughout their lives. This question will become even more interesting when some students have access to artificial intelligence or other advanced technologies and other students do not.

Systems exhibit resilience if they are to survive. School systems exhibit resilience by adhering to established policies, procedures, and culture to resist environmental change. One such school policy might be, *not invented here*; that is, policies not originating with the school system are not of value and may be a threat. Schools may strive to maintain their culture including pay structure, reward structure, values, and such. For example, schools reward students with academic grades, praise, promotion to the next class in sequence, among others and reward faculty with tenure, pay raises, and promotions. Rewards are for good behavior or following the established rules of norms, values, and conduct—essentially adhering to the established culture.

Success to the Successful Archetype

The STS archetype describes a pattern wherein competing groups or individuals for limited resources gain some advantage and, over time, if this advantage continues, one group or individual can significantly outperform the other group or individual. The reward is not so much as being better, but *first*. This behavior can be observed in school systems, wherein good behavior or performance (adhering to established rules, values, norms, and expectations) are rewarded with good grades. Students compete for grades—a limited resource—and those most successful throughout high school not only have good grades, but also have an opportunity to go on to college if the entry-level criteria is met or exceeded, as there is a limited resource-- space in college, especially good colleges. The process is repeated at the undergraduate level and those students most successful have an opportunity to go on to graduate school, and then perhaps to complete a terminal degree. See the success-to-the-successful archetype in Figure 1 for a generic model. This concept is sometimes referred to as *the rich get richer* or Pareto's law. That is, given a set of students in this case, the success-to-the-successful archetype expects that the distribution of degrees or educational attainment would follow Pareto's law, where few students would achieve an advanced degree but most would have something less. Adamic (2002) noted that other terms used to describe these phenomena are Zipf's law and power-law distributions. In each case, few agents have most while most agents have less, or few events rarely occur while most events occur more frequently. For example, few people have most of the wealth, while most people have far less; a few cities are very large, more cities are mid-sized, and most are small towns.

Historical data related to educational attainment, from Kindergarten through advanced higher education, shows success is not only an individual's effort, but also the effort and processes from multiple stakeholders (Smith, Anthony, Elliot, Davis, 2009).
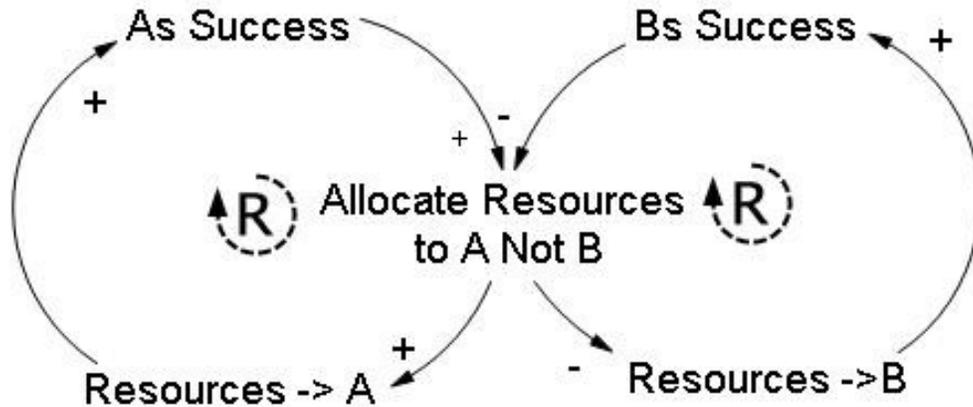
Success to the Successful Archetype

Figure 1. Success to the successful archetype.

Data Collection

We collected secondary data from the United States Census Bureau for the United States, as well as for the States of Georgia and Washington as specific examples—see Tables 1, 2, and 3. This data covers the years 1990 to 2009. Educational attainment levels in 2009 were somewhat higher than year 2000, which in turn were somewhat higher than 1990, thus a gradual increase in educational attainment over this timeframe.

Findings

We prepared three tables covering years 1990, 2000, and 2009 with data from Georgia and Washington states as representative states, and the United States overall. Each table presents two degree levels and one diploma level: a high school diploma, a bachelor's degree, and an advanced degree—a master's or doctorate degree. These numbers are for adults over the age of 25.

Table 1. *Educational Attainment – 1990 (United States Census Bureau, 2012)*

	Advanced Degree	Bachelors	High School
WA	7.0%	22.9%	83.8%
GA	6.4%	19.3%	70.9%
US	7.2%	20.3%	75.2%

Table 2. *Educational Attainment – 2000 (United States Census Bureau, 2012)*

	Advanced Degree	Bachelors	High School
WA	9.3%	27.7%	87.1%
GA	8.3%	24.3%	78.6%
US	8.9%	24.4%	80.4%

Table 3. *Educational Attainment – 2009 (United States Census Bureau, 2012)*

	Advanced Degree	Bachelors	High School
WA	11.1%	31%	89.7%
GA	9.9%	27.5%	83.9%
US	10.3%	27.9%	85.3%

Success to the Successful

The percentage of degrees follows the pattern expected by the STS archetype or Pareto's law based on observation of the data, wherein the advanced degree level falls within the 20% range and the bachelor's degree to a high school diploma fall into the 80% range. Factors that people have control over such as wealth attainment, income, and popularity also follow the pattern expected by the STS archetype or Pareto's law as well for the same reasons. While factors such as drive, motivation, family success, competitiveness, role models, opportunity, and so on also contribute to educational attainment levels, grades earned by students are earned in part by student effort, something a student can control. The STS archetype seems a useful model to help explain the educational distribution of grades and subsequent educational attainment of students.

The STS system exists in the school system (k-12 and higher education) thematically as a whole-system of stakeholders that all should contribute to students' success and continued success. Smith, Anthony, Elliott, and Davis (2009) suggest the following stakeholders impact the success of students: Educational leadership, teachers, family, community, and the student.

Yukl (2006) addressed awareness of self and accountability of individual efforts as a catalyst for success. Smith et al. (2009) presented shared success in the K-12 and higher education school system with the following themes:

1. Educational leaders need to develop and provide high quality curriculum and programs that represent the technology and future needs of industry to ensure students have the opportunity to learn what is necessary for success.
2. K-12 teachers and higher education professors need to provide innovative facilitation, quality feedback, caring attitude, and genuine desire to provide the necessary information for students to embrace for success.
3. Family (home environment) needs to be supportive with a caring attitude, financial support, knowledge equivalent to or higher than the educational goals of their student family member…or provide opportunities for mentors with the knowledge and skills, to provide emotional support so students' minds can focus on the educational opportunities.
4. Community and social support. Business leaders, community groups, and educational leaders need to collaborate to fill any gaps in knowledge, emotional, and financial needs.
5. Students need to exhibit personal accountability. If all stakeholders identified in these five themes share and collaborate all stakeholders share in STS.

With these themes collaboratively shared amongst all stakeholders, a supportive stakeholder community helped students succeed and work through the philosophy behind STS.

The combined efforts of multiple stakeholders can be described with the following acronym (Smith et al., 2009):

S—Sharing
U—Understanding
C—Caring
C—Creating
E—Engaging
S—Students brings
S—Success

Conclusion

From a uniform distribution of student performance in the first grade, the distribution changes remarkably as the quest for higher education continues. This distribution curve is influenced by competition for a limited resource (grades and admission to college and graduate school) along with student interest, drive, access to funding, and intellect and the resulting pattern follows Pareto's law or the STS archetype, wherein approximately 7% of adults

have an advanced degree, about 28% have a bachelor's degree, and about 85% have a high school education.

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