**Declining Preference to STEM Courses in America**

Name

Institution

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**Introduction**

Since it has emerged as a major concern in America, that there is a new trend in which fewer younger people are choosing science based and engineering causes, research surveys conducted point to a common fact that most American students like sciences courses, but have little aspirations in pursuing science careers. Many governments across the globe, including the United States, as well as organizations have expressed fears in this trend, having made a common observation that an inadequate number of current scholars are choosing to pursue careers in Science, Technology, Engineering as well as Mathematics (Ackerman, Kanfer & Beier, 2013). More particularly, these observations indicate that the changes in the trends of choice occur at the age 16, when the upcoming scholars divert their attention to other courses other than the STEM categories.

In this case, the concerns by the American Government and technology-based organizations either have predicted, or are already experiencing a gap in the relevant skills in the fields of STEM. As a global concern, there has been the need to investigate the circumstances surrounding the trends, with most studies showing that the environment of upbringing and learning for the students plays a pivotal role in influencing their career decisions. There is an equally pressing need to enhance a culture of spreading scientific literacy and aspirations across all the American societies, as well as across the globe (Barr, 2014). The K-12 education system in the United States has to improve in order to meet the challenge of maintaining the nation’s status as an international leader in the fields of Science, Technology, Engineering, and Math, in the face of increasing competition from other nations.

**Why Science Participation Matters**

As indicated in the introductory section, there are many governments and technology-based organizations that have expressed concerns over the declining number of young people that choose to study science in the modern era. The concern has had a major touch on the younger learners aging from 16, whose attitude with the Science, Technology, Engineering, and Mathematics (STEM) courses has changed. In addition to the concern over the declining number of younger people choosing to study science-based courses, further concerns involve the narrow profile of those who chose to study and pursue STEM careers. In this case, there are fewer women, working class as well as some of the minority groups in the United States, who have little to no presence in physical sciences and engineering (Barr, 2014).

However, the most important aspect of this discussion is the role of these STEM courses to the national development agenda. There are various STEM industries, which require qualified personnel to continue their pivotal role in the national economy. The main concern involves the possibility of sustaining these industries in an era characterized by reduced interests in choosing STEM based career by younger people. The current trend of declining interest in STEM based courses may seem manageable for the current operations within the respective industries. However, the greatest challenge stands in the future of these companies, which would have run out of labor from specialized individuals after the retirements of the current bunch of experts in the industries.

Despite the remarkable roles played by STEM industries in enhancing national economic prosperity and competitiveness, several players in these industries have either predicted, or already experiencing inadequate number of specialists from science, technology, engineering and mathematics. It is a concern that does not only threaten the lifeline of such industries, economic growth and competitiveness of the nation, but also impedes the social welfare of the larger society. It is important to note that the study and subsequent pursuit for scientific careers do not only have a place in economic growth, but they also have immense benefits to the individuals and their communities, since they enhance a sense of active participation in developing and shaping both social and technological aspects of such societies (Barr, 2014). In this case, based on the high demand for individuals with such training, as well as the rising mismatch with the possible supply, there is an urgent need to conduct a comprehensive audit of the education and societal systems, with an aim of determining why younger people have a declining preference to the choice of STEM based courses.

**Importance of Studying Children’s Aspirations**

There have been previous research activities that have the crucial age of young people, during which they are prone to the influence of their elders such as parents and other elders. Research shows that most of the younger people at the age of 14 have a fixed attitude towards the possibility of studying a science course, as well as pursuing a science related career in their subsequent lives. There are various reasons why it is an important venture to comprehend the basis of aspirations for younger people, especially in studying science in general and spatial causes in particular. One of the reasons is that childhood aspirations can act as a source of hint for the possibility of a choice that the child would make.

However, such aspirations are not absolute indicators of the exact nature of choice that the children are likely to make for their future careers. For instance, research shows that students who aspire to study a science related course at the age of 14, is three and a half times more likely to pursue a science related course in their future careers, as compared to those who do not manifest such aspirations. At the age of 14, students have a chance to develop long-term goals, some of which include career goals. It is possible, therefore, that they can form long term career goals to study science-based courses, which would lead them STEM careers in their future lives.

**Reasons Why Science Participation is declining**

**Aspirations higher than Science**

Analyzing the various reasons why fewer upcoming scholars choose STEM careers, it emerges that most of them aspire with their future lives, aspirations that most often tend to be higher than science. Most of the younger scholars have a feeling that STEM based courses often take too long to study, practice and acquire the excellence required for one to excel in life. These scholars, mostly aged between 10-14 have a general feeling that STEM based careers cannot render the desired nature of their future lives, forming the basis for their choice of managerial professional and less technical courses. According to these surveys, majority of the students also state that there is a sense of pressure from their parents, who want them to do well in school. The implication of such pressure is that students tend to make lighter choices that are less demanding of them. According to most students, the STEM based courses are complex, time consuming and hard to pass.

When a parent puts pressure on a child to perform well in school and excel in their life, some students begin to perceive the pressure at the age of 10-14, when they begin to experience a sense of future responsibility. When they observe the nature of responsibilities undertaken by their parents, they begin to shape up their lives at early stage, in a manner that would make it less cumbersome in future lives when they assume responsibilities. For example, children who have parents in any of the STEM based careers stand the highest chances to be influenced in various ways, with reference to their decisions to pursue STEM based courses.

Depending on the experiences drawn from parents’ lifestyles, duties and responsibilities, as well as how well they cope with their general lives, children can make decisions to follow their parents’ career lines, or choose their own ambitions. Children, who admire their parents’ careers are more likely to choose science or spaced based courses, unlike those who feel discouraged by the nature of their parents’ careers. Given the complicated and busy schedule often manifested by parents and elders in STEM based careers, most students feel scared, threatened, and discouraged to take similar career lines.

**Familial Commitment to Science Training**

Just as discussed in the previous section, parents, as the immediate environment for most students, have a major role to play in helping their children in making career choices. In this case, there are two sides of the coin. Parents can either render a positive influence on the development and choice of a career, or create an environment that discourages a child from making certain career decisions. Given the nature and extent of family influence on the possibility of a student choosing a career, studies have pointed to a common fact that children’s decision to take science based courses depend on the amount of ‘science capital’ owned by their family members, relatives, or other people of significant influence to their lives.

The more the science capital the family owns, the higher the chances that a student from such a family would get an influence of choosing a career in STEM. However, for students from families that either lack, or have insignificant science capital, there are reduced family influences for them to choose a career in STEM. Science capital refers to the overall science based qualifications, knowledge and understanding about science, interests as well as social contacts. Social contacts in this case refer to the presence of contacts between any of the family members and other people in the science based careers. There are studies that have pointed to the fact that science capital occurs evenly across societies, which should be a level playing field for all families to exert similar influence on their children to make relevant science based careers.

However, the challenge associated with science capital is that it has become possible to assume that those with higher science capital belong to middle economic class. Even though it is not always the case, the probability of a finding a member of the STEM careers in the middle class economic class remains relatively high. Furthermore, it is not always the case that all the middle-income earners have sufficient science capital. For students, especially those aged between 10 and 14, who are optimistic for economic prosperity, such assumptions have been sources of discouragements, a trend that has led to a significant reduction in the number of younger Americans joining the STEM courses.

**The association of braininess to science**

Since time immemorial, there has been a culture in the education system, which has instilled an attitude among learners, that the complexity of science-based courses requires very brainy people. This culture has created a trend in which teachers and parents classify the learners into different categories based on the level of intelligence. Even though such classification would be more objective if they would be based on potential performance of the learners, there are chances that children pay less attention to their individual capabilities to perform. More particularly, there are students who have shown that they feel threatened and intimidated by the culture of associating science to being brainy.

Many of the students begin to manifest the ‘not for me*’* attitude as they tend towards age 16, when they can evaluate their future lives as a way of taking charge. Even though there are students who have the ability to perform well in any of the STEM courses, the fear they develop about the complexity of science subjects hinder them from making decisions to pursue science-based courses. For instance, surveys indicate that there are approximately 80% of younger students, who have believed that science courses are complex, and belong to the brainy students. The number of such students continues to rise, a trend that reduces the total number of younger scholars joining STEM courses.

**The influence of the male (white), middle class image of STEM courses**

There are a set of factors that determine the possibility of a student aspiring to take a science course in future. These factors revolve around the gender, race, as well as the relationship with at least one person who has a career in any science related course. On one hand, surveys indicate that a given student has higher chances of choosing a science course past the age of 16 if he is male and of Asian origin. Moreover, such a student also has higher levels of cultural capital, is in the top set for a scientific course, as well as when they have a family member who is running a career in any of the science related courses. On the other hand, there limited chances that a white female student would choose any of the science and space related courses (Dougherty, Oliver & Fergusson, 2014). Furthermore, a student who sees little or no opportunity in a science related course originates from a family that has low cultural capital, is at the bottom set, and lacks any relationship with an individual running a career as a scientist.

The influence of gender on the possibility of a student taking a science course has often existed from the early periods of the students’ education lives. Even though most girls often rate science subjects as their favorite courses, surveys have indicated that they have relatively less chances of taking science subjects. Instead of science subjects, female learners have shown higher preference for art-based courses, as well as care-based subjects such as nursing. In this case, female students tend to subscribe to the culture of fear given to the science subjects as a tough undertaking, which requires the brainy, masculine male students. In addition to the prevailing attitude in which students believe in the complexity of the science subjects, female learners also fear the long periods of endurance as one completes a science course.

They tend to compare and choose art and care-based courses, which take relatively short periods to complete and enter the job market. The need to gain economic prosperity in life, accompanied by other pressures from the families also influence female learners to prefer ‘lighter’ courses that take shorter time to complete, as one prepares to enter the job market. In the American society, there are female students who define themselves as *girly,* or highly feminine. Learners who belong to this category are less likely to choose any science related courses. In this case, there is an increasing adoption of modern female trends such as modelling among younger learners (Dougherty, Oliver & Fergusson, 2014).

Such trends often demand that members adopt the culture of extreme femininity, which reduces the possibilities of choosing a scientific course for a future career. Studies indicate that the girls who show a higher preference in choosing STEM courses tend to be more academic oriented, and are more likely to associate themselves with the male counterparts. There are rare cases where the *girly* girls have also shown preference to pursuing STEM courses, especially at the younger ages of between 10 and 11. However, such they often tend to drop such aspirations as they continue to study, especially when they reach 16.

Analyzing the influence of racial factors in the possibility of a younger American learner choosing a STEM course; it is evident that there are inequalities in the education system that denies black students adequate grounds for career choices. Even though it remains a matter that attracts public silence despite its huge reality on the ground, acts of racism, in which non-natives lack access to equal educational opportunities affect such students. There are cases where a non-native student with a remarkable ability to pursue a STEM course lacking an opportunity to fulfil such choices (Dougherty, Oliver & Fergusson, 2014). However, it is important to note that the ability and the subsequent number of students taking STEM courses for future scientific careers would fill the gap in skills required, regardless of their races. Consequently, the non-native students such as the blacks, whose number in the United States has equally risen, show a declining trend of participating in scientific courses and careers.

# The Role of Education Policy in Shaping Children Aspiration

There have been arguments that the American education policy, as well as those in other countries, have assumed the fact that many students have continued to manifest low aspirations, especially for pursuing science related careers. In recognition of this worrying trend, and as response to save the future of education, successive American Governments such as the Obama Administration have called for the need for students to raise their aspirations, as a way of enhancing the possibility of higher educational achievements. However, there are also cases where younger scholars have manifested higher aspirations to achieve academic excellence, as a way of securing better life for their future. The main concern for such students is the basis of such aspirations, since majority of them have shown much preference to the less technical managerial and professional courses. Research shows that 91% of the American students at the aging from 14 agree that they have an inherent need to make a lot of money from their careers. In addition, approximately 81% of the students also have high aspirations that they need to go to the university, regardless of the courses they would want to study.

Just as in America, other students from across the globe also have the urge to pursue careers that would help them make lots of money through income and other money making opportunities. When a student has the urge to make money, they often tend to think of less complex careers that take relatively less time to complete. It is a way of ensuring that they get to the job market as fast as possible, usually after completing their studies to acquire the relevant skills. In addition to the urge to join careers that facilitate students dream of making money after their studies, it also matters for them on the kind of courses they need to choose to acquire the most relevant skills for the job markets.

In such cases, many students choose to align their professional lives towards arts and other professional careers that are less demanding to study, but have adequate opportunities for making money. For example, there are various studies indicating that the students from years 6 to year 9 show a higher preference for careers in sports, arts, teaching as well as medicine as among the most popular aspirations for their future lives. When students get to the 8th and 9th year of study, business courses often remain the most popular aspirations. In the long-term, governments and organizations continue to witness a declining number of students who have aspirations to becoming scientists from ages 8 and 9. Despite the efforts by most governments including the American governments to increase the aspirations among younger students taking science courses, there is still little change in the percentage of such students registering their interests in the STEM based careers.

One understands that the variation in the rates of compensation for individuals in different careers also depends to some extent on government policies. If such government policies do not favor STEM based careers in terms of how well professionals get compensation, there are chances a huge population of younger scholars, who have money making ambitions, tend to scramble for the chances in the other careers including art-based ventures such as management and care-based professions. Such trends do not only occur in the United States, but also remain widespread in different countries across the globe. Individual governments and organizations should focus on the need to enhance the compensation policies to improve the earning levels for individuals in the science careers.

## Implications for Policy Development and Practice

# Creating a Shift in the Policy Discourse

There is need increase the possibility of students choosing to study science subjects, by increasing their general interests as well as building science capital in their surroundings. From this discussion, it is evident that the declining trends in the student aspiration to study science courses do not only occur in the United States, but also occurs in the other nations, where younger scholars have higher preferences for other careers that promise higher economic income. Research surveys have indicated that the low levels of participation in the STEM based courses do not originate from the assumptions that students do not like science courses (Dougherty, Oliver & Fergusson, 2014). The attitude observed among the students depends more heavily on the academic and career culture that exists to influence the decisions made by the students, especially between the ages of 10 and 14.

When national governments and organizations, most of which have shown concern over worrying trends of declining STEM participation develop strategies to render a revolution in the system, it is important that they base such processes on the increasing the overall interests among students. There are many ways through which the relevant bodies or authorities can spar up the low rating interests in students, who have shown higher preference to studying art related courses. For example, as discussed above on the need for creating and sustaining a base for science capital. Science is one of the sources of interests, motivation and the required inspiration for the students.

In this case, research studies support the fact that students who have at least a relative around them, who runs a successful career in any of the STEM based courses have higher preferences for science studies as well as subsequent pursuit of such subjects. Relevant government institutions and independent organizations should, therefore, invest in the development of adequate science capital by running attractive and promising scientific projects that would spur scientific interests among the young scholars. Considering the enormous influence science capital has on the ability of students, especially those at age 10, in making decisions to study and practice STEM based courses, it is important to capitalize on the opportunity to trap major youth potential. The younger people can use such science capital as a source of motivation in supporting their decisions to study and pursue STEM based careers in their future lives.

# Establishing a culture of Early Scientific Intervention

Even though it is sad reality in the world of academia that the study of science, engineering, technology, mathematics, as well as space related courses has become less popular over the recent decades, such trends continue to face and cripple the future of science and related careers. It is a fact that there is an existing attitude of negativity among younger learners, who have a belief that the scientific courses and careers do not belong them, and that their complexity require a distinct class of students. When such students have to make long-term career choices, there have been more preference to art-based courses. In this case, such trends tend to pass from one generation to another, which creates a culture in which most learners have phobia for any science related courses.

Based on the need to achieve economic prosperity in future lives, younger people have believed that one has pursue a career away from science. It is in tandem with the existing euphoria that majority of the middle income earners are people who run careers in the STEM industries. However, with the hope and aspiration of doing better, usually than their middle income earning parents, younger people tend to make decisions that tend to vary and differ from those of their elders. It is at this stage that children below 16 can acquire relevant influence based on appropriate career intervention. Since research activities have shown that there are students who fail to choose science related careers despite their remarkable abilities, it is important that such career interventions identify the scientific capabilities of students in helping them develop appropriate career choices.

In cases where there are students with a potential of studying any of the science related courses, such career interventions should begin at early stages when children have not settled into long-term career decisions. The man theme of the early career intervention involves helping the children choose the right career path, based on their capabilities and interests, other than relying on prevailing negative perceptions about certain courses. Such perceptions and inappropriate attitudes influence the kind of career choices the students make, while creating a gap in required knowledge and skills in the future of science and technology (Dougherty, Oliver & Fergusson, 2014).

**Establishing Interventions that break the *Science=Scientist* attitude**

There is a common perception among the young people that whenever one pursues a science related course, then they have a permanent destiny with scientific career. In such cases, the most intriguing fact that most of the young learners fear to become scientists, based on the prevailing attitudes surrounding the lifestyles led by scientists. As indicated in the previous discussions, there are studies have shown that majority of the middle income earners are people who run science based careers. Such statistics often scare younger people, and reduces the probability of science aspirations. As a form of intervention, there is need to develop strategies that broaden the young minds, by avoiding the pervasive perception that one has to become a scientist with predefined lifestyles by studying a science related course.

In developing the efforts to transform the current pervasive ideologies about the study and possible life career in science, science educators have a major role to play in ensuring that they instill the most appropriate insights into the minds of the students. For example, it is important to guide students into understanding the fact that the study of any science related course leaves an individual with various career options. An individual, after studying science, acquires a unique opportunity to face life with an open mind to utilize the enormous knowledge and skills acquired to enter any other career of choice. In addition, while interacting with the young science learners, science educators also have a role in guiding them in understanding overall value and prevalence of science in everyday life.

# Embedding STEM career awareness in the school science lessons

In the modern era of education in the United States as well as other countries such as England, there is a common concern that career education, including dissemination of career information in form of guidance, being poorly resourced in most schools. It implies that most countries affected by such concerns have less effective career information. More particularly, governments and relevant organizations have raised regarding the low quantity and quality of STEM career information dissemination. Teachers and other relevant stakeholders in education have performed below the expected levels in displaying efforts to offer proper guidance for science based careers. The important factor in this case is the fact that the missing effective career guidance plays a pivotal role in helping potential STEM students make the right decisions early enough.

Children grow up developing, modifying and fixing their minds regarding the nature of courses, as well as the types of career opportunities they wish to explore in their future. When teachers embed a program in which they boost the overall awareness of science courses in their lessons, learners get an opportunity to open their minds as they formulate their potential courses in future. Furthermore, students who do not get certain ideas and overall concepts regarding STEM based courses, they have an opportunity to obtain all the relevant and accurate answers from the informed teachers. In cases where teachers are unable to answer any concern raised by students during lessons, they can supply alternative sources of the most appropriate information required by students. Such children, who get chances to interact with adequate scientific information, develop a full sense of awareness, and tend to increase their aspirations to study science related courses, and pursue a STEM career in their future lives.

# Developing a Culture that Addresses all forms of Inequalities

Different forms of inequalities, and all their related factors, often reduce the possibilities of a child seeing science ‘for me’ past the age of 16. Social inequalities amplify the nature propagation of reduced access to opportunities for particular groups of learners in the societies. Some of the most prevalent forms of social inequalities include racism, which creates a sense of stereotyping of certain races as being incapable of taking science or other related courses. In most cases, the possibility of studying science and pursuing a STEM based career remains a preserve of certain races, while similar opportunities remain inaccessible by others, despite the natural potential in each learner. Addressing the challenges faced by such learners alienated by the boundaries of social inequalities, policy makers in the United States, and funders across the globe should consider a course for empowering the disadvantaged students.

The most significant players in possible efforts to empower such disadvantaged learners include educators such as science teachers. These players who have an opportunity to take a leading role in challenging the unwitting biases, as well as providing particular support and encouragement to the learners from disadvantaged groups (Gamse, Martinez & Bozzi, 2015). The main aim for the providing a base for support and encouragement for such students is to help them develop a new perspective about their careers, by seeing any of the STEM based courses as a potential career in the future. One such initiative occurs in the United States, which include the development of innovative attempts to bring empowerment, equity, as well as democratic forms of educating mathematics and science related courses. Educators and funders should work in close consultation to ensure that they identify such gaps resulting from social inequalities, as a way of improving the possibility of students participating in STEM based courses, based on their abilities, rather than their social backgrounds.

# Broadening the Post-16 Science Options

The narrow spectrum of courses that one can venture into, for a long period, has also formed a basis for the reducing interests in studying science among learners past 16. Traditionally, science has had the three main areas of Physics, Biology and Chemistry, which one can study at A levels. Furthermore, traditional systems of admission into such courses have also proven tight and strict, as stakeholders limit possible admissions on the basis of traditionally stipulated qualifications from the learners. The situation has created a major barrier for most students who wish to continue with their studies in science past 16. In this case, it would be a significant step to open up the narrow range of options for science potentials.

The policy makers in the United States as well as other nations, should work in close consultation in considering the overall value of forming a new A-Level science course. Such a course would aim at expanding the students minds to see wider career opportunities in science past the age of 16 (Chullen et.al, 2014). Consequently, such policies can trap bigger scientific potential in learners, who would otherwise have dropped their aspirations to study science. Furthermore, the value of such a new A-Level course would help in imparting into learners, various knowledge and skills required for day-to-day human life. Students would also apply such skills in other career paths, since they equip one with significant ideas on how to approach basic challenges in life.

# Building Science Capital with both Students and Families

As defined in the previous sections of this paper, science capital refers to the collection of scientific base, including social relationships, and scientific assets owned by a family. The presence of adequate science capital plays a pivotal role in influencing young people’s decision to choose science courses past the age of 16. Building both families’ as well as young people’s would benefit the public, by building a base for scientific literacy. The presence of adequate science capital also encourages the young people to continue with their studies even past 16, since there is a sense of hope for a brighter future.

For educators who work within STEM education systems, as well as the STEM industry stakeholders, there should be various programs that aim at helping both the learners and their families, in seeing science as possible, and a relevant option in their lives. Moreover, when different stakeholders, including educators and STEM industry players contribute by supporting learners and families by seeing the value of science in their daily lives, students develop and enhance their overall aspirations to study science as a possible remedy to their daily challenges. In this case, students begin to view the study of science, and subsequent exploration of STEM based courses as a practical solution to their challenges.

## Conclusion

The above discussion outlines the various challenges that face the American K-12 education system, which create a culture of declining aspirations among young people studying STEM based courses. It analyzes the various circumstances under which students, despite their potential and interests in science, continue to drop their decisions to study past the age of 16. The concern over the declining participation in science courses does not only occur in the United States, but also threatens the existence and sustainability of STEM industries. Based on the above discussion, it would be a significant step that the K-12 education system in the United States has to improve in order to meet the challenge of maintaining the nation’s status as an international leader in the fields of Science, Technology, Engineering, and Math, in the face of increasing competition from other nations.

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