The influence of ability tracking on the performances of minority learners

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ABSTRACT

The development of an equally beneficial and efficient teaching and learning system implies the application of multiple educational theories and methods. One method that had become prominent throughout the years is ability tracking. Based on this method, elementary and middle-school students are grouped into levels that are designated to presumably suit their skill according to developmental stages in a particular subject. Students are guided during the school years by the school system, teachers, counselors and specific guidelines. However, if the advisement available to them is biased, the students' placement to particular ability tracks can be detrimental to their future. Several educational research studies determined that African American, Latino, Native American, and other minorities are disproportionately assigned to lower ability tracks as early as the first grade. The present paper will analyze the implications of the tracking procedures upon the achievements in sciences for both minority groups and mainstream students. The minority-mainstream achievement gap has a significant impact on the professional accomplishments of the students and their future endeavors.

Keywords: ability grouping, minorities, performance, career orientation

INTRODUCTION

National educational data proves that minority students are much more likely than white students to be enrolled in low-track mathematics courses by the 10th grade (Kelly, S., 2009). Several research studies emphasized that black students are found disproportionately in lower ability groups and academic courses as early as the first grade (Entwisle, Alexander, and Olson, 1997).

Entering high school with lower levels of academic achievement and a history of less rigorous course taking is detrimental to many minority students, black students, in particular. The achievement and prior course taking are predictors of the courses that students will be taking by their sophomore year. Moreover, the course-taking history and performances in these courses can be a prevalent indicator for the sciences and engineering career choices students embrace after finishing their high-school years.

The present paper aims to understand to what extent are the natural sciences and mathematics course-taking patterns and performances responsible for choosing a science, technology, engineering and mathematics –oriented career (STEM) for several segments of student population who is part of the American system of education.

LITERATURE REVIEW

In a study published in 2004, Kelly explained that by high-school, whites are about twice as likely as are blacks to be enrolled in advanced mathematics courses. Researchers, in a quest of understanding the educational disparity, formulated the idea that the above disproportionate representation of black students in low-track courses could be a reflection of the within-school segregation (Mickelson 2001a, 2001b). The within-school segregation is considered accountable for over half the total segregation in a district (Clotfelter, Ladd, and Vigdor, 2003).

Interestingly enough, the course-taking process may have a lasting impact on a student's career. It is proven that throughout the years, a student facing various settings, from within-class ability grouping to the low tracked courses in middle and high school, may diminish his/her chances in practicing a high-demand , high-reward career of the STEM (science, technology, engineering, and mathematics) fields. Through Mathematics course taking in particular, in high school a student can increase his /her opportunities in entering STEM related careers. A study published by Adelman reported that students who took pre-calculus in high school, but had mediocre grades, were more likely to attain bachelor's degrees in STEM fields than were students with high grades who completed only Algebra II (Adelman, 1998).

Achievement, Family Background and Course Taking

The different course taking patterns are attributable to the prior school performances. Lower track placements among black students are due, to some extent, to lower achievement scores in previous years (Alexander and McDill, 1976; Heyns, 1974). Course taking and placement in specific tracks is due, also, to family background. Correlation of race with family background increases the black-white course-taking gap (Kelly 2004; Lucas, 1999).

At the same time, before a student can take a course, the course has to be offered by that school. The capacity of school to enroll students in academically rigorous courses is often

referred to as the inclusiveness of the school (Sørensen, 1970). In schools with a higher percentage of black students the probability of these being placed in an upper track is higher (Lucas and Gamoran, 2002).

As a conclusion of the abovementioned studies, it was shown that track placements are a function of both objective and subjective criteria. Whereas grades and test scores may be identified as objective reasons of course-taking patterns, the teacher's recommendations and the decisions taken by students, parents and guidance counselors are often identified as the subjective determining factors for the course-placement (Kelly 2007). Research studies also suggested that social-class inequality in course taking is caused by differential levels of parental involvement (Baker and Stevenson, 1986) or student expectations (Kelly, 2004).

The article published by Sean Kelly in 2009 discusses two potential sources of educational inequality; discrimination by school personnel, intentional or statistical, and the student decisions (Kelly, 2009, p.61). Regarding the first issue, he observes that the black-white gap in mathematics course taking can indeed be explained primarily by differences in academic and family background upon high school entry and the ways academic background is dealt with by the school personnel (Kelly, 2009, p.61). Furthermore, the author identifies another major factor- the type of school. A student's chance of being enrolled in a high track mathematics course is actually greater in predominantly black schools than in non-black and integrated schools. For the second issue, related to student decisions, Kelly did not find a big disadvantage in predominantly white Catholic schools. He noticed that the average level of mathematics course taking among all students was actually higher in Catholic schools.

Another related article, also published in 2009, discusses the effects of the decisions made by middle school students upon registering for different high school course tracks (Chambers, 2009). This study questions the term "achievement gap" and the implications of the fact that White students perform better on standardized tests due to greater ability and effort. It is suggested that while the education community always evaluates achievement gap in terms of measurable educational outputs (results in standardized tests and previous academic performance), it does not often considers the important impacts of educational inputs. The community does not always see the correlation between poor educational inputs, such as the existence of caring and well-trained teachers, quality educational resources and policies for social justice, and the output performances for the low-tracked students. The authors observed that poor educational inputs specific to low-academic tracks that enroll minority students are conducive to poor performances for students at the stage of choosing a career. The study concludes with the idea that school tracking policies are responsible for negatively affecting student achievement by separating students and normalizing this separation. The separation characteristic to tracking is ending in creating even more racial social and educational disparities (Chambers, 2009).

METHODOLOGY AND RESULTS

An anonymous survey was applied in the Department of Mathematics and Natural Sciences at an Upstate New York college for the students enrolled in the offered academic disciplines during the 2010-2011AY. The survey is given in the Appendix A of the present paper. The results of the survey are qualitatively analyzed and interpreted. It is their analysis that will help to better understand the choices young people make regarding their careers. The odds and circumstances of delineating someone's future depend not only on the individual, but also,

on the students' direct collaborators, teachers, counselors, administrators, parents, and not surprisingly, their friends and peers.

As it was mentioned, the survey included questions such as: "Were you tracked in middle-school?" and, also "Were you tracked in high-school?" From the pool of the fifteen students of the first surveying session, aiming for majors in 'Physical Therapy', 'Nursing' and 'Health Services Management', twelve of them were Caucasian. Out of the twelve Caucasian students, only four were tracked in the average level programs for Mathematics, Biology, Chemistry and Environmental Sciences throughout their middle- and high-school years. All of the rest of Caucasian students were tracked in the high-level programs in both middle- and high-school years. They also received intellectual support from their teachers throughout their school years.

From the three minority students of the first pool of interviewed students, the one African American, who planned on majoring in Health Services Management, was not tracked in any of the tracked courses of either middle-, or high-school systems. The second African American student, planning on majoring in Nursing, who understood that her success with her career occurred due to 'lessons in class', was tracked in high-level classes in Chemistry and Biology, and middle-level classes for Physics, Medicine, and Environmental Sciences in middle-school. She was also tracked in high-school for average level courses in Mathematics, Chemistry, Biology, Physics and Environmental Sciences. The medical courses were also part of her training in high-school during the high-level tracked courses for this discipline.

A third student representative of minority population within the first pool of respondents was a Chinese American student aiming for a major in Nursing. She considered that her success with her career was due to, 'hours of preparation', 'lessons in class', and also, the 'courses previously taken'. She was also part of the tracking systems in both middle and high-school at all of the disciplines named in the survey, i.e. the average-level tracked courses in Mathematics, Chemistry, Biology, Physics, Medicine, Environmental Sciences, and Engineering.

From the second pool of sixteen interviewed students, twelve were Caucasian. All, but two of these Caucasian students (who chose careers in the Natural and Health Science areas, in Physical Therapy, Nursing, and Health Service Management programs) were actually tracked in both their middle-school and high-school years. All of the tracking that they were part of in middle-school was either average, or high-tracked level courses. High-school years for these Caucasian students also included tracked courses of high-level Mathematics, Biology, or Chemistry. The rest of four students who were part of this second interviewing session were minorities such as, Polish, African American, Haitian, and Native American. With the exception of the Polish and the Haitian who were tracked in the average level courses for Mathematics, Chemistry, Biology, in both middle- and high-school, the other two representatives of minorities, were tracked in high-level classes at least in their high-school years.

For a better and more encompassing understanding of the results it would be necessary that the survey also be applied to the fields of engineering with a special focus on the core-subjects of the engineering careers. The derived conclusions would also gain a greater reliability if the survey would be implemented to other higher-education institutions that are offering degrees in the highly-sought after fields of the Science, Technology, Engineering and Mathematics fields.

CONCLUSIONS

The qualitative analysis of the aforementioned study supports and enhances a previously formulated hypothesis; the quality and the orientation for a science related career is highly dependent on the courses that are to be taken in high-school, and most important in middle-school. The participation of the students to these average and high-level tracked courses for science oriented domains is quintessential to the success and the determination students have for choosing these STEM careers. All of the interviewed students with the exception of one African American acknowledged that they were part of the tracking systems for the most important fields related to the Health Sciences, Nursing, and Physical Therapy occupations. Many of them were selected to be part of the tracked level streams in Mathematics and Natural Sciences since their secondary school years. They became acquainted with the demands and core knowledge of these highly rewarding careers of STEM fields since their adolescence years. The process gave them confidence in their abilities to pursue their dreams regarding highly-competitive careers all of which are also in high demand for the necessities of the twenty-first century. The support that must be offered to the students is dependent on the orientation toward these science related careers the student has to have since his/her secondary education years. Teachers, parents, counselors and administrative staff must equally apply their expertise when guiding students in their educational endeavors, or must offer the possibility to all of the interested students to be part of the high-ability, high-level tracked courses of all of the STEM careers. If not all of the students are nurtured in the school system since their very early education years in the most competitive domains of the twenty-first century, through support, preparation and school initiative, they will not be able to actively win the competition for a better future. All students of any school system, urban, suburban, or rural need to have the ability to become better professionals of their generation, able to cope with the multitude of issues, challenges at hand regarding a cleaner, healthier, and safer environment. The task of pursuing a science career for the student generation of the twenty-first century, as one of the most stringent demands of the US educational policy, has to be equally and efficiently fulfilled in any school system. Therefore, teachers, educators, administrators, students, and parents alike are responsible for accomplishing it to the best of their abilities.

REFERENCES

Adelman , C.(1998).Women and Men of the Engineering Path: A Model for Analyses of Undergarduate Careers. Washington, DC: US Department of Education, Office of Educational Research and Improvement.

Alexander, K.L., and McDill E. (1976). Selection and Allocation Within Schools: Some Causes and Consequences of Curriculum Placement. *American Sociological Review*, 47, 626-40.

Baker, D.P., and Stevenson, D.L. (1986). Mother's Strategies for Children's School Achievement: Managing the Transition to High School. *Sociology of Education*, 59, 156-66.

Chambers, T. V. (2009). The "Receivement Gap": School Tracking Policies and the Fallacy of the "Achievement Gap". *The Journal of Negro Education*, 2009, 78 (4), 417-426.

Clotfelter, C.T., Ladd, H.F., and Vidgor, J.L. (2003). Segregation and Resegregation in North Carolina's Public School Classroom. *North Carolina Law Review*, 81, 1464-1512.

Entwisle, D., R., Karl, L., A., and Olson, L.S. (1997). Children, Schools and Inequality, Boulder CO., Westview Press Edts.

Heyns, B. (1974). Social Selection and Stratification Within Schools. *American Journal of Sociology*, 79, 1434-51.

Kelly, S. (2004). Do Increased Levels of Parental Involvement Account for the Social Class Difference in Track Placement? *Social Science Research*, 33, 626-59.

___(2007). The Contours of Tracking in North Carolina. *High School Journal*, 90, 15-31.

Kelly, S. (2009, January). The Black-White Gap in Mathematics Course taking. *Sociology of Education*, 82, 47-69.

Lucas, S. (1999). Tracking inequality. New York: Teachers College Press.

Lucas, S.R. and Gamoran, A. (2002). Track Assignment and the Black-White Test Score Gap: Divergent and Convergent Evidence from 1980 and 1990 Sophomores, 171-98 in Clsosing the Gap:Promising Strategies for Reducing the Achievement Gap, Washington, DC: Brookings Institutions.

Mickelson, R.A. (2001a). Subverting Swann: First- and Second-generation segregation in the Charlotte-Mecklenburg Schools. *American Educational Research Journal*, 38, 215-52.

Mickelson, R.A. (2001b). The Effects of Segregation and Desegregation on African American Middle School Students' Academic Achievement. Paper presented at the annual meeting of the American Educational Research Association, Seattle, Wa.

Sørensen, A.B. (1970). Organizational Differentiation of Student and Educational Opportunity. *Sociology of Education*, 43, 355-76.

APPENDIX A
Questionnaire

1. What is your gender? M F

2. Ethnicity Caucasian African Am. Asian Am. Native Am. Asian Other

3. Nationality

4. Age

5. Are you? Graduate Student Undergraduate Student

6. Major

7. How do you consider yourself in the following areas?

Mathematics	good	very good	average	less than average
Chemistry	good	very good	average	less than average
Biology	good	very good	average	less than average
Physics	good	very good	average	less than average
Medicine	good	very good	average	less than average
Environmental Sci.	good	very good	average	less than average
Engineering	good	very good	average	less than average

8. Who influenced the most your current academic career?

Teachers Parents Friends Myself

9. Undergraduate GPA Below 2 2-2.5 2.5-3 3-3.5 3.5-4

10. Graduate GPA Below 2 2-2.5 2.5-3 3-3.5 3.5-4 N/A

11. What is the major cause for your academic success?

Talent Luck Hours of preparation Lessons in class Courses previously taken

12. How many hours do you spend on average (weekly) for training?

0-3 3-6 6-9 9-12 12-15 15-18 18-20 More than 20

13. Are you better at: Theory Laboratories

14. What other activities were you part of in middle school when training for the following subjects?

	Tutoring	Gifted programs	Special Projects	Advanced Placement	College Prep.	After-school	Other* Explain
Mathematics							
Chemistry							
Biology							
Physics							
Medicine							
Environmental							
Engineering							

15. What other activities were you part of in high school when training for the following subjects?

	Tutoring	Gifted programs	Special Projects	Advanced Placement	College Prep.	After-school	Other* Explain
Mathematics							
Chemistry							
Biology							
Physics							
Medicine							
Environmental							
Engineering							

16. In middle school, what was usually your teacher's perception about your efficiency?

	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Good							
Average							
Very good							

17. In high school, what was usually your teacher's perception about your efficiency?

	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Good							
Average							
Very good							

18. In middle school, what was usually your teacher's attitude toward your interest in:

	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Support							
Non-support							
Indifferent							

19. In high school, what was usually your teacher's attitude toward your interest in:

	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Support							
Non-support							
Indifferent							

20. Were you tracked in middle-school?

Courses	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Low-level							
Avg.-level							
High-level							

21. Were you tracked in high-school?

Courses	Math	Chemistry	Biology	Physics	Medicine	Environmental Sciences	Engineering
Low-level							
Avg. level							
High-level							