

Components of Success in School Mathematics among Students of Ethiopian Origin (SEO)

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Abstract

The ongoing immigration of Ethiopian Jews to Israel began in the early 1980s. Since then many studies have reported the persistent poor economical, social and educational predicaments encountered by this small distinctive Jewish community in Israel. It has also been documented that the overall academic achievements of students of Ethiopian origin (SEO) lag significantly behind the national average. This is especially acute in mathematics and as a group SEO are poorly represented in the advanced level mathematics matriculation tracks. Consequently, many potential education and career options are restricted for a disproportionately large number of SEO where success in mathematics is mandatory.

Various potential barriers underlying the academic underachievement of SEO as a group have been described, which has led to important insights; however, differential achievements within SEO remain to be studied. In particular, little is known about those few SEO who, in spite of their difficult circumstances, manage to achieve and maintain success in mathematics. This study focused on exploring components of “successful” mathematical learning among SEO; it sought to answer the research question:

“Why and how do some Israeli students of Ethiopian origin (SEO) manage to enroll and maintain success in the advanced level mathematics matriculation tracks (5 units), where SEO are significantly underrepresented?”

This study was guided by the assumption that uncontrollable and fixed personal or socio-cultural factors do not fully explain academic achievement disparities in general and among SEO in particular. Furthermore, it was proposed that while studying, failure is certainly legitimate and has led to valuable insights, increased understanding, and identifying characteristics and

circumstances among SEO that foster academic trajectories against different risk factors by addressing questions such as what works; when, where, and how are particularly important.

The research sample consisted of a diverse group of thirteen SEO (17-20 years old) that have been successful in mathematics. At the time of the study, eight of them were studying in the advanced mathematics matriculation track in seven high schools and the other five were in a special selective pre-academic program in a prestigious technological university a year after they had completed high school. By using a qualitative case study methodology, and based on several personal and environmental factors identified by research in mathematics education and related fields, this study explored the mathematics learning experiences, the success stories, and the enacted mathematical behavior of the students in their classrooms and in problem-solving sessions specially designed for this study.

The findings showed that most of the parents of these youngsters had no high academic and economic resources, and that the schools they attended were also not endowed with many educational resources. In addition, there was no evidence that these students are mathematically gifted. Rather, three important interrelated and synergetic mathematics-related characteristics among the participants played prominent roles contributing to their achieving and maintaining success in the advanced level mathematics matriculation track:

- a) A positive mathematics identity: This includes positive mathematics-related perceptions and goals that enhanced students' "will" to engage, as well as invest and guided their mathematics learning behavior;
- b) Self-regulation of learning: This includes productive mathematics-related habits, actions and strategies of the participants manifested by high academic investment and self-regulated learning. More specifically, these students used successful strategies to actively manage, modulate, and monitor, their cognitive functioning, their behavior, their emotions and motivation as well as their learning environment for learning;
- c) Academic resilience in mathematics: This refers to the participants' capability to develop and use effective resources to succeed in mathematics regardless of challenging or threatening circumstances.

It is argued that success is to be measured not so much by the position that one has reached in life but also by the obstacles that one has overcome while trying to succeed. Accordingly, this study highlighted two significant predicaments that placed the achievements of the participants of this study at a potential risk:

- ☒ Lack of academic/mathematics socializing agents: The absence of knowledgeable adults, who could provide good orientation about the system and the schooling processes, persuade the students to engage in their learning, to guide their behaviors and shape the development of positive mathematical identities;

- ☒ Stigma-induced identity threat: Negative experiences associated with being a successful mathematics student in the context of being SEO; this was often activated by a “solo status” (being physically distinct and a numerical minority) of these SEO in most academic contexts such as in advanced level mathematics classes.

Resilience against the odds was manifested through experience of personal agency (e.g. self-directed learning) and positive ethnic identity, which was intertwined with success in mathematics. Furthermore, the participants coped with harsh predicaments (e.g. perceived ethnic stereotypes) by transforming them into driving forces for academic success. Also, in the process, they were able to harness the few resources they could find in their own environments (e.g. parents, teachers, and support programs).

The findings identified potential key components of success in mathematics among the thirteen SEO, that are adaptable and that can be taught and learned, confirming the initial assumption that factors that cannot be controlled or altered easily by educators do not fully account for disparities in achievements.

Hence these results may constitute a theoretical and empirical contribution to the existing knowledge about mathematics learning by immigrants and other minority students in general, and by SEO in Israel in particular. Furthermore, they can serve as a basis to inspire the design of suitable ad hoc intervention programs or for improving existing learning environments. Programs that help SEO to develop these desirable components of success in mathematics, which the participants of this study worked so hard to develop on their own, may enhance the outcomes of a large number of underachieving SEO.

Since research on differential mathematics achievements within SEO is scarce, more studies are needed. One possible research direction would be creating “design experiments” that would put the above recommendations in practice. This result may also be important for and applicable to other students from underrepresented or disadvantaged groups.