Policies of secondary Schools for Excellence in Science and Technology (STEM) in Egypt: An Evaluation Study

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Abstract

Since their establishment, STEM (Science, Technology, Engineering, and Mathematics) high schools in Egypt have faced a range of challenges, as highlighted by several previous studies. These challenges primarily concern policies related to student admissions, teacher and leadership selection, curriculum development, and funding. Specifically, issues related to student admissions include the persistence of traditional admission systems that fail to account for students' interests and a lack of clarity regarding admission policies and criteria. Regarding teacher and leadership selection, there is a shortage of qualified teachers in STEM subjects, a lack of specialized supervisory staff, and the centralization and bureaucracy that limit the effectiveness of planning and development. Furthermore, there is a weakness in the application of policies related to selecting STEM school directors in Egypt.

In terms of curriculum development, there is a noticeable absence of specific policies for developing STEM curricula, training educators on STEM content, and reducing unnecessary content. Regarding funding policies, there are no specific policies governing the financing of STEM schools, leading to inadequate library resources and staff, as well as procedural delays in the funding process. Centralized decision-making also hinders effective financial management. As a result, these gaps necessitate immediate attention to ensure that the schools meet their objectives and align with modern educational goals, sustainable development, and the labor market’s needs.

Based on these concerns, the primary research question is framed as follows:

How can the policies of STEM high schools in Egypt be evaluated?

From this primary question, the following sub-questions emerge:

1. What is the theoretical framework for STEM high school policies?
2. What is the documented reality of STEM high school policies in Egypt?
3. What is the practical reality of policies regarding student admissions, teacher and leadership selection, curriculum development, and funding in STEM high schools across Egypt?
4. What are the proposed actions to improve these policies?

The research aims to identify the theoretical framework of policies governing STEM schools, analyze the documented reality of these policies, and assess the current situation to propose improvements for STEM high school policies in Egypt.

The research presents a theoretical framework for educational policies and STEM schools in Egypt. It covers the following aspects: the nature of STEM schools, their philosophy, goals, importance, and the principles underpinning these institutions. It also examines educational policies, including their definition, sources, functions, stages of formulation, and a detailed presentation of the specific policies being evaluated, along with the standards and criteria for evaluating pre-university educational policies and how they are implemented.

Using a descriptive methodology, the researchers describe and analyze the policies concerning student admissions, teacher and leadership selection, curriculum development, and funding. The focus is on these policies because they are directly related to human resources (teachers, leaders, and students), curriculum development, and financial resources. Improving the policies in these areas positively impacts the overall effectiveness of STEM schools and helps them achieve their objectives. A set of indicators was developed to evaluate each policy, based on standard criteria including social dynamics, integration, democracy, equal opportunities, free and compulsory education, quality of education, rationality and standards, institutionalization, justice, and effectiveness.

These criteria were chosen because they represent fundamental principles that ensure fairness and effectiveness in educational policies, enhancing the quality of student admissions and curriculum development, aligning the policies with social values such as democracy and equal opportunity, and supporting transparency in the funding process and in selecting teachers and school leaders.

The study includes a documentary analysis of the reality of STEM high school policies in Egypt. One of the key findings is that the vision for STEM high schools aligns with Egypt's Vision 2030, aiming to provide high-quality training that equips students with the skills required for future jobs based on research and innovation. STEM high schools aim to nurture talented students, focusing on their abilities and teaching science, mathematics, and technology. They also emphasize educational values, global openness, and fostering creativity in students.

The study identifies the main policies of STEM schools, which include nurturing talent, supporting technology, reinforcing spiritual and educational values, and developing students' creative abilities.

Additionally, a field study was conducted with a sample of 96 teachers from STEM schools in Alexandria, Sharqia, and Fayoum, totaling three schools. The results indicated that while policies regarding student admissions and teacher and leadership selection were implemented to a moderate extent, the policies related to funding were weakly implemented. The study also revealed regional differences in the application of STEM school policies, with Alexandria showing better results. The research highlights the strengths and areas in need of improvement within the policies of STEM schools. Based on these findings, a set of proposed actions was formulated to enhance policies related to student admissions, teacher and leadership selection, curriculum development, and funding in STEM schools.