

Preface

National interest in science, technology, engineering, and mathematics (STEM) education is at its peak level. The need for designing and implementing technology-rich STEM learning activities that promote successful learning in K-12 education are no longer a discussion. However, teachers and educators are in great need of learning from research-based best practices and real-world classroom examples. In this book, the contributing authors aim at addressing this need by taking a step toward answering the “how” question—how to provide an effective instruction in STEM teaching and learning, whereas the current literature in STEM learning seems to focus on the “what” question—what we should do to improve STEM education.

The book is prepared by STEM faculty in postsecondary education with the contributions of STEM high school teachers based upon their authentic experiences within a three-year-research project, Fostering Interest in Information Technology (FI³T). The FI³T project was part of a nationwide initiative sponsored by the National Science Foundation’s (NSF) Innovative Technology Experiences for Students and Teachers (ITEST) program. The FI³T project provided a unique framework for a collaborative partnership among a university, K-12 schools, and local industries to increase STEM learning opportunities for underrepresented and underserved high school students and teachers.

This book offers a series of interrelated chapters where the contributing authors document the impact of the FI³T project on high school students’ STEM learning and critical thinking. Addressing all four areas of STEM, the authors also provide project examples and resources available for teacher and student use.

In the introductory chapter, the FI³T project Principal Investigator, Mesut Duran, first describes the purpose of the book. The author next provides an overview of recent STEM learning initiatives in the United States (US), particularly focusing on ITEST programs. The author next presents the FI³T project perspective on STEM learning, highlighting its unique features: information technology (IT) integration and collaborative strategies. The chapter ends describing the organization of the book.

In the second chapter, Mesut Duran introduces the FI³T project in detail, describing the critical framework of the project, partnerships, and participants. Duran next writes about the FI³T project events and activities. The chapter ends with key findings from the FI³T project research.

Addressing the use of IT within the context of each STEM field, the FI³T project Participating Investigators, Daniel Lawson, Brahim Medjahed, Elsayed Orady, and Margret Höft focus on IT/Science, IT/Technology, IT/Engineering, and IT/Mathematics in Chaps. 3–6 respectively. Each chapter includes an introduction, training and instructional strategies, project examples, and resources available for teacher/student use. In each chapter, these topics are addressed in the context of each of the STEM fields.

In Chap. 7, the FI³T project External Evaluator, Mark Jenness, writes about project evaluation. He first discusses the value and purpose of the project evaluation, roles for the evaluation team, organization of project evaluation, and implementation of the evaluation. Next, he presents FI³T project evaluation findings describing the project effects on participating teachers, students and faculty. The following section includes discussions concerning the strengths, limitations, and challenges of the FI³T project from an evaluation perspective. He concludes his chapter with highlighting the lessons learned during the FI³T project evaluation and how evaluation findings were used during the life of the project.

In the last and final chapter of this book, Mesut Duran provides a summary of the book, followed by discussions on the FI³T project implications for policy and practice. The author concludes the chapter and the book with recommendations for further research in STEM learning.

There are several constituents that will benefit from the writings in this book. Educators who are interested in offering collaborative inquiry- and design-based STEM learning projects will benefit from the content of this book. In addition, school-level decision-makers, such as curriculum directors, department chairs, grant writers; funding agencies such as foundations that fund educational programs and STEM programming; and higher education faculty thinking about developing grant/research proposals for K-12/Higher Education collaborations will find this book valuable.

STEM Learning

IT Integration and Collaborative Strategies

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