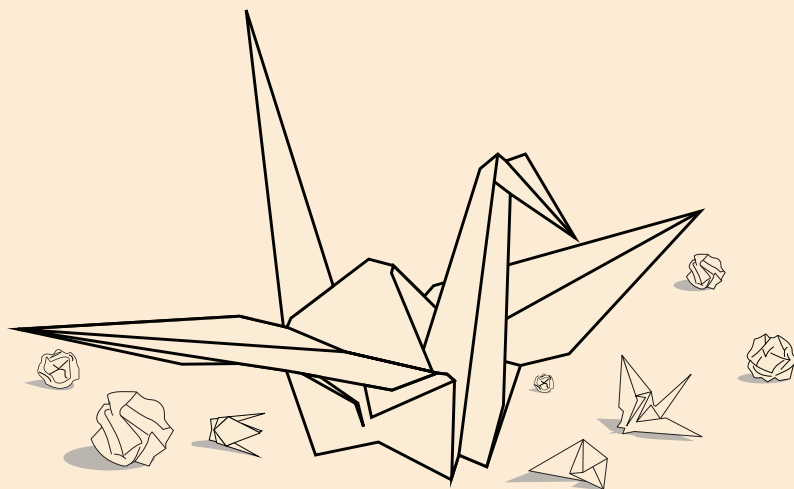


THE RESEARCH PLAYBOOK

FOR STUDENTS AND SCHOLARS IN ALL DISCIPLINES



FADIL IQBAL
M.C.M. IQBAL

The Research Playbook

For Students and Scholars in All Disciplines

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Fadil Iqbal and M.C.M. Iqbal

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For our families.

Thank you for bringing out the best in us and
reminding us why we do what we do - even when
things are falling apart.

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*Are those who have knowledge and those
who have no knowledge alike? Only the people
of understanding are mindful.*

The Quran (39:9)

Preface

THE transition from school to university education presents students with new challenges. In school, knowledge is literally spoon-fed, while at the university students are encouraged to seek knowledge and expand on what they have learnt. In the final year, the students must complete an independent project from planning to execution, culminating in a report or thesis. While mentors and senior students can provide guidance, the responsibility of writing, composing and presenting the thesis falls on the student.

This book is for students reading for a degree or a postgraduate degree, preparing to conduct a research project. It seeks to support students at the various stages of the project. We have relied not only on our own first-hand experience in undergraduate and graduate education, but also on the many students whom we have mentored and guided in their journey. While our learning is in the sciences, this book is intended for all students.

The contents of the chapters are a distillation of the various issues faced by students. It should be regarded as a guidebook during the research process from writing a research proposal, through how to search for literature, writing, and presenting the thesis with confidence. Some

tools are included that can assist not only in research but also in future careers.

Obviously, an undertaking of this nature cannot profess to be comprehensive. Our expectation is that it gives the student the confidence and trust to tackle the task. This book represents our first partnership in writing; however, our teamwork actually began 34 years ago when Fadil was born!

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14th of January, 2026

Introduction

Perhaps I could best describe my experience of doing mathematics in terms of entering a dark mansion. You go into the first room and it's dark, completely dark. You stumble around, bumping into the furniture. Gradually, you learn where each piece of furniture is. And finally, after six months or so, you find the light switch and turn it on. Suddenly, it's all illuminated, and you can see exactly where you were. Then you enter the next dark room...

Andrew Wiles
Mathematician

ANDREW Wiles' description of solving a problem in mathematics is like conducting a research project. At the beginning you are completely lost in darkness, but gradually you begin to see things until you finally find the switch.

Research, in the framework of this book, refers to methodically seeking answers to a question, by collecting and analysing data, and making logical conclusions after considering possible outcomes. This process can apply to both the Humanities and the Sciences. As an undergraduate student, you will inevitably engage in a research project. This book serves as a guide through the various phases serving as a road map to help you reach the ultimate destination of submitting and defending your thesis.

The book begins by introducing the purpose of a research project in university curricula and explains the various skills that will be learned. These skills will be beneficial in your future career and life.

Next, we explain how to write a research proposal. A necessary requirement is that you should know how to search for literature relevant to your work. This requires becoming familiar with reading research papers, understanding their writing style and format. Over time you will accumulate many papers and documents on your desktop. These need to be sorted and stored for later retrieval and the use of Mendeley software is explained for this task.

Recording the data gathered during research is an important task described in how to maintain a research notebook, in the sciences and social sciences. We provide the basic principles in quantitative data analysis, the focus of students in the sciences, and qualitative data analysis for students in the social sciences. Time management is crucial during the

research project to avoid the frustration of running out of time at the end. Some elements of time management are provided to help learn these habits, which will also benefit one's personal life.

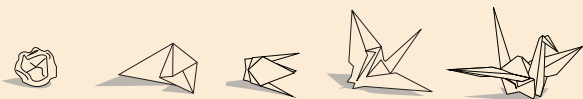
Writing the thesis is an unnerving task for many students. We explain the structure of the thesis and how to write the different sections. Some basic principles of English are given to help avoid elementary mistakes. Presenting the research at a conference and defending the thesis is another daunting task; we share our experiences to assist you.

Finally, some suggestions and tools are provided for what to do after graduation. Our ultimate aim is to support you in a small way to make your unique contribution to this planet, in whatever capacity, to be a useful citizen!

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RESearch, in the framework of this book, refers to methodically seeking answers to a question, by collecting and analysing data, and making logical conclusions after considering possible outcomes. This process can apply to both the Humanities and the Sciences. As an undergraduate or post-graduate scholar, you will inevitably engage in a research project. This book serves as a guide through the various phases serving as a road map to help you reach the ultimate destination of submitting and defending your thesis.



FADIL IQBAL received his BSc in Physics from the University of Colombo and his PhD in Biophysics and Bioimaging from Indiana University Indianapolis. He lives in Maryland with his wife and two sons. He works at the National Cancer Institute, where he investigates the cell's machinery using advanced microscopes at the Laboratory of Receptor Biology and Gene Expression. At home he enjoys recording podcasts, playing Minecraft and doing science experiments with his sons.



M.C.M. IQBAL graduated from the University of Peradeniya with a BSc in Agriculture in 1980. He did his Dipl.-Ing Agron from the ETH Zürich and his PhD at the University of Göttingen. He served as a lecturer at the Eastern University of Sri Lanka and later as a scientist at the National Institute of Fundamental Studies in Kandy. He enjoys reading books on popularising science and writing articles for the layperson.

