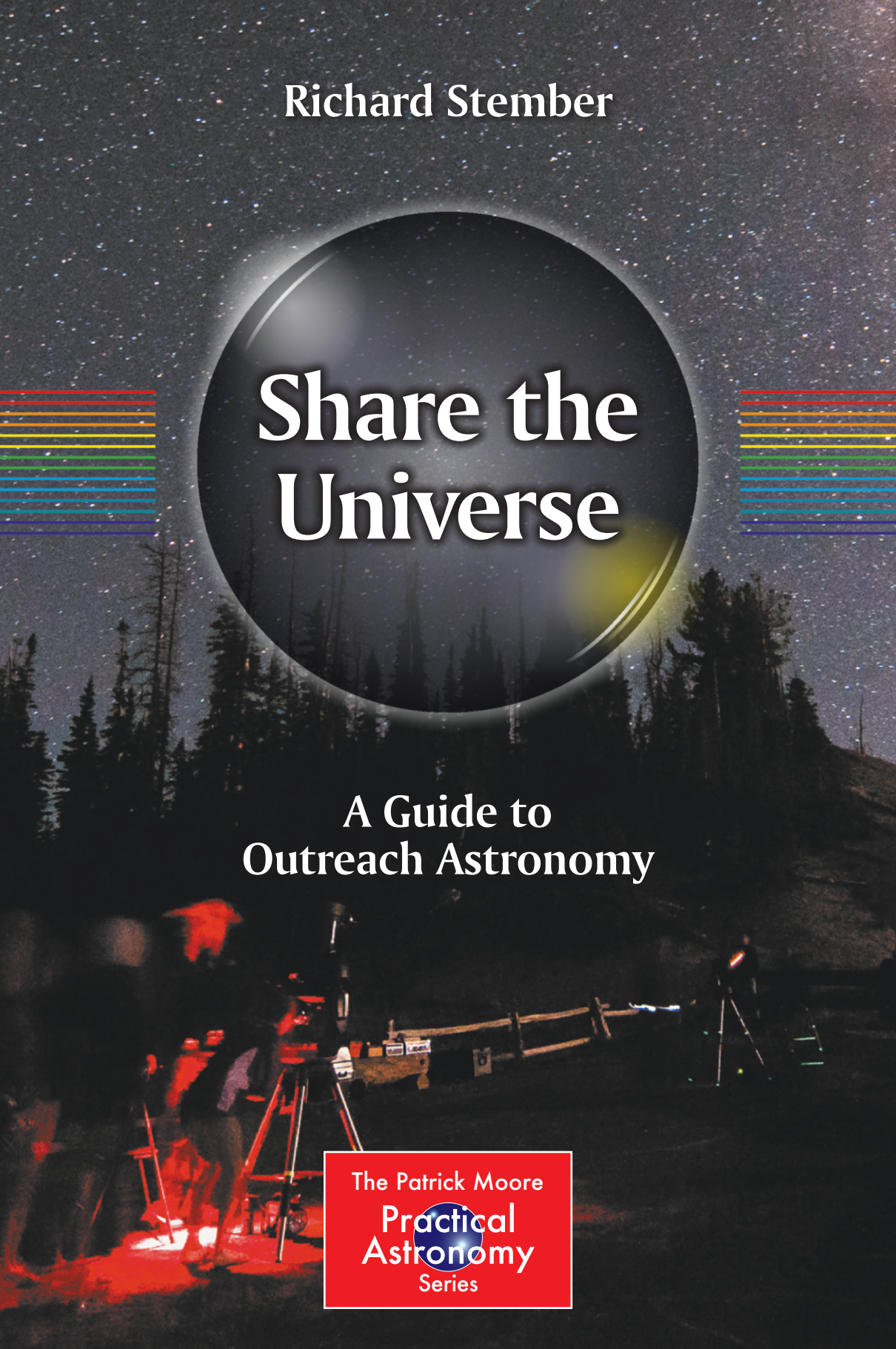
Richard Stember

Share the Universe

A Guide to Outreach Astronomy



The Patrick Moore Practical Astronomy Series

The Patrick Moore Practical Astronomy Series

Series Editor
Gerald R. Hubbell
Mark Slade Remote Observatory
Locust Grove, VA, USA

The Patrick Moore Practical AstronomySeries is a treasure trove of how-to guides for the amateur astronomer. The books in this series are written for hobbyists at all levels, from the enthusiastic newcomer to the veteran observer. They thus go far beyond more general, popular-level books in both scope and depth, exploring in detail the latest trends, techniques, and equipment being used by amateur astronomers around the world.

You will find herein a diverse list of books on constellations, astronomy catalogues, astrophotography, eclipse chasing, telescope equipment, software, and so much more. All books in the series boast full-color images as well as practical sections for putting your newfound knowledge to use, including star charts and target objects, glossaries, hands-on DIY projects, troubleshooting walk-throughs, and a plethora of other helpful features.

Overall, this series bridges the gap between the many introductory books available and more specialized technical publications, providing digestible, hands-on guides for those wishing to expand their knowledge of the night skies.

Richard Stember

Share the Universe

A Guide to Outreach Astronomy

Springer

Richard Stember
Science Heads Inc.
Lake Forest, CA, USA

ISSN 1431-9756 ISSN 2197-6562 (electronic)
The Patrick Moore Practical Astronomy Series
ISBN 978-3-031-53494-2 ISBN 978-3-031-53495-9 (eBook)
https://doi.org/10.1007/978-3-031-53495-9

Cover credit: Mr. Zach Schierl

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Paper in this product is recyclable.

This book is dedicated to my wife, who puts up with all my passions, ideas, and projects. She gives me the space and encouragement to pursue my passions. Without her, my life would contain far less love and meaning. And I dedicate this book to all the amateur astronomers who labor on weeknights and weekends sharing their passion for astronomy with the public. You inspire me with your knowledge, dedication, and sense of purpose. Your efforts are immensely appreciated and should never go unnoticed.

Preface

Inspiration can hit you at any time. Sometimes it feels like a brick, other times just a gentle breeze. It was a cool cloudless autumn evening when inspiration swept gently across my face. Octobers can be hot in Southern California, but on this night it was cool and clear; perfect for a star party. It didn't take much effort to convince my 11-year-old son to walk down the street with me to his elementary school. His school was hosting its annual Family Astronomy event. It had been a long time since I had looked through a telescope, and I was probably even more excited than my son.

We arrived at the back of his school an hour after sunset. Arrayed before us were a dozen or more telescopes of various types. A sizable crowd of parents and students had organized themselves into lines. The telescopes ranged in size from a large 25-inch truss Dobsonian, which required climbing a ladder to look through the eyepiece, to compact but seemingly more advanced computer-controlled telescopes mounted on tripods. There was even a rotating, articulated chair with binoculars attached ready to scan the heavens.

The air was thick with excitement, and we could hear animated conversations punctuated with "Wow!" or "That's amazing!" Children were jumping up and down and running from line to line. The sky was dark, and time was precious. Bedtime was fast approaching, and yet there was so much to see.

I knew that this was a special event – something that my son and I would remember for a long time. That night, at the age of 42, I was introduced to the world of Outreach Astronomy. The event inspired me to purchase my first telescope, join a local astronomy club, and start my journey that continues to this day sharing astronomy with the public. Several years on, I would form a non-profit dedicated to supporting STEM education and raising science literacy. That organization, Science Heads Inc., has since hosted hundreds of events reaching thousands of children and adults. It has also expanded to multiple states, adding volunteers, and forming chapters stretching clear across the country.

I am now at the age when many people retire. But my outlook on life has only increased my passion. I look forward to many more years of sharing what I know with people who, like me, are curious about the Universe. It's a noble passion – one which provides direction and purpose.

Over the years, I have been very fortunate to meet and work with many like-minded amateur astronomers. They taught me much more than just how to use a telescope. With their guidance, I learned how to explain complex concepts to those new to astronomy. I learned how to put myself in the shoes of a person unaccustomed to looking through a telescope; how to work with children, adults, physically challenged individuals, and those who are developmentally delayed.

Astronomy is the most approachable of all the sciences. It's exciting and easy to understand. It's also easy to participate in making it a perfect vehicle to explain how science "works." All it takes is to look up. Lack of knowledge, intellectual or physical abilities, or fully functioning senses need not be obstacles to learning about the Universe.

This book is a guide for hosting many types of astronomy outreach events. In it, I will share some of the best practices, tools, and resources available. It will highlight the important work being done by leaders in the field and will explain how you can reach an ever-broader audience while serving your community.

If you have a passion to share knowledge like I do, this guide will help you better plan, run, and participate in outreach events. You will learn how to engage people and include many who have historically been left out or ignored.

The time that I have spent doing outreaches has more than been rewarded with the satisfaction that I am helping raise science literacy in my community. To this day I still enjoy hearing "Wow!" when someone sees Saturn or the Moon for the first time in a telescope. And I enjoy having a guest walk away feeling like they just learned something new.

As you would expect, my own learning continues. I welcome your suggestions on the topics covered in this book. Feel free to email your comments to me at richard@scienceheads.org. If appropriate and possible, I may include them in subsequent editions of this guide.

Lake Forest, CA, USA Richard Stember

Acknowledgments

Over the 25 years that I've been doing outreach, I have been honored to work with dozens of people who graciously and selflessly shared their expertise. Their passion and generosity are truly inspiring and infectious.

Since it is not possible to thank them all on these pages, I will instead recognize the people and organizations who provided information and materials helpful to writing this guide. Without their help this book would not have been possible.

I am indebted to Mr. James Benet who many years ago introduced me to outreach astronomy and provided helpful advice while writing this book; Ms. Noreen Grice who, through her books and correspondence, educated me about working with differently abled audiences; Mr. Zachary Schierl for sharing his experience at the National Park Service and insight about informal interpretation; Mr. John Land of the Tulsa Astronomy Club who opened many doors for me to collaborate with members of his club; Ms. Peggy Walker of the Broken Arrow Sidewalk Astronomers and a local Chapter Coordinator of Science Heads Inc. for sharing ideas about how to work with intellectually challenged audiences; Ms. Rebecca Hammond and Mr. James Hammond for sharing the hands-on activities that they developed for Science Heads Inc.; and Ms. Genaye Channel of Girl Scouts USA for providing important information about the Girls Scouts.

I also wish to thank the staff at Springer Nature and Mr. Michael Maimone for their help in making this book a reality.

Contents

List of Figures

About the Author

Richard Stember has been involved in Outreach Astronomy for nearly 25 years. He started as a volunteer with the *Orange County Astronomers*, then founded a non-profit organization called *Science Heads Inc.* This was not the first time Richard ventured into running a non-profit. For 16 years, he was a board member and president of *Comprehensive Child Development Inc*., a Long Beach California-based organization that helps low-income families. Richard received a bachelor's degree in chemistry from the State University of New York, College at Oneonta. After graduation, he went to work for several analytical instrumentation manufacturers where he provided technical support to scientists and researchers working in pharmaceutical, consumer products, and environment testing laboratories. Over the years, he has been employed as a Product Specialist, Marketing Product Manager, Sales Engineer, Programmer, and CEO. In 1976, he set out on his own and founded LABTRACK, a software company that develops scientific data management software. Richard wrote and introduced the world's first commercial Electronic Lab Notebook software. This and other software he developed are used by hundreds of companies around the world to improve their research, R&D, and quality control programs.

Chapter 1
Introduction to Outreach Astronomy

A teacher affects eternity; he can never tell where his influence stops.

Henry Adams

Everyone finds themselves in the role of educator at some point in their life. Parents are educators for their progeny. Employees are often asked to take a new employee under their wing. Good managers lead by example. And professionals of all stripes help their clients by dispensing information pertaining to their field of expertise. Sharing knowledge with others is an essential part of being human. We naturally feel the need to educate and enlighten others.

Education itself can be categorized into two distinct types: *Formal Education* and *Informal Education*. The United Nations Educational, Scientific and Cultural Organization (UNESCO), describes formal education as *"… institutionalized, intentional and planned through public organizations and recognized private bodies…"*.

Many people are unfamiliar with the term *Informal Education.* It occurs outside of or after formal education has ended. Visiting a museum is engaging in informal education. Watching documentaries, reading books, and attending lectures are also forms of Informal Education. Informal Education differs from Formal Education not just in when and where it occurs but also by content and learning process. Even the objectives, motivations, and interests of participants can be significantly different.

1.1 Outreach Astronomy as Informal Education

Describing oneself as a "lifelong learner" is common today. Individuals often actively seek out sources of information and opportunities to learn about subjects that are of interest. Sources may include books, magazines, web sites, lectures, museums, nature centers, and documentaries.

People also passively assimilate information that is presented to them. It may be from a TV show, commercial, movie, or a social media site they just visited; they

R. Stember, *Share the Universe*, The Patrick Moore Practical Astronomy Series,
https://doi.org/10.1007/978-3-031-53495-9_1