The Academic Research library and Science Education: A Roadmap for the Journey

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The Academic Research Library and Science Education: A Roadmap for the Journey

Sue Ann Gardner
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ROADMAP

Science LIBRARIES

+ 

Science INQUIRY

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Science EDUCATION
ROADMAP

Students and Faculty
+
Collections

________________________
Academic Library

Image courtesy of Maynooth Library
Image courtesy of Edinburgh University Library
Image courtesy of Media Grid
Image courtesy of University of Split
SCIENCE LIBRARIES

• Combine traditional and emerging service models and infrastructure to promote effective learning
• Provide access to a wide array of materials for in depth single subject and cross-disciplinary research
• Incorporate appropriate technology
• Offer ample ergonomic workspaces
Science Collections and Services

- In person and remote reference service
- Instruction
- Research assistance
- Digital access
- Hard copy materials / Document delivery
- Databases and indexes
- Clientele: Students, faculty, staff, the public
- User competencies: Remedial to advanced
The Science Commons

• Varied work spaces:
  – Collaborative spaces
  – Solitary spaces
• Encourages innovation and creativity
• Facilitates situated and active learning
• Promotes communities of practice
Price Science Commons

Image courtesy of AIA
National Science Education Standards definition:

The diverse ways in which **scientists** study the natural world and propose explanations based on the evidence derived from their work.

Refers also to the activities through which **students** develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world.

SCIENCE INQUIRY looks like...
DESTINATIONS on the journey...

Science LIBRARIES

+ Science INQUIRY

= Science EDUCATION

Scholarly Communication

Science Literacy

Inclusion

Innovation
DESTINATION: Scholarly Communication

- Scientific publishing
- Repositories
  - Institutional
  - Subject
- Multimedia
- Data
Scientific Publishing

- Copyright
- Permissions and licensing

- Commercial publishing
- Nonprofit publishing
- Gratis (library-based) publishing
  - Monographs
  - Journals
  - Conference proceedings
  - Catalogs
  - Et al.

Zea Books
Science Text Repositories

- Scholars’ Bank: https://scholarsbank.uoregon.edu/xmlui/
- Biodiversity Heritage Library
- iDigBio
- ArXiv
- biorXiv
- Et al.
Multimedia Database Services

• The multitude of format types, and system and storage requirements pose a challenge to managers

• Storage and display systems
  – OCLC ContentDM
  – Luna
  – Et al.

Image courtesy of NREL Visualization Lab
Science Research Data

• Data repositories
  – Institutional
    https://library.uoregon.edu/datamanagement/repositories.html
  – Subject
    Dryad
    figshare
    GenBank
    Et al.
Open Scholarship

Open scholarship, which encompasses open access, open data, open educational resources, and all other forms of openness in the scholarly and research environment, is changing how knowledge is created and shared. For research libraries, open scholarship offers opportunities for campus collaborations and new service roles.

—Association of Research Libraries
Open Science

Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes, and other research processes are freely available, under terms that enable reuse, redistribution, and reproduction of the research and its underlying data and methods.

—Facilitate Open Science Training for European Research
Proprietary Science

- Biological taxonomy (priority naming)
- Engineering
- Biotechnology
- Business
- Pharmaceuticals
- Agricultural technology / Agribusiness
- Classified government information
- National security initiatives
- Personally-identifiable data
DESTINATION: Science Literacy

A CLIMATE-ORIENTED APPROACH TO TEACHING SCIENCE STANDARDS

CLIMATE LITERACY
ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

Science Literacy

Image courtesy of ESIPFED
DESTINATION: Science Literacy

Cartoon caption:

Thanks to the Internet, it is now possible to be extremely well-informed and completely wrong at the same time!

— Rightreason.org

Science librarians have an important role to play in combating science illiteracy.
Science Pedagogy

• Next Generation Science Standards (K-12)
  – Practices
  – Crosscutting concepts
  – Disciplinary core ideas

• Except in math, post secondary pedagogical best practices in the sciences are not yet widely adopted

• Science librarians can partner with faculty, discipline-based education research initiatives
Science Outreach

- LibGuides
- Instruction
- Library Web site
- Social media
- Conferences
- Informal science
Informal Science Education

- Displays
- Use of mobile technology
- Popular science talks
- Science slams
- Science – Art collaborations
- Coloring, crafts
- Kids’ activities — Curriculum collection
- Field trips
DESTINATION: Inclusion

Diversity, it’s harder than rocket science.

Image courtesy of the Inclusion Solution
DESTINATION: Inclusion

• Public mission
• Science equity
  – Gender
  – Ethnicity/Race
  – Age
  – Educational attainment
  – Etc.
• Accessibility
• First Year Experience
• User Experience
Science Advocacy

• Service learning
• Community events
• Invite civic leaders to visit the space to celebrate achievements

Image courtesy of City of New York
Science Activism

MARCH FOR SCIENCE
EARTH DAY
APRIL 22, 2017
#marchforscience
EUGENE
DESTINATION: Innovation

Innovation

Image courtesy of 123RF.com
Innovations

• Interactive applications
• Smart technology
• Advances in privacy protections
• Creative content creation and delivery
• Personalized customer service
• Greater community integration
Funding

- Internal funding
- External funding (IMLS, NEH, NEA, CLIR, foundations, et al.)
- Donors / Fundraising
- Entrepreneurship

Image courtesy of gopetition.com
Summary

• Libraries are a vital component in excellent post-secondary science education

• Now is the time to partner with colleagues in the academy to help establish post-secondary science pedagogical best practices

• Innovations in science education are facilitated by new learning spaces, such as the science commons
A Roadmap for the Journey

The traveler that resolutely follows a rough and winding path will sooner reach the end of his journey than he that is always changing his direction, and wastes the hour of daylight in looking for smoother ground and shorter passages. —Samuel Johnson