Training/Education Conundrum

Our Perspective

How can I find?

If I want to....., how do I....?

What does it mean?

How can this help me with my work? (integration)

How could this impact my work? (application)

What does this mean for the “big picture” (influence understanding and practice)?

How could this save the world?
NCBI’s Education & Hackathon Programs

subject matter experts with technical experience and the ability to communicate

SCIENCE
We endeavor to help people make scientific and science-based discoveries that may have a positive impact on the world (in particular, on us humans).

EDUCATION
We aim to educate people in science and scientific principles, as well as how to gather relevant, high quality data and effectively utilize it (interpretation and integration). We facilitate group-based application or pipeline development. We endeavor to increase awareness of NLM resources and demonstrate how they are useful for scientific research.

CONSULTING
We work with members of the scientific community to find ways to enhance or troubleshoot their own work. This often involves discussions of NLM databases and tools, or others’ resources, and/or experimental and computational methodologies.

ADVOCACY
We serve as a conduit between the scientific community and NLM resource developers and actively seek out and promote awareness of existing issues and gaps.

NCBI’s “Education Faculty”

subject matter experts with technical experience and the ability to communicate
Short (1-3min) videos demonstrating a specific task for an NCBI resource. These are designed for and available on our YouTube channel.

Requested by NCBI Education Faculty and/or Development Teams
Videos
Wayne Matten
Initiated by NCBI Faculty or Development Teams for “end-users” as on-demand help.

Task-focused:
“Where do I click to.....?”

1 to 3 minutes (generally)

Video Program Goals:
• Fulfill all internal requests
• Good video usage & continued views

Processes tracked with Jira.
Scripts are written in collaboration with Business Owners.
Videos created with Camtasia - recording the live NCBI website with voiceover & close captioning and then uploaded to YouTube.
Assessed by number of views and comments provided by viewers on YouTube dashboard.

https://www.youtube.com/NCBINLM

We’re always looking for ideas!
(hint, hint)
2018 NLM Associates Presentation
“NCBI’s Education & Hackathon Programs”
1/7/2019

FY2019 Videos, so far:

“Variant Interpretation using NCBI Resources”
“NCBI Pharmacogenomics Resources for Clinical Care”
“Preparing your computer to run EDirect for PC/Windows Computers”
“Preparing your computer to run EDirect for Mac/OS & Linux Computers”

…and more to come!
for example, upcoming are:
new My Bibliography release & complete PubMed redesign

Relatively short (12-25min) presentations demonstrating how to attain a goal using one or more NCBI resources to answer a question. These are recorded and included on YouTube.
Initiated by NCBI Education Faculty
Webinars
Peter Cooper
assisted by Rana Morris

Mostly initiated by NCBI Faculty for "end-users" as short educational events and also as on-demand help.

Goal-oriented: "If I want to..., how do I......?"
12 to 25 minutes (generally)

Webinar Program Goals:
• 2 new webinars/month
• Good attendee evaluations
• Good video recording views

Manage logistics: scheduling, publicity, registration, communications, creation of FTP materials-directory, close caption ordering, survey creation, recording processing & video upload to YouTube

Present or consult with presenters on content/flow and provide a webinar-specific .pptx template

Produce webinars
Assess webinars based on number of registrants/attendees, attendee evaluations & webinar video recording views and comments

Webinars

A Practical Guide to NCBI Web BLAST
An NCBI Minute Webinar

Keeping Current and Getting Help with NCBI Resources
An NCBI Minute Webinar

Using NCBI's MedGen in Clinical Practice
An NCBI Minute Webinar

dbGaP's New Ancestry Composition Visualization tool
An NCBI Minute Webinar

Genome/Variant Interpretation Using NCBI Resources
An NCBI Minute Webinar

Posted on YouTube

U.S. National Library of Medicine
National Center for Biotechnology Information
**FY2018 Stats**
- 24 new Webinars (100 videos)
- 174,956 attendees/viewers
- 690 Staff Hours
- Cost $0

**FY2019 Webinars, so far:**
- “Getting the most from Track Hubs in NCBI’s Genome Data Viewer” 12 attendees
- “Variant interpretation using NCBI resources” 40 attendees
- “5 Questions you can answer with NCBI’s medical genetics resources” 45 attendees
- “Using BLAST Well” 106 attendees

...upcoming webinars...
- Feb 6, 2019: “NCBI’s new genetic variation API services”
- Feb 13, 2019: “An insider’s guide to the new My Bibliography”

...soon to be scheduled...
- “NCBI pharmacogenomics resources for clinical care”
  - “KIS: NCBI’s new search sensor project”

...and more to come!

**Presentations (30min - 1hr)**
- Discussing the current state of science and how NCBI resources can be used to understand and discover relevant information for a particular audience.

*Initiated by request or invitation from the scientific/clinical community or proposed by NCBI Education Faculty or Business Owner*
Presentations
Rana Morris
Peter Cooper
Sherri Holland-Bailey
and others
Invited/requested or NCBI-driven
(conferences) for “end-users”
Audience-focused, case-based
presentations: “Based on what I do,
what is the current state, and how
can this help me?”
30 minutes to 1 hour

Presentation Program Goals:
• Fulfill as many requests as possible
• Good evaluations, happy hosts,
  and excited participants
• Reusable material

Present: present using a similar
workflow to the Workshop module
development process.
Coordinate: consult with BO
presenters, assisting with content/flow,
and providing logistics support, provide
.pptx template, coordinate publicity,
develop and coordinate an assessment
plan and an event report
Assess: using an existing event
evaluation system, or with new
audience, peer and/or self-evaluations

NCBI's Education & Hackathon Programs
FY2019 Presentations, so far:

"Accessing human and other reference genomes and related data at the NCBI"
H3Africa Coordinating Centre, 29 Scientists

"Having a BLAST!"
"Effectively searching NCBI databases"
"NCBI Education & Hackathon Programs"
5 NLM Associates

"NCBI Resources for Extramural Grantees"
NIH OD>ORIP, 17 Program Officers

"Introduction to Bioinformatics"
NVCC, 45 Students and Faculty

"Hot Topics in Basic/Clinical Research & NCBI Resources"
NIDDK Sponsor & Clemson University, 14 Students and Faculty

"NCBI Pharmacogenetics resources for clinical care"
"Interactive visualization of NCBI annotations for variant interpretation"
ASHG National Meeting, 170 Scientists, Clinicians and Students

"Genomics/Genetics & the Practice of Anesthesia"
"Using PubMed Effectively in Clinical Practice"
VANA National Meeting, 243 Nurse Anesthetists

FY2018 Stats
(combined with workshops)
9 Events
1,007 attendees
786 Staff Hours
Cost $6,332 (travel)

...and more to come!

“Functional Genomics Resources”
Late April 2019, Washington State University

“How to effectively and efficiently use NCBI resources for evidence-based clinical care”
Fall 2019, VCU & ODU Advanced Nurse Practitioner Student Meeting

Extensive (3hr) discipline-specific, participant-centered courses discussing science, real-world cases, and featuring exercises illustrating how NCBI resources can be implemented in research discovery.
Initiated by request or invitation from the scientific/clinical community
Workshops

Rana Morris
Peter Cooper
Wayne Matten
Sheri Holland-Bailey

Invited/requested events

1-2 day events, 2 modules per day, ~50 people per module

3 hour modules:
Discipline-specific, case-based & task-driven active learning

Workshop Program Goals:
• 4 regional events/year
• Good evaluations, happy hosts, & excited participants
• Reusable material
• Feedback & contacts for NLM BOs

Presentations & Workshops

Rana Morris
Peter Cooper
Wayne Matten
Sheri Holland-Bailey

Invited/requested events

30 minute to 1 hour Presentations
Audience-focused, case-based presentation: “Based on what I do, what is the current state, and how can this help me?”

3 hour Workshop modules
Discipline-specific, case-based & task-driven active learning: “Based on what I do, what is the current state, and how can I use this in my work?”
2018 NLM Associates Presentation
“NCBI’s Education & Hackathon Programs”
1/7/2019

Workshops
- Rana Morris
- Peter Cooper
- Wayne Matten
- Sherrí Holland-Bailey

Invited/requested events
- 1-2 day events, 2 modules per day, ~50 people per module
- 3 hour modules: Discipline-specific, case-based & task-driven active learning

Module - 9am to Noon
Short intro & overview of workshop flow
Task 1 – Scientific Question or Task
scientific/research background
relevant NCBI resources/processes
workflow overview
guided live demo exercise
independent practice exercise
Task 2 – Scientific Question or Task
scientific/research background
relevant NCBI resources/processes
...
Recap
SurveyMonkey Evaluation

Module - 1pm to 4pm
Short intro & overview of workshop flow
Task 1 – Scientific Question or Task
scientific/research background
relevant NCBI resources/processes
workflow overview
guided live demo exercise
independent practice exercise
Task 2 – Scientific Question or Task
scientific/research background
relevant NCBI resources/processes
...
Recap
SurveyMonkey Evaluation

NCBI RESOURCES FOR
HUMAN GENOMICS RESEARCHERS
- Find a high-quality genome sequence with annotations
- Learn more about a gene and find related data
- Identify and assess disease/condition-related genetic variants
- Find and download relevant experimental studies with datasets

NCBI RESOURCES FOR
NIH-FUNDED RESEARCHER
- Pre-Award Grant Preparation
  Prepare a BioSketch using My Bibliography & SCIENEX
- Post-Award NIH Public Access Compliance:
  Ensure published manuscripts are included in PMC by the
  publisher or author by NIH
- Post-Award Reporting:
  Update My Bibliography with funded grants and
  grant-funded publications
- Include these publications in your Annual or Final Report (ARF)

NCBI RESOURCES FOR
CLINICAL GENETICS
- Research a patient’s genetic variant for diagnostic validation
- Access a patient for a pharmacogenomic complication to a prescribed drug
- Explore an Undiagnosed Disease
  Find, decide, support materials
  Identify a relevant genetic test
  Diagnoses indicated genetic variant
  Determine molecular pathology
  Propose a target for intervention

Invited/requested events
- 1-2 day events, 2 modules per day, ~50 people per module
- 3 hour Workshop modules
  - Discipline-specific, case-based & task-driven active learning: “Based on what I do, what is the current state, and how can I use this in my work?”

Workshops
- Rana Morris
- Peter Cooper
- Wayne Matten
- Sherrí Holland-Bailey
FY2019 Workshops, so far:

University of Michigan Medical Center
- Applied Bioinformatics for Clinical Discovery and Decision Support
- Human Genome Research
- Clinical Microbiology Research
- Using Command-line Calls to Access and Download Data

October 2018, 108 participants

NIH>National Cancer Institute, Frederick
March 2019
City of Hope National Medical Center
April 2019

National Jewish Health & University of Colorado, Anschutz
June 2019

Stanford University
Late Summer 2019

Meharry Medical School & Vanderbilt University Medical Center
Fall 2019

Washington State University
Late Spring 2020

Colorado State University
Summer 2020

ETSU, Quillen School of Medicine & Quillen VA Medical Center
Fall 2020

...upcoming workshops...

NIH>National Cancer Institute, Frederick
March 2019
City of Hope National Medical Center
April 2019

National Jewish Health & University of Colorado, Anschutz
June 2019

Stanford University
Late Summer 2019

Meharry Medical School & Vanderbilt University Medical Center
Fall 2019

Washington State University
Late Spring 2020

Colorado State University
Summer 2020

ETSU, Quillen School of Medicine & Quillen VA Medical Center
Fall 2020

Evaluations

Webinars:
- Attendee SurveyMonkey survey
- YouTube Video views/comments

Presentations:
- Event/Conference evaluations
- Presenter evaluation
- Host evaluation

Workshops:
- Participant SurveyMonkey survey
- Peer evaluation
- Host evaluation

Evaluation Goals:
- Effectiveness of the particular event
- Effectiveness of the program
- Feedback for NLM Business Teams

Webinar Attendee Survey Topics
Demographics: job/organization & use cases
Webinar:
- What helped/interested you the most?
- Was the content helpful for your work?
- Grade the webinar (A-F)
- Will you recommend? (net promoter score)
- Ideas for content & delivery improvement
- Resource-specific questions: those discussed in the webinar (developed with BOs)

Workshop Participant Survey Topics
About you:
- Job or role/organization
- Job or research description

Workshop and Instructor Evaluation:
- Relevancy of content to your work?
- Learn something applicable for your work?
- Strengths/weaknesses of workshop/instructor
- Recommend/grade the workshop/instructor
- Other topics of interest for future workshops?

Resource-Specific Feedback & Contact:
- Tasks, issue cases that you do at NCBI
- Those you can’t or don’t at NCBI
- Other resources you use
- Top 3 changes at NCBI to make things easier or work better for you
- Can we contact you for additional feedback?

OERS Scoring
1. Good-size, interested & interactive audience
2. Good-size, excited & interactive audience with some members who have identified specific ways to apply what they’ve learned in their work
3. Great-size audience with most having specific plans to incorporate/implement what they’ve learned in their work
2-3 day facilitated group-work on discrete bioinformatics-related projects, including data pipelines, analysis workflows and applications. Offered by NCBI Faculty or initiated by request or invitation from the scientific community.

Allissa Dillman
Ben Busby
Invited/requested or offered by NCBI Faculty
2-3 day events, 4-8 groups/event, 4-6 people/group
Facilitated group projects to develop applications or analysis pipelines

Hackathon Program Goals:
• 12 events/yr in collaboration with hosts at conferences & universities
• Reusable material: functional applications on GitHub & publications in peer-reviewed journals
• Feedback & contacts for NLM BOs

U.S. National Library of Medicine
National Center for Biotechnology Information
2018 NLM Associates Presentation
“NCBI’s Education & Hackathon Programs”
1/7/2019

Hackathons
Allissa Dillman
Ben Busby
Invited/requested or offered by NCBI Faculty
2-3 day events, 4-8 groups/event, 4-6 people/group
Facilitated group projects to develop applications or analysis pipelines

9am Logistics
• Discussion of Roles
• Intro to the Project
• Output Formats
• Publishing

9:30am Presentations on Interesting Topics

10am Teamwork:
Plan creation, Data acquisition, Create Intro to Project presentation (1-2 slides)

12:30pm (Working Lunch)
Introductory Presentations of Projects & Team Members

1:30–6pm Teamwork:
Code/Pipeline building

6:30pm Dinner: with your group or on your own

9am Presentations on Interesting Topics

10am Teamwork:
Data clean up, Code/Pipeline fixing, Create Update presentation (3-4 slides)

12pm (Working Lunch)
Project Progress Presentations

1–6pm Teamwork:
Code/Pipeline fixing and updating based on feedback, Code testing

4pm “Writers” meet for a writer group exercise

6:30pm Group Dinner: an opportunity for networking, project discussions & gathering feedback

9am Presentations on Interesting Topics

10am–4pm Teamwork:
Code/Pipeline fixing, Bug fixes, Documenting code & READMEs, Final pipeline testing, (Working Lunch)
Create Final Presentation

1pm “Writers” meet for a writer group exercise

4pm Final Project Presentations & Awards Ceremony

Invited/requested or offered by NCBI Faculty
2-3 day events, 4-8 groups/event, 4-6 people/group Facilitated group projects to develop applications or analysis pipelines

REUSE: Rapid Elimination of Useless Sequences
Genome Assembler Components
TaraCyc: large-scale mapping of viral metabolomics data
beRi: Virtual Environments for R
Alignment-free Pathogen Genomics
Simulating Transcriptome Structural Variants
Blockchain for Infectious Disease Anatomy of Morbidity

LYDA HILL AWARD
Machine Learning Predictive Scoring for Neurological Injury in Pediatric Heart-lung Bypass Patients

Best Desk-to-Bedside Award
Machine Learning To Distinguish T-cell Receptor Subregions

Best Use of Visualization Award
Differentiation of Metastatic Potential in Melanoma Cells

Next Sci-fi Blockbuster Award
Developing Deep Learning Models in Virtual Reality

Most Out-of-the-Box Award
Simulating Molecular Dynamics of Potential Drug Target Regions

Most Likely to Become a Start-up Award
Machine Learning Algorithm for Staging of Liver Disease
FY2019 Hackathons, so far:

NCBI-style Data Science Hackathon
Cold Spring Harbor Laboratories,
November 2018, 25 participants

FY2018 Stats
14 Events
560 participants
560 Staff Hours
Cost $21,000

...upcoming hackathons...

Virus Hunters Data Analysis Hackathon
San Diego State University
January 2019

Biological Data Science Hackathon
Fred Hutchinson Cancer Center
February 2019

NIH/NCBI Hackathon
NIH Campus
February 2019

FAIR Data Hackathon
BioIT World 2019 Conference
April 2019

NIH/NCBI Women’s Hackathon
NIH Campus
May 2019

and more to come.....

current idea: eCourses
Sherri Holland-Bailey
Rana Morris

Developed using Articulate®
Self-paced, interactive, on demand, online courses that cover student-focused, task-based topics

These could supplement Workshops or, over time, could replace them as options.

Prototype Examples:
➢ EDirect for Accessing and Downloading Data
➢ NCBI Resources for Granting
new idea:
“Hackathon for Educators”
Rana Morris
Allissa Dillman

Based on the Hackathon model
Groups of Educators from similar scientific/clinical disciplines (Undergraduate: Genetics, Microbiology, Biochemistry, Bio101, etc.; Clinical Graduate Schools)
Development of case studies or training methods & modules

Could be an add-on to a Bioinformatics Education Symposium

NCBI Education & Hackathon Teams

Rana Morris, Ph.D.
Peter Cooper, Ph.D.
Allissa Dillman, Ph.D.

Wayne Matten, Ph.D.
Sherri Holland-Bailey, MLIS

Also:
Bonnie Maidak – collaborates with MMS for Librarian training
Majda Valjavec-Gratian – offers selected courses for the NIH Library and online
Where can you find out more?

- Biohackathons: biohackathons.github.io
NCBI EDUCATION & HACKATHON PROGRAM OVERVIEW

- Rana C. Morris, Ph.D. – Education Program Lead
- Allissa Dillman, Ph.D. – Hackathon Program Lead

- **Who are NLM/NCBI’s training audiences?**
  
  - NCBI Education & Hackathon Programs focus on our end-users: Health & Life-science researchers, Clinicians, Upper-level Science & Clinical Educators (Undergraduate, Graduate, and Professional)

- **How do we reach them?**
  
  - YouTube Video tutorials/Live Webinars - advertised through social media
  - Presentations & Workshops - advertised in collaboration with hosts
  - Hackathons - advertised through social media in collaboration with hosts

- **How do we deliver training?**
  
  - Video Tutorials on YouTube (sometimes linked from the relevant webpage)
  - Live online Webinars (GoToMeeting online platform), recordings posted on YouTube
  - Presentations at Conferences, Meetings & Universities/Medical Centers
  - Workshops at Universities/Medical Centers
  - Hackathons at Conferences, Meetings & Universities/Medical Centers

- **How do we manage our programs and collaborations?**
  
  - Video Tutorials & Webinars: internal requests/ideas & collaborations with Education Faculty & Business Owners to create scripts, produced and posted by Education Faculty member
  - Presentations:
    - invited presentations from conference, meeting or university/medical center hosts are managed and produced by the presenting Education Faculty
    - internal requests/ideas for conference exhibit presentations are managed and produced by Education Faculty or coordinated by Education Faculty in collaboration with Business Owner presenters
  - Workshops & Hackathons: invited events are coordinated in a collaborative process with the inviting host through frequent Email communications & established logistics processes

- **How do we conduct needs assessment (or determine content coverage for education/hackathon events)?**

  *We do not conduct formal needs assessments.*
  
  - Video Tutorials & Webinars: based on common HelpDesk questions, consultations with users, and requests from development teams for publicity
  - Presentations & Workshops: content for invited events are based on specific requests or consultation and collaboration with the host to determine what is most appropriate for their audiences (may include Emailed questions or more formal surveys)
  - Hackathons: group projects for invited events are based a publicity-based proposal process with curation based on the topic quality and participant applicant type and number
• How do we design training?
  • Video Tutorials are developed by an Education Faculty member in collaboration with a Business owner or team.
  • To the right is a detailed formal description of our design process.
    ▪ this version is used for production of Presentation/Workshops
    ▪ an abbreviated version is used for production of Webinars
  • The Hackathon program is based on a structured schedule with group-developed strategies and plans for research (learning) and development

• How do we conduct evaluation?
  • Training Evaluation
    ▪ Video Tutorials: views and comments
    ▪ Webinars: Registrant/attendee number, SurveyMonkey attendee surveys, recorded video views and comments, logged in OERS
    ▪ Presentations: Presenter self-evaluation, comments from participants & host, often the conference/organization runs its own evaluations and shares the results, logged in OERS
    ▪ Workshops: SurveyMonkey participant surveys, peer & host evaluations, logged in OERS
    ▪ Hackathons: Host/Facilitator evaluations, group productivity (GitHub & manuscript submissions), logged in OERS
  • Program Evaluation
    ▪ Effectiveness of each training event & each segment of the program for future strategic planning
    ▪ Cost of each program and “return on investment” (ROI) - including both target audience impact and marketing/publicity for NCBI Business lines
    ▪ Alignment fit for NCBI & NLM priorities

• What training is available to the Associates/NLM staff, and how do they sign up?
  • Anyone is welcome to view our YouTube Videos or sign up for Webinars.
  • Presentations & Workshops are generally held off-campus at host organizations/institutions for their target audiences
  • Hackathons are held on- & off-campus with open applications to participate.

For more information & links to all our Social Media sites/feeds