Proposal for a Web-Based Open Pharmacometrics Curriculum: Results of a Four-Month Pilot Evaluation

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OBJECTIVES

Given the small number of formal academic training programs and associated faculty, resource sharing and collaboration in pharmacometrics (PM) training are critical to the continued development of the discipline [1]. The objectives of this work were:

- To quantify the extent and intensity of global interest in an Open Pharmacometrics Curriculum (OPC).
- To identify additional web-based resources that could potentially make up a complete OPC.

METHODS

- Six semester-long courses on various PM-specific topics were developed, with audio/video recordings and supporting example files.
- The resulting 126 videos were made open and freely available by posting on a YouTube channel [2], with simultaneous announcement on the NMusers discussion group.
- Usage data from Google web analytics were collected over a 4-month period (updated at time of presentation to a 6-month period).
- Web searches were performed to identify additional open courses, relevant to an OPC.

COURSES

The following courses were available in the OPC for this pilot evaluation:

- MI205: R for Pharmacometrics
- MI210: Introduction to Population Pharmacokinetic-Pharmacodynamic Modeling and Simulation
- MI212: Advanced Topics in Population Pharmacokinetic-Pharmacodynamic Modeling & Simulation
- MI250: Introduction to Bayesian Pharmacokinetic-Pharmacodynamic Modeling & Simulation
- MI255: Exposure-Response Modeling of Categorical, Count, and Time-to-Event Data
- MI260: Model-based Meta-analysis to Support Decision-Making in Drug Development

RESULTS

- Over the 6-month period, lectures were viewed 22,303 times by individuals in 92 different countries for a total of 191,946 minutes watched.
- A pattern of short views in the initial week of availability was followed by a pattern of longer view times (averaging approximately 20–30 minutes each), which was sustained over the time studied.
- Views primarily originated from computers (88%), followed by tablets (7.1%), mobile phones (4.2%), and others.
- Operating systems for devices viewing content were Windows (75%), Macintosh (13%), iOS (6.0%), Android (3.5%), Linux (1.8%), and others.
- 243 individuals subscribed to the channel.
- Additional freely available open web courses were identified to supplement the OPC in topic areas such as math, pharmacology, programming languages, and statistics.

TOP TEN TRAINING TOPICS

Course	Topic	Views (% Total)	Minutes Watched (% Total)	Average Duration (mm:ss)
MI210	Lecture 1	1666 (7.5%)	7050 (3.7%)	4:13
MI205	Lecture 1	1399 (6.3%)	11227 (5.8%)	8:01
MI250	Lecture 1	1044 (4.7%)	8917 (4.6%)	8:32
MI210	Lecture 2	897 (4.0%)	16738 (8.7%)	18:39
MI260	Lecture 1	804 (3.6%)	4998 (2.6%)	6:12
MI212	Lecture 1	704 (3.2%)	1515 (0.8%)	2:09
MI210	Lecture 3	615 (2.8%)	10660 (5.6%)	17:19
MI250	Lecture 2	498 (2.2%)	5600 (2.9%)	11:14
MI255	Lecture 1	488 (2.2%)	2110 (1.1%)	4:19
MI210	Lab 2	451 (2.0%)	3814 (2.0%)	8:27

Figure 1: *Most Viewed OPC Topics*

RESULTS (continued)

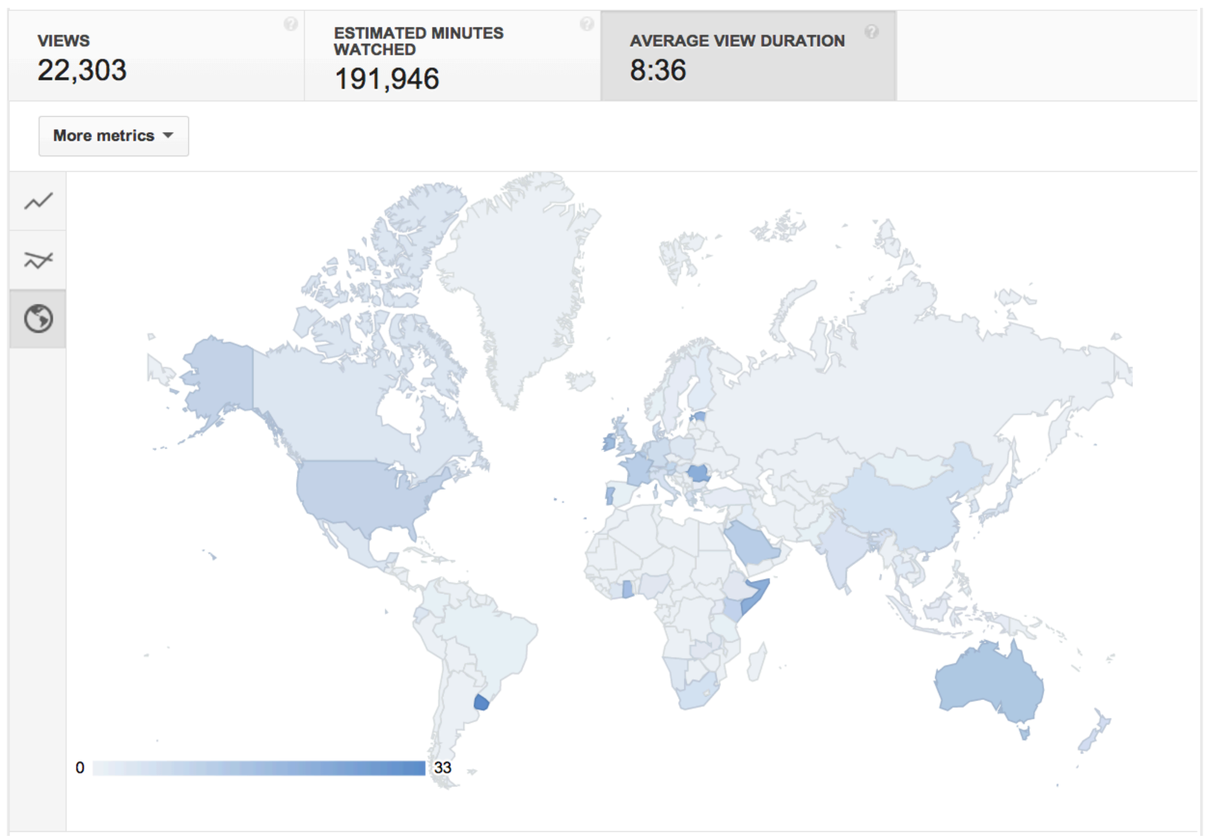

Figure 2: *Global Average View Duration (minutes)*

EXPANDING THE OPEN PHARMACOMETRICS CURRICULUM

Some examples of additional freely available open courses (not intended to be all-inclusive):

Source (Content)	URL
Coursera (variety of topics)	www.coursera.org
edX (variety of courses from major institutions)	www.edx.org
Harvard Open Learning (variety of topics)	www.extension.harvard.edu/open-learning-initiative
Johns Hopkins Data Science (9 courses focused on data science)	jhudatascience.org
Khan Academy (variety of topics)	www.khanacademy.org
Metrum Institute (typical pharmacometrics topics)	www.youtube.com/user/metruminst
MIT Open Courseware (variety of sci/tech topics)	ocw.mit.edu/index.htm
Online Courses (search engine for open online courses)	www.onlinecourses.com
Stanford Online Courses (variety of topics, some open)	online.stanford.edu/courses

Additions welcome. Please forward suggestions to info@metruminst.org

GAPS AND CHALLENGES

- Continued development of open content for flipped-classroom training paradigm [3]
- Collaboration between groups to facilitate critical mass for academic training in the discipline (e.g., open journal club, shared thesis committee members)
- Cloud-based open computational infrastructure for training purposes:
  - Funding for cloud computing costs
  - In-kind donation of cloud computing expertise
  - Open & free availability of pharmacometrics software

CONCLUSIONS

Results reveal a strong global interest in an OPC, with evidence of in-depth study of the materials and ready availability of additional training content. Given the positive initial results, future efforts will focus on building a complete OPC.

REFERENCES

1 Barrett JS, Fossler MJ, Cadieu KD, Gastonguay MR. Pharmacometrics: a multidisciplinary field to facilitate critical thinking in drug development and translational research settings. J Clin Pharmacol. 2008 May;48(5):632-49.

2 http://www.youtube.com/user/metruminst

3 http://en.wikipedia.org/wiki/Flip_teaching

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