

## **Request for Collaboration “RFC”**

Date: September 9, 2008

Title: Virginia Physics “Flexbook”

Issuing/Using Entity: Secretaries of Education and Technology in collaboration with the Virginia Department of Education

### **I. INTRODUCTION**

The Secretaries of Education and Technology are committed to fostering the promotion of Science, Technology, Engineering and Mathematics (“STEM”) education to increase the supply of the Commonwealth’s technology-related workforce. The Secretaries are seeking Statements of Participation (SOP) from regional career and technical centers, school divisions and institutions of higher education to collaborate in the publication of open source physics instructional materials, otherwise referred to as a “flexbook” that is intended to improve the quality of physics instruction for all students. The Offices of the Secretaries will consider responses to this Request for Collaboration (RFC) and determine next steps based on the breadth and depth of participants. Each statement should, in part, address these objectives:

- 1.) Willing to contribute unique physics content in an open source format
- 2.) Willing to support peer review of the draft open source physics “flexbook”
- 3.) Commit to piloting the use of the open source physics “flexbook” for evaluation purposes upon completion of peer review

Respondents should also state the number of faculty members willing to participate and what, if any, resources are needed to fulfill the objectives noted above.

The Commonwealth is partnering with CK-12 ([www.ck12.org](http://www.ck12.org)) to provide participants access to a free, open source technology platform to facilitate the publication of the newly developed content as a “Flexbook” – defined simply as an adaptive set of instructional materials or the use of an open-source, collaborative, and web-based compilation model that can be manifested as an adaptive textbook supplement.

The primary focus of the Virginia Physics “Flexbook” is to elevate the quality of physics instruction across the Commonwealth for all students by providing teachers contemporary and emerging physics content and laboratory modules. A secondary focus is a demonstration of development and publication of peer self-reviewed content in a way that is timely for 21<sup>st</sup> century science and technology growth. A tertiary focus of publishing in an open source format is to assess its efficacy in lowering instructional materials costs to ensure all Virginians might benefit regardless of district financial health.

### **II. BACKGROUND**

In May 2007, under a joint project of the Secretary of Education’s office and NASA, nine physicists met at the National Institute of Aerospace in Hampton, VA to review Virginia’s Standards of Learning (SOL) in physics and to make recommendations regarding their strengths and weaknesses. The physicists were drawn from universities, government research laboratories, and industry so as to bring viewpoints from the full range of physics workplace focus: basic and applied research, applied

research and technology development, and development, manufacture, and operations. Two representatives from the K-12 education community participated on the team.

To guide the effort, team members reviewed K-12 education content including the Advanced Placement and International Baccalaureate programs, recommendations by the American Association for the Advancement of Science (AAAS) Project 2061 and the American Institute of Physics, the National Research Council's National Science Education Standards, and content standards of several states (including Virginia) that were highly ranked by the Fordham Review of state standards.

The team was asked to evaluate the current VA physics SOL and make recommendations for the average citizen in Virginia for participation in the political, economic, social, and technological environment of the 21<sup>st</sup> Century. The review did not focus on advanced physics, believing that several organizations including the college boards, international baccalaureate, and AIP, among others, were developing that area.

*Among* the major findings and recommendations were:

- 1) While the current VA physics SOL are clearly written, easily understood, and separate process from content, they are dated, too broad and shallow; and do not allow for in-depth coverage of important concepts.
- 2) A more useful SOL framework would establish a “core” subset of the current content to be taught by all teachers, discard obsolete materials that should not be taught at all, and introduce a new set of contemporary and emerging physics topics that should be offered to teachers as a set of electives from which they must choose several areas each year. Laboratories encompassing contemporary experimental equipment and written lab reports must be integrated into both the core and elective course elements.
- 3) The Department of Education should support an open-source software framework for teachers to develop contemporary and emerging technologies curriculum and contemporary laboratory experiments in a timely manner.

### **III. PROPOSED APPROACH**

Based on responses, a team of 8 - 10 physics teachers from several school divisions in the Commonwealth shall be assembled to pilot several aspects of the recommendations noted above. The goal is to develop a Physics “Flexbook” containing contemporary and emerging physics content modules and laboratory modules. This first “Flexbook” is meant to complement and supplement current printed textbooks and *is expected to contain content outside of the current VA physics SOL*. It is not our intent to replicate the traditional physics in current approved printed texts.

This proposed first open source book would *supplement (not replace)* currently approved physics texts by providing teacher-developed content that addresses 21st century physics including:

- laboratory experiments that incorporate modern state-of-the-practice technologies as employed in today's workplaces
- mainstream contemporary physics, such as (but certainly not limited to) particle physics to the quark level, Feynman diagrams, nanophysics, bio-physics, plasmas, LCD/LED, and astrophysics
- emerging physics, which would include concepts that are a bit more speculative than those listed as contemporary such as quantum computing.

Each of the participating teachers will contribute one or two “chapters” to the book. There is no length requirement on a “chapter” but each must address some element in one of the three main areas of interest listed in the paragraph above. (For example, one chapter might address nanophysics; another chapter might address plasmas and their current applications, etc)

The Secretary of Technology, the Secretary of Education, and the Virginia Department of Education believe that this collaborative can serve as a valuable education tool for the Commonwealth and will work to ensure that this pilot initiative results in a sustainable program that can be expanded to other subjects and disciplines.

In keeping with the speed of 21<sup>st</sup> century business processes, it is the intent of the Secretaries and the Department to have a peer reviewed "Flexbook" available for release by COB February 27, 2009.

#### **IV. INSTRUCTIONS FOR RESPONSES**

Respondents should submit a brief SOP that, in addition to addressing objectives 1, 2, and 3 of the introduction above, shall include:

- 1) A brief statement of interest in participating in the collaborative to publish a physics flexbook
- 2) An overview of the capacity for the respondent to contribute in a meaningful way on the quality of the content including a **short Curriculum Vitae (CV)** for proposed participating personnel.
- 3) A road-map for how the respondent intends to incorporate the physics flexbook into its instructional plan upon successful peer review.
- 4) A summary of ideas or concerns not identified by this RFC that should be addressed as well as input on how the respondent would address them.

Responses should not exceed eight (8) pages exclusive of CVs.

Project staff will conduct a dialogue with respondents and may seek out more information in support of the response. As part of the dialogue process suggestions for improving responses may be given to respondents by project staff. Updated responses will be accepted up until the deadline. Therefore, early responses are encouraged.

Scoring grid for selection shall be as follows:

- 1) Demonstrated understanding of the problem at hand - 40pts
- 2) Qualification of proposed personnel as evidenced by CV - 40 pts
- 3) Geographic and demographic (rural, suburban, urban school division) distribution - 20pts

SOP's shall be returned by 4:00 PM EST on September 30, 2008, by mail or electronically. Electronic responses should be addressed to: [jimbatterson@live.com](mailto:jimbatterson@live.com) and cc to [tristen.pegram@governor.virginia.gov](mailto:tristen.pegram@governor.virginia.gov). Include Virginia Physics Flexbook Response in the subject line. Non-electronic responses will also be accepted. Please send to:

Jim Batterson	Tristen Pegram
9180 Wigneil Street	Secretary of Technology's Office
Suffolk, VA 23433	1111 E. Broad Street, 4 <sup>th</sup> floor
	Richmond, VA 23219

Technical questions should be made to [jimbatterson@live.com](mailto:jimbatterson@live.com). Policy inquiries should be addressed to [lan.neugent@doe.virginia.gov](mailto:lan.neugent@doe.virginia.gov).

#### **ABOUT CK-12**

CK-12 Foundation is a non-profit organization with a mission to create a collaborative online authoring environment enabling the production of free and open educational content that can be customized for each student while being aligned with curriculum guidelines. In addition, CK-12 also aims to empower teacher practitioners by generating or adapting content relevant to their local context. This enabler will allow the production of adaptive textbooks termed the "FlexBook". CK-12 intends to pioneer the generation and distribution of high quality, locally and temporally relevant,

educational web texts. The content generated by CK-12 and the CK-12 community will serve both as source material for a student's learning and provide an adaptive environment. The compiled or authored material will be available under the Creative Commons by Attribution Share-Alike license.

**APPENDIX: Proposed Timeline**

Sept 9: RFC Released

Sept 30: Completed Responses of interested divisions due

Oct 17: 8-10 respondents selected to participate

Oct 29: Official kick-off activity in Richmond (conference call available)

January 15, 2009: DRAFT chapters completed and ready for peer review

February 9, 2009: Peer reviews complete

February 27: VA 21st Century Physics Supplemental Flexbook V1.0 Released