UTMOST

Undergraduate Teaching in Mathematics with Open Software and Textbooks
CCLI Phase 2 Grant Proposal to the NSF, Supplemental Questions
July 2010

Thhank-you for the opportunity to respond to your questions and concerns raised by our proposal. We have organized our responses according to the original questions.

1. Engagement with Related Projects

NSF Question Text (in drafts only):
= Engagement with related projects =

* There are a number of projects related to the SAGE effort, e.g. the MAA's "MathDL Books Online" project led by Lang Moore, see award number: 0231083; the "Connexions" project at Rice University led by Rich Baruniak, see http://cnx.org/; and the "Holistic Numerical Methods Institute" led by Autar Kaw, see http://numericalmethods.eng.usf.edu/index.html. What possibilities do you see to engage in synergistic activities (e.g. in content, expertise, shared technology, etc) with these efforts?

RESPONSE:

David Farmer (AIM) and Rob Beezer have been pursuing more general projects around the creation of open textbooks, in any discipline. As part of this, they have had extensive discussions with Kathi Fletcher and Joel Thierstein of the Connexions project (Project Manager, Executive Director, resp.). It would be a natural outcome to have Sage-enhanced textbooks designed to be compatible with their system (such as their XML schema) and distributed with their Rhaptos software.

(Jason MathDL)

The "Holistic Numerical Methods Institute" is new to the project's personnel, but it also looks like a good fit with Sage and related instructional materials. One of the textbooks we may convert is [59] Steven Pav's *Numerical Analysis*, so numerical analysis is an are of the undergraduate curriculum we will be examining.

2. Engagement with Other Institutions

NSF Question Text (in drafts only):
= Engagement w/other institutions =

* A number of reviewers wanted to see more information about implementation efforts at other schools. For example, "PIs could have strengthened the proposal by addressing institutionalization efforts at participating colleges and universities if implementation is successful" and "I would have rated this proposal higher if it had included commitments from the seven additional institutions." In sections 5.3.1 and 5.3.2, the proposal narrative does set out a useful description of the activities and selection criteria. But beyond the three institutions with whom you have already secured commitments to test out the implementation of SAGE, what other institutions have you contacted and who will you work with at each?

* How do you plan to ensure that a diverse set of institutions will be involved? Are some of these HBCUs or MSIs? What about two-year colleges? What timetable for bringing these institutions on board do you envision? Please supply appropriate letters of interest, if not commitment to participate.

RESPONSE:

As part of reducing our budget, we have reduced the number of test sites from ten to eight, and plan to work with three schools in the 2011-12 academic year and five in the 2012-13 academic year. We have commitments from three schools for the first group. (And info on some new ones, Seattle

CC, Nate Dean ideas, etc goes here.) We have planned to have the flexibility of selecting the other schools in Spring 2011, when we have a more precise estimate of which converted textbooks will be available for the schools to use.

With very limited advertising we have expressions of interest as emails from the following six faculty:

- Edgar Jasso, North Seattle Community College (KEEP??)
- David Joyner, U.S. Military academy
- Dana Ernst, Plymouth Sate University (Maine)
- Dan Drake, Korea Advanced Institute of Science and Technology
- Erin Martin, Westminster College (Missouri)
- Jared Schlieper, Armstrong Atlantic State University (Georgia)

We plan to advertise more widely, solicit HBCU and MSI schools as we carefuuly select additional institutions to participate as test sites.

Pong ideas here on CSDH minority profile.....

3. Project Details and Management

NSF Question Text (in drafts only):
= Project details and management =

More than one reviewer expressed concern that the proposal had outlined perhaps an overly ambitious agenda: "However, the breadth of the proposed activities, in the absence of additional supporting detail for how the activities will be accomplished, raises some concerns." Or, "I am concerned about the many initiatives the project proposes."

* What does the team envision as the relative balance of effort among the different implementation components laid out in section 5?

* What is the scope and nature of the production of non-text-based materials? How comprehensive a set of materials does the project envision, e.g. are these suites of general visualizations that can be used in a wide variety of settings? What other types of materials are planned?

* Please clarify the roles and responsibilities of project team members as they are connected to the primary goals, objectives, and tasks of the project. It would also help greatly if these activities are mapped to a timeline.

* What types of members of the Editorial Board do you envision? What expertise and experience do you see are appropriate? Who has already agreed to serve, and how will you recruit others?

response:

4. Evaluation

NSF Question Text (in drafts only):
= Evaluation =

In general the panelists saw the proposed evaluation efforts as solid, however questions remain. For example: "The PIs present data to support the fact that large numbers of people are creating accounts online, but details to indicate how they are using the accounts and an assessment of the impact of prior efforts on student learning would have strengthened the proposal." And "There was some thought that more details of the assessment of student learning from the Phase 1 activities should have been included in the current Phase 2 proposal."

* The types of questions posed at the beginning of section 6 are fine, but can these be "sharpened" to go beyond just descriptive (What and How?) towards the explanatory (Why?) Please provide some examples of these more probing questions the project team would ask and how you might collect data or otherwise make observations that would help answer these kinds of questions.

* One direction of this kind of inquiry was suggested by a panel member who asked about connecting the evaluation and assessment work to research efforts about the use of dynamic textbooks. Is this reasonable and how might the evaluation group go about investigating this?

* One of the important benefits of the Sagebooks environment is that materials may not only be reused, but also revised and adapted by others. From that starting point, are there ways the project can observe user behavior more deeply? For example, can modifications be tracked, contributions recorded, etc. What about capturing and analyzing network interactions among participants? What does the social graph look like and how does it change and why? Is growth in student understanding somehow observable through changes in how students use the materials and interact with the faculty and/or their peers?

RESPONSE:

5. Technology

NSF Question Text (in drafts only):
= Technology issues =

* You'll have seen that several reviewers commented on wanting to see more detail regarding the Sage server infrastructure, both current and projected. For example, "A concern would be the actual purpose of the Sage servers and their on-site implementation. More information should be given about what impact this will have on actual usage of the implementation." Or "The capabilities of the Sage server were unclear—is the current software sufficient to meet the needs of a moderate to large campus using these on-line texts?" Please clarify these points.

* What statistics are available regarding installations of SAGE? Can the "nature" of such installations be tracked? I am thinking here of things like: locations, growth over time, distribution over time, the usage data at each installation, etc.?

* What is the cost for a site to set up a SAGE server to provide access locally? (Note: the implementation cost is related to questions that follow regarding broader impact and affordability.)

RESPONSE:

6. Dissemination and Impact

NSF Question Text (in drafts only):
= Dissemination/Impact =

* How will the system to allow textbooks to be converted to this on-line format be assessed? Will the larger-scale adoption of texts developed in this context be assessed (as compared with other similar texts, etc.)? Please respond.

* The panel also sought to understand whether "the use of AIM as an 'established authority' to vet the texts will be sufficient to motivate large-scale adoption." Please respond.

* There was also concern that: "dissemination appears to be largely focused on colleges and universities with more resources." However, reviewers did recognize that the project has an intent to engage two-year colleges and under resourced institutions among the test sites. Please clarify how the dissemination plan expects to undertake reaching a broad audience of potential users.

* Some panelists also wondered about the appeal of the open-source texts beyond the existing community. For example, in the panel summary reviewers wrote: "A final question raising concerns about broader impact was whether the open-source textbooks being developed would be (or even could be) appealing by those outside of the existing Sage community." While NSF does share enthusiasm for open-source approaches, the concern raised by reviewers is legitimate. What are the potential barriers to broader adoption that the project has identified and how does it propose to address these?

RESPONSE:

7. Budget

NSF Question Text (in drafts only):
= Budget =

* One panelist had "major reservations" that release-time was not clearly budgeted for the teacher-authors who will implement, develop and assess the modules of the online interactive texts. Please clarify this question.

* There was confusion regarding how provisioning the remote use of Sage would be handled. Is this through an in-kind contribution of server time and maintenance at the University of Washington, or is the intent to request grant funds to install new servers at participating institutions?

* The above question is related to concern that broad adoption is dependent on the capacity for adopting institutions to host an installation of Sage locally and bear those long-term costs, or whether sufficient capacity exists centrally to allow many remote users spread across participating institutions. If more server capacity must be implemented (and this could take the form of either central improvements or greater resources brought to bear at each site), are there adjustments to the originally proposed technology expenditures that are better spent in this way, then on their initially proposed purposes? Please respond.

RESPONSE:

8. Additional Notes

NSF Question Text (in drafts only):
= Additional Notes =

* A couple of the institutions that are part of this collaborative submission indicated on their respective cover sheets that Human Subjects Approval was in the process of being sought. We will need to receive the appropriate documentation that this approval has been granted by the relevant Institutional Review Boards. The best thing to do here is to have that signed approval (on the school's letterhead) scanned as a PDF and e-mailed directly to me.

* Our overall CCLI budget for math remains tight so we are trying to support as many projects as we can. Therefore we would like to see if you could explore some potential cost savings in your budget. We think we can get up to a figure of $525K. Where you would find adjustments to make would be entirely up to you and your team. If this is doable and I hope it is, you'll need to submit a revised budget and include a "budget impact statement" that describes what if any impact the reduction would have on the scope of the project. I realize that with a collaborative submission, you will need to work with your collaborators. But it would be up to you though as to where you would look for the savings. It may mean that all of the partners will need to submit revised budgets, but it would be fine if you chose to do this only with a subset of your group. Again, it is your call here.

RESPONSE:

9. Budget Impact

We have been asked to reduce the project budget by $75,000. The following summarizes the hard choices we have made with rationale alongside the impact on the budget and the activities of the project. Dollar figures include indirect costs.

Test Site Servers ($3,780): As discussed above, we have eliminated our placement of two experimental servers at test sites. This is the amount budgeted to purchase these servers.

Test Site Stipends ($12,000): Reducing the number of test sites from ten to eight, staggered as a reduction in the first year to three, will result in this savings in stipends to those institutions.

Evaluation ($): With a reduction in the number of test sites,...

Sage Days ($5,670): Since submitting our original proposal, the Sage project has received a grant from National Science Foundation COMPMATH program (with Stein as co-PI), to fund a series of Sage Days workshops. One workshop is devoted to the Sage Notebook web interface, a key feature for education, Sage-enhanced textbooks and the goals of this grant. By combining one of the workshops for this grant with this other workshop on the notebook, we have reduced the funding for one workshop by half. This should have no negative impact on the quality of the workshop, and possibly the synergy between developers and users of the notebook will be increased.

AIM Open Textbook Initiative ($7,560): Funds for dissemination as part of the open textbook inititative at AIM have been reduced by $2,000 in each year, which will partly limit what can be done in this area.

Computers ($3,024): Since submitting our proposal, Grout has been provided a new laptop by his home institution. Beezer will use a personal, but less powerful, desktop computer for Sage development work.

Summer Salary, Stein ($21,452): Stein's summer participation has been reduced by a single month. This will lessen the amount of work done to design, lead and implement improvements in the notebook server (sagenb.org). Funds for student and developer projects have not been reduced, so much of this work will be accomplished as originally planned.

Summer Salary, Beezer ($14,960): Beezer's summer participation has been reduced by a single month. This will lessen the number of textbooks that will be Sage-enhanced or the contributions of code to the Sage library, but should not affect the creation of a system for converting textbooks.

Travel ($6,300): Travel funds have been reduced from $30,000 to $25,000.

UTMOST Project Timeline

Personnel	Summer 2010	AY 2010-11	Summer 2011	AY 2011-12	Summer 2012	AY 2012-13	Summer 2013
All			Sage Days		Sage Days		
Beezer	Textbook Conversion System	Sabbatical Leave Textbook Content Sage Library	Textbook Conversion System	Liaison, Reed		Liason	
Grout				Liason		Liason	
Hassi					Evaluation		Evaluation
Judson		Abstract Algebra textbook		Liaison, SFSAU		Liason	Evaluation
Kedlaya				Liaison, CSDH		Liason	
Stein				Liason		Liason	