



Evaluation Report

NIMBioS/Project Kaleidoscope Webinar

*Mathematics and Life Science Education: Promoting
Interdisciplinarity*

April 23, 2009

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Executive Summary

Brief Synopsis of Event

A one-hour webinar entitled “*Mathematics and Life Science Education: Promoting Interdisciplinarity*” was presented by NIMBioS Director Louis Gross on April 23, 2009, in conjunction with Project Kaleidoscope (PKAL). PKAL is one of the leading advocates in the United States for what works in building and sustaining strong undergraduate programs in the fields of science, technology, engineering and mathematics (STEM). The webinar, which was part PKAL’s series of monthly interactive calls about interdisciplinary learning, was hosted online via WebEx. Dr. Gross presented participants with information about using a multi-pronged approach to integrate quantitative ideas throughout biology curricula. Specific topics addressed by Dr. Gross in the webinar included the following:

- Improving curricular offerings to enhance the opportunities for students to develop an interdisciplinary perspective;
- reinforcing the importance of quantitative approaches for life science students, so that they don't see math courses as simply a hurdle to get over; and
- methods to help students to become "fearless users" of the new technologies which have allowed biologists to much more readily carry out quantitative analyses.

Highlights of Results

- Two-thirds of respondents felt as though the webinar met their expectations
- Participant expectations included learning about strategies for integrating math and biology curricula, encouraging collaboration among math and biology faculty, and getting a general idea about the current thinking about Interdisciplinarity
- Of the 21 respondents who indicated they planned to institute curricular changes to incorporate interdisciplinary science education at their institutions, 17 said they felt the webinar provided useful information to help them do so.
- Most (90%) of participants felt questions from the audience were answered well
- Most participants had no problems with using WebEx; however, some did experience audio issues
- If given more time, participants would have liked to have gotten more specific information about implementing interdisciplinary curricular change, including overcoming administrative issues

- The most common request for future webinars was to provide more specific information about how to implement an interdisciplinary science program, including case studies of existing successful programs

Conclusions and Recommendations

The majority of the webinar participants found the information presented useful and relevant, but indicated they would like more detailed information about designing and implementing an interdisciplinary science program. Most participants indicated coming to the webinar with expectations of getting a “how-to” tutorial with specific information about overcoming known obstacles that established interdisciplinary science programs have faced. While participants thought the webinar provided good ideas about increasing quantitative literacy in biology students, their comments suggest a general lack of knowledge on their part regarding resources available to those considering developing an interdisciplinary science program.

Although several respondents indicated experiencing some sort of trouble with the technology used to present the webinar, most problems were not directly related to the Web Ex software (e.g. computer monitor switching to screensaver mode, browser shutting down). Several respondents did, however, indicate having audio problems. The most common issues were the audio not being loud enough to hear, and having to listen to the webinar via the telephone rather than the computer.

Based on analysis of participant response data, the recommendations are as follows:

- There is significant interest in the topic of the current webinar. Continue to offer webinars in this subject area, but consider narrowing the focus to specific implementation issues (e.g. how to promote collaboration among departments; resources available for those considering creating an ID program; a case study of a successful program).
- If using WebEx for future webinars, consider looking into the cause of the audio issues to determine where the problems lie and how to fix them.
- Consider offering a tutorial hosted at NIMBioS about designing and implementing an interdisciplinary science program. Participant feedback suggests it may be useful to invite individuals to speak who have successfully implemented an interdisciplinary program, as well as individuals who are currently in the process of designing a program. Resources available to those interested in creating an interdisciplinary program and opportunities for networking should be highlighted.
- Consider developing a web page linked to the NIMBioS site with resources for institutions interested in developing an interdisciplinary science program. Participant feedback suggests useful information would include relevant textbooks, student assessment instruments, case studies, and links to web sites of successful programs. If possible, a forum where individuals can network and discuss questions and suggestions online would also be helpful.

NIMBioS/Project Kaleidoscope Webinar Evaluation

Mathematics and Life Science Education: Promoting Interdisciplinarity

Background

Introduction

A one-hour webinar entitled “*Mathematics and Life Science Education: Promoting Interdisciplinarity*” was presented by NIMBioS Director Louis Gross on April 23, 2009, in conjunction with Project Kaleidoscope (PKAL). PKAL is one of the leading advocates in the United States for what works in building and sustaining strong undergraduate programs in the fields of science, technology, engineering and mathematics (STEM). The webinar, which was part of PKAL’s series of monthly interactive calls about interdisciplinary learning, was hosted online via WebEx. Dr. Gross presented participants with information about using a multi-pronged approach to integrate quantitative ideas throughout biology curricula. Specific topics addressed by Dr. Gross in the webinar included the following:

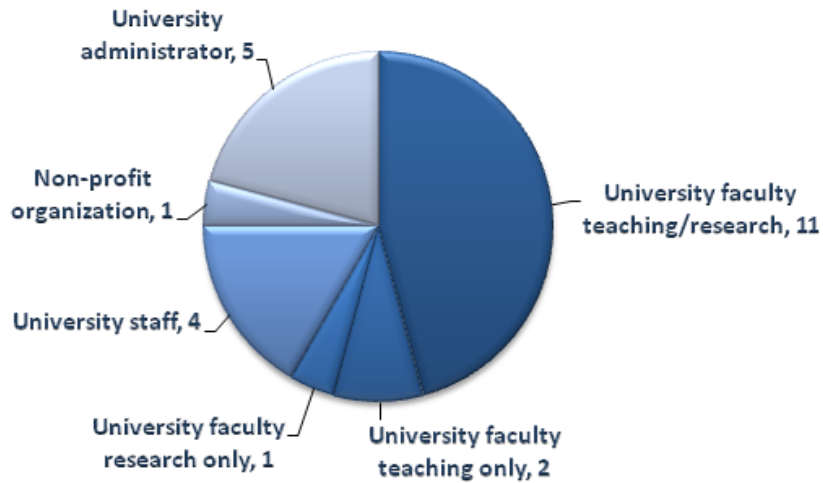
- Improving curricular offerings to enhance the opportunities for students to develop an interdisciplinary perspective;
- reinforcing the importance of quantitative approaches for life science students, so that they don't see math courses as simply a hurdle to get over; and
- methods to help students to become "fearless users" of the new technologies which have allowed biologists to much more readily carry out quantitative analyses.

Participant demographics

A survey, which included optional demographic questions, was disseminated to all 27 participants to gather information about their perception of the webinar. Twenty-two of the 25 webinar survey respondents provided answers to the optional demographic survey questions. Of the 11 males and 11 females responding to these questions, 19 self-identified as white, and 2 as black or African American. One respondent did not indicate a racial identification. No respondents indicated being of Hispanic/Latino ethnicity.

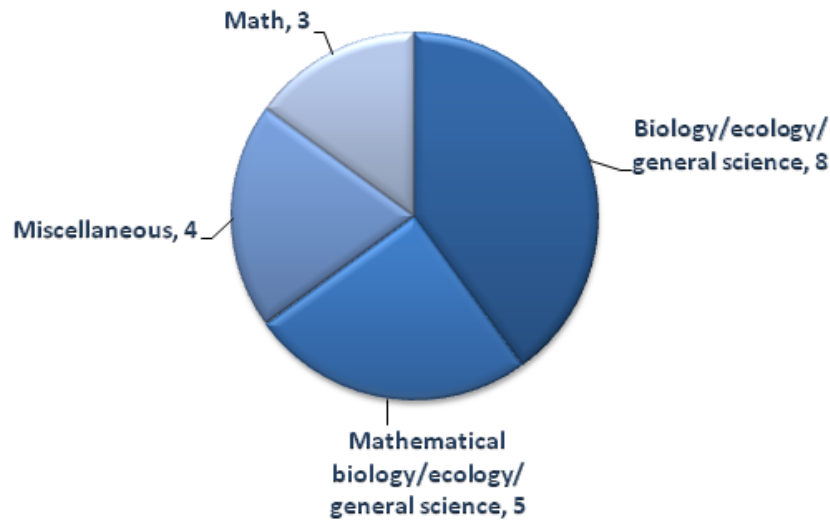
Most respondents were university faculty or staff (including administrators), and one was from a non-profit organization (Figure 1). Of the 23 respondents from institutes for higher education, 22 were from 4-year colleges/universities, one of which was classified as a women’s only institution.

Figure 1. Status of webinar survey respondents



Respondents were from several areas of business/education/research as well (See Appendix B for a detailed listing). Most respondents indicated working in either a math or science field, or in an interdisciplinary mathematical science field (Figure 2).

Figure 2. Survey respondents' main area of business/education/research



Participant Recruitment

The majority of respondents (59%) indicated they heard about the webinar through an email from PKAL, while 23% heard about it from the dean of their respective colleges. The remaining four respondents heard about the webinar from various other sources (See Appendix B for details).

Evaluation Design

Evaluation Questions

The evaluation of the webinar was both formative and summative in nature, in that the data collected from participants was intended to both gain feedback from participants about the quality of the current webinar, and also to inform future webinar events. The evaluation framework was guided by Kirkpatrick's Four Levels of Evaluation model for training and learning programs (Kirkpatrick, 1994¹). The evaluation questions were developed according to level one of the model, participants' reactions, in order to gather information about how participants felt about the content and format of the webinar. Several questions constituted the foundation for the evaluation:

1. Did participants find the information presented in the webinar useful?
2. Did the webinar meet participants' expectations?
3. Did participants feel the presenter adequately addressed audience questions?
4. Were there any technical problems with the format of the webinar?
5. What topics would participants have liked to cover if given more time?
6. What topics would participants like to cover at future webinars?

Evaluation Procedures

An electronic survey covering the evaluation questions was designed by the Evaluation Coordinator with input from the NIMBioS Director. The final instrument was hosted online via UT's secure survey web host mrInterview. Links to the survey were sent to the 27 webinar participants on April 27, 2009. Reminder emails were sent to non-responding participants on April 30 and May 4, 2009. By May 13, 2009, 25 respondents had given their feedback, for a response rate of 93%.

Data analysis

Data from the electronic survey included both forced-response and supply-item questions. All data were downloaded from the online survey host into the statistical software package SPSS for analysis. Quantitative data were analyzed using SPSS, while qualitative data were analyzed in SPSS Text Analysis for Surveys. Qualitative responses were categorized by question and analyzed for trends.

Findings

Overall Satisfaction

Participant expectations

In response to a question about their expectations for the webinar, the majority of respondents (73%) indicated they were hoping to learn strategies for integrating math and biology curricula at their institutions:

"I was hoping to gain additional perspectives on Interdisciplinary teaching methods: how does this math/science partnership work?"

¹ From Kirkpatrick, D.L. (1994). *Evaluating Training Programs: The Four Levels*. San Francisco, CA: Berrett-Koehler.

“Strategies to help develop effective courses for an interdisciplinary math biology class.”

“Practical methods for incorporating more mathematics into biology and vice versa.”

“More about the structure of ID programs and how to create them.”

A smaller number of respondents (14%) indicated they were hoping to learn how to encourage collaboration among math and biology faculty:

“How best to help faculty develop interdisciplinary connections within biology and mathematics (and where external funding support might be located).”

“Ideas about the types of mathematical courses that would be most applicable to environmental studies/science programs. Ideas about interdisciplinary cooperation between mathematicians and biologists on courses, projects, faculty-student research, etc.”

“Actually, to encourage our biology and computational science faculty to come together and learn about what is possible and to get resources.”

Three respondents indicated they were just interested in getting a general idea of the current thinking about interdisciplinarity between math and biology.

Two-thirds of respondents felt as though the webinar met their expectations (Table 1). Analysis of open-ended responses revealed two participants did not find the content useful; however, several participants indicated they thought the content was very helpful:

“I thought it was a very useful, informative webinar. Interesting problem-based suggestions for incorporating math and biology together throughout the curriculum. Interesting ideas for increasing quantitative literacy throughout the curriculum.”

“The webinar was very helpful. Lou's presentation addressed many of the concerns that I have heard expressed by others as well as my own concerns about tailoring math courses to meet the needs of life science students”

Table 1. Meeting of participant expectations for the webinar, by category of learning expectations

Category of participant learning expectations:	Number of responses	Expectations met?	
		Yes	No
Ways to integrate math and biology curricula	16	63%	37%
How to encourage collaboration between math/biology faculty	3	67%	33%
Get a general idea of the thinking in the field	3	100%	0%

Of the participants who did not feel the webinar met their expectations, two said they were disappointed that the webinar did not cover all the content they had hoped, while three said they would have liked more detailed information:

“I expected more about math courses, but the webinar also focused a lot on including quantitative work in biology courses. It was still informative and worthwhile, but not quite what I expected.”

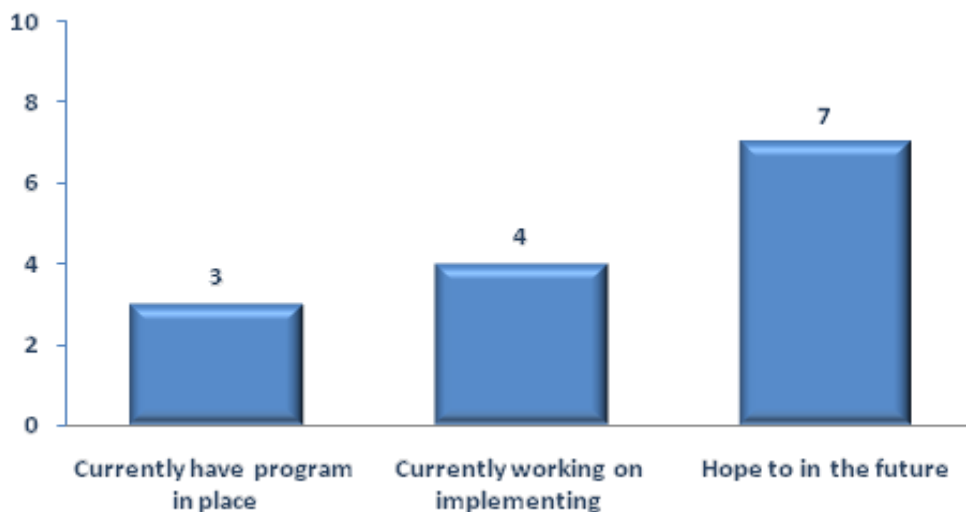
“There was a lot of “theoretical” discussion but not much on specifics. Perhaps that is just the nature of such short-term webinars. One telltale sign was that there were not many audience questions.”

“...I wanted to know more about how to help students improve math skills so that students can perform better in gateway science courses. It wasn't clear how the biology example that was presented could be extrapolated to other areas of science.”

Webinar content and format

Respondents answered several questions about the webinar content and format. Of the 21 respondents who indicated they planned to institute curricular changes to incorporate interdisciplinary science education at their institutions, 17 said they felt the webinar provided useful information to help them do so. Analysis of open-ended comments by those indicating they planned to institute curricular changes revealed varying levels of implementation (Figure 3).

Figure 3. Levels of implementation of curricular change at participants’ institutions



All respondents indicated they felt sufficient opportunity was given for questions and comments from the audience, and most (90%) felt the questions from the audience were answered well. Some participant comments:

"I think that there was sufficient opportunity but the direction of the webinar didn't really lend itself to asking the types of questions that I think most people would have liked to ask."

"The speakers' answers went on too long. It would have been better if he was shorter and more to the point instead of waxing philosophical."

"Questions were handled very well. A longer webinar may have allowed more questions/discussion."

"... I think I would like less time for presentation and more time for questions and interaction. It is very difficult at the end of a very long day to focus on a presentation that lasts almost an hour."

Although several participants indicated experiencing some sort of trouble with the technology used to present the webinar, most problems were not directly related to the Web Ex software (e.g. computer monitor switching to screensaver mode, browser shutting down). Several respondents did, however, indicate having audio problems. The most common issues were the audio not being loud enough to hear, and having to listen to the webinar via the telephone rather than the computer.

Suggestions for Future Webinars

Participants were asked what they would have like to have covered in this webinar if given more time, as well as what topics they would like to see at future webinars. Analysis of open-ended responses indicated that a common response theme to both questions was to have more specific details provided about how to design and implement an interdisciplinary science program:

"Info on resources to implement interdisciplinary curricular development."

"More specifics about math courses for biology students -- e.g., what is most important for the biology students."

"I think that most scientists want to discuss nuts and bolts issues---not theoretical ideas."

Suggestions from respondents for future webinars included using specific examples of interdisciplinary programs that have been successfully implemented:

"I would like to see webinars similar to this one: practical advice and real-world examples of how ID Learning is occurring elsewhere."

"Detailed case studies on how interdisciplinary curricular development has been accomplished (institutional differences, structural and political impediments, economic costs, pedagogical outcomes - how measured and by what instruments)."

Other suggestions for future webinar topics included information about promoting interdisciplinarity among specific science fields such as physics, geology, pre-health sciences, and epidemiology:

“New directions for geology; the intersection of geology, biology and environmental sciences/environmental studies. New directions for physics, especially in relation to renewed interest in sustainable energy (wind power; microhydro, etc.).”

“Public health, global health, epidemiology, etc. as topics to bring students together from different disciplines.”

Another emergent theme for future webinar topics was provision of information about overcoming administrative issues encountered when implementing curricular change:

“Leadership issues in transformational change (e.g., ID curriculum change)”

“Ideas/models for softening departmental barriers”

Conclusions and Recommendations

The majority of the webinar participants found the information presented useful and relevant, but indicated they would like more detailed information about designing and implementing an interdisciplinary science program. Most participants indicated coming to the webinar with expectations of getting a “how-to” tutorial with specific information about overcoming known obstacles that established interdisciplinary science programs have faced. While participants thought the webinar provided good ideas about increasing quantitative literacy in biology students, their comments suggest a general lack of knowledge on their part about resources available to those considering developing an interdisciplinary science program.

Although several participants indicated experiencing some sort of trouble with the technology used to present the webinar, most problems were not directly related to the Web Ex software (e.g. computer monitor switching to screensaver mode, browser shutting down). Several respondents did, however, indicate having audio problems. The most common issues were the audio not being loud enough to hear, and having to listen to the webinar via the telephone rather than the computer.

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- If using WebEx for future webinars, consider looking into the cause of the audio issues to determine where the problems lie and how to fix them.
- Consider offering a tutorial hosted at NIMBioS about designing and implementing an interdisciplinary science program. Participant feedback suggests it may be useful to invite individuals to speak who have successfully implemented an interdisciplinary program, as well as

individuals who are currently in the process of designing a program. Resources available to those interested in creating an interdisciplinary program and opportunities for networking should be highlighted.

- Consider developing a web page linked to the NIMBioS site with resources for institutions interested in developing an interdisciplinary science program. Participant feedback suggests useful information would include relevant textbooks, examples of student assessment instruments, case studies, and links to web sites of successful programs. If possible, a forum where individuals can network and discuss questions and suggestions online would also be helpful.

Appendix A

Project Kaleidoscope Webinar Survey

Project Kaleidoscope Webinar Survey

"Mathematics and Life Science Education: Promoting Interdisciplinarity" Presented by Dr. Louis Gross Director of the National Institute for Mathematical and Biological Synthesis

Thank you for taking a moment to complete this survey. Your responses will be used to improve the webinars offered by Project Kaleidoscope and the National Institute for Mathematical and Biological Synthesis. Information supplied on the survey will be confidential, and results will be reported only in the aggregate.

We will send two reminder emails to webinar participants who have not responded to this survey. If you would like to be excluded from these reminder emails, please enter your name below. Your survey results will still remain confidential and your name will not be associated with any of your responses in reporting of survey results.

Name:

How did you hear about this webinar?

What were you hoping to learn by attending the webinar?

Did the webinar meet your expectations?

Yes

No

Comments:

Do you plan initiate curricular changes that incorporate interdisciplinary science education at your institution?

Yes

No

Comments:

Do you feel the information presented during the webinar was useful information for initiating curricular change?

Yes

No

Comments:

Did you have any problems with the technology used to present the webinar (e.g. connectivity, sound, images)?

Yes

No

Comments

Do you feel there was sufficient opportunity for questions and comments from the webinar audience?

Yes

No

Comments:

Do you feel the questions from the webinar audience were answered well?

Yes

No

Comments:

What additional information would you have liked to have covered in this webinar?

What topics would you like to see covered in future Project Kaleidoscope webinars?

Additional comments:

Demographics

Your participation in answering the following questions is completely voluntary and will be used for aggregated reporting only. Answer only those questions with which you feel comfortable.

I am a(n):

Undergraduate student

Graduate student

Postdoctoral researcher

University faculty—teaching/research

University faculty—teaching only

University faculty—research only

University staff

Business/industry employee

Non-profit organization employee

Other:

If you are affiliated with a college/university, please describe your institution: (check all that apply)

2-year institution

4-year institution

Minority serving institution

Women's only institution

Not applicable

Please give a 2-5 word description of your main area of business/education/research (e.g. mathematical immunology, high school science teacher, etc.)

Gender:

Male

Female

Are you Hispanic or Latino?

Yes

No

What is your racial background? (check all that apply)

American Indian or Alaska Native

Native Hawaiian or other Pacific Islander

Asian

Black or African American

White

Appendix B

Open-ended Responses

Open-ended responses, by question and response category

How did you hear about this webinar? (n=23)

Email from PKAL (13)

e-mail announcement from ICO/PKAL

e-mail from PKAL

Email from PKAL

pkal staff

We are funders of the project and receive emails of the events.

email

Through the P-Kal/Keck network.

Email from PKAL

Keck/PKAl

through PKAL

PKAL

Project Kaleidoscope

Through PKAL emails.

Email from Dean of College (5)

Email note from Muriel Poston, our Dean of Faculty.

e-mail from dean's office

The Dean of the College - Rosemary Zumwalt

Through an email from the dean.

Dean announcement

Miscellaneous (4)

Through ICO (Independent College Offices)

From the sponsored programs officer at my college.

In reply to email to Lou Gross asking about the math course for biology students that he teaches.

From a colleague.

What were you hoping to learn my attending the webinar? (n=22)

Ways to integrate math and biology curricula (16)

More about math for biology students

more ideas on how to strengthen quantitative training of undergraduate biology majors

I was hoping to gain additional perspectives on Interdisciplinary teaching methods: how does this math/science partnership work?

more about the structure of ID programs and how to create them

More about integration of Math and Biology

Strategies to help develop effective courses for an interdisciplinary math biology class.

I was hoping to hear ideas about developing mathematics curriculum for life science undergraduates.

Four of us gathered, including one mathematician, a biologist who teaches biostatistics, the interim head of biology and me. We are exploring models of courses where mathematics is truly part of biology courses.

How to help students integrate math into science courses (especially biology, chemistry, physics).

How math and biology were being taught in an interdisciplinary manner. If I learned about some assessments for interdisciplinary STEM courses, that would be icing on the cake.

Practical methods for incorporating more mathematics into biology and vice versa.

ways to better integrate mathematical concepts into introductory biology course

What's happening in the interdisciplinary relationship between biology and math, particularly the biology perspective.

Successful integration of mathematical concepts

About tools for integrating math into my biology courses, and to find out what Lou Gross has been up to; I know of his work from a symposium at the 2002 Cell Biology meeting.

A basic ingredient in our PKAL proposal is to better integrate math into science courses. I was hoping to find out about resources or models for that.

How to integrate math/biology faculty (3)

How best to help faculty develop interdisciplinary connections within biology and mathematics (and

where external funding support might be located).

Ideas about the types of mathematical courses that would be most applicable to environmental studies/science programs., Ideas about interdisciplinary cooperations between mathematicians and biologists on courses, projects, faculty-student research, etc.

Actually, to encourage our biology and computational science faculty to come together and learn about what is possible and to get resources.

Get a general idea of the thinking in the field (3)

Nothing specific... in general, I was hoping to get some curricular ideas or see ways that undergraduate science programs can be improved.

to learn what the current thinking is in the field and what new ideas are out there

background and resources that could be utilized in currently funded projects and future proposals to improve outcomes efficacy.

Did the webinar meet your expectations? (n=12)

Wanted more information (3)

I expected more about math courses, but the webinar also focused a lot on including quantitative work in biology courses. It was still informative and worthwhile, but not quite what I expected.

There was a lot of "theoretical" discussion but not much on specifics. Perhaps that is just the nature of such short-term webinars. One telltale sign was that there were not many audience questions.

Yes and No. I wanted to know more about how to help students improve math skills so that students can perform better in gateway science courses. It wasn't clear how the biology example that was presented could be extrapolated to other areas of science.

Content was helpful (3)

Audio wasn't great but content was helpful.

I thought it was a very useful, informative webinar. Interesting problem-based suggestions for incorporating math and biology together throughout the curriculum. Interesting ideas for increasing quantitative literacy throughout the curriculum.

The webinar was very helpful. Lou's presentation addressed many of the concerns that I have heard expressed by others as well as my own concerns about tailoring math courses to meet the needs of life science students.

Didn't find it very useful (2)

Fairly 100 level stuff. I have already participated in similar discussions with my colleagues at my previous institution, Spelman College

I arrived late because of a lab. I did not find the presentation to be useful.

Didn't get through all the content (2)

I think it was the material at the end that was cut from the talk that included what I really wanted to hear. I did still appreciate the information that was given earlier.

I don't think we got through the webinar content that was set out.

Miscellaneous (2)

but they may well not have been realistic

Good to see that modules are being developed. This is probably one of the biggest hurdles to small scale curricular reform.

Do you plan initiate curricular changes that incorporate interdisciplinary science education at your institution? (n-14)

Hope to in the future (7)

Yes, both as part of projects seeking extramural support and as part of a larger college conversation.

You is to be interpreted as my department. I am not sure whether or not I will be involved; I might.

I'm not sure I will be the initiator, but I have a little better idea of what might be possible. Of course, given current resource constraints, changes that require "new initiatives" money may have to wait.

I am wanting to develop a change to our current calculus requirement for biology majors so that the students see it as more directly relating to their biology curriculum. Students currently see the two disciplines as disconnected.

Yes absolutely - Interdisciplinary Environmental and Sustainability Studies. I may be main point person on developing new curricular goals.

At least that is the desire. Others will have to do this however, as I am only a grants officer.

Probably, but on our own because the overall sense among our group was that we did not learn much of value.

Currently working on implementing (4)

Working on implementing Interdisciplinary science courses into the general education offerings.

I am preparing to offer an upper division mathematics course in math biology next spring.

We already are since we have an NSF bismuth so are on our way.

Yes it is in progress, both with respect to ID courses but also by better coordination of concepts among courses.

Currently have program in place (3)

We plan to have a strong focus on problem-solving that links a number of areas in science but also

includes math courses. So here is a taste of that in a course description for an upcoming math course: , Course Description, A structured framework in which students develop problem-solving, quantitative reasoning and critical thinking skills. Development of conceptual thinking through collaborative activity and clear writing. Focus on extracting mathematics embedded in scientific narrative. Problems may come from biology, chemistry, physics, mathematics, and social sciences.

We already have an interdisciplinary environmental studies program with a statistics requirement.

We have an institute devoted to that purpose.

Do you feel the information presented during the webinar was useful information for initiating curricular change? (n=5)

Need more information (3)

Potentially yes, although not necessarily for what I envisioned.

Again, I didn't get much specific information.

But much more needs to be said and done. The challenges are very significant.

Good resources given (2)

Good references - a place to go after the webinar introduction.

Good resources.

Did you have any problems with the technology used to present the webinar (e.g. connectivity, sound, images)? (n=8)

Miscellaneous (4)

So long as my colleague with the mouse remembered to jiggle it occasionally, to keep the screen from going to sleep.

Firefox died once. I relaunched in safari, but i don't know if it was a safari vs firefox issue or simply a need to restart.

Took a very long time (20 min) to load WebX

My fault; the room I reserved was crap, not designed for teleconferencing. We made do and didn't miss anything important.

Audio issues (4)

Audio feed back.

Some early delays in getting the webpage to properly show. Listened to opening remarks on phone only until we repeated the login process and had the images appear.

For some reason the audio was coming through a phone connection and not the internet. I am not

sure why that was. We could not amplify the sound enough.

We tried to make the sound louder. It was difficult for all of the people in the room to hear.

Do you feel there was sufficient opportunity for questions and comments from the webinar audience? (n=7)

Miscellaneous (5)

I think that there was sufficient opportunity but the direction of the webinar didn't really lend itself to asking the types of questions that I think most people would have liked to ask.

The speaker's answers went on too long. It would have been better if he was shorter and more to the point instead of waxing philosophical.

yes

Jeanne Narum did a good job facilitating opportunities.

but not all of the questions were helpful/pertinent.

Would have liked more time for questions (2)

Questions were handled very well. A longer webinar may have allowed more questions/discussion.

Yes and No. I think I would like less time for presentation and more time for questions and interaction. It is very difficult at the end of a very long day to focus on a presentation that lasts almost an hour.

Do you feel the questions from the webinar audience were answered well? (n=3)

Miscellaneous (3)

great dialog

Too long.

Lou was very helpful.

What additional information would you have liked to have covered in this webinar? (n=10)

More specific information about math biology curriculum (5)

Info on resources to implement interdisciplinary curricular development.

More specifics about math courses for biology students -- e.g., what is most important for the biology students.

I think that most scientists want to discuss nuts and bolts issues---not theoretical ideas.

More specifics in how to implement a curriculum that met the needs of biology students.

More practical examples. I left early because it was not a good use of my time.

Miscellaneous (5)

Perhaps a bit more about NSF support for this bio-math (bioinformatics, etc) initiative. Of course, we are particularly interested in support for collaborative research and curriculum development at the undergraduate level (and at a PUI).

Can't think of any off hand.

I would be interested to know if there is an increase in the number of biology students that pursue things like quantitatively oriented undergraduate research projects or upper-level mathematical biology courses as a result of increased exposure to quantitative ideas in biology classes.

Although some information on how we might include more math in a general education curriculum might be useful, we are specifically interested in how we can strengthen and reinforce math skills that students will use in a variety of science courses. We think students are mostly challenged by word problems--that is translating the language of math or science into quantitative form. So many high schools are NOT emphasizing these things such that students come to college with the mechanical skills (they may know some formulas) but they are more challenged by translating specific problems in chemistry or biology into mathematical terms. Having some webinars on this topic would be more useful.

maybe some opportunities for further engagement/collaboration, regionally perhaps.

What topics would you like to see covered in future Project Kaleidoscope webinars? (n=14)

Information about specific disciplines (4)

New directions for geology; the intersection of geology, biology and environmental sciences/environmental studies. New directions for physics, especially in relation to renewed interest in sustainable energy (wind power; microhydro, etc.).

I'd like to hear some reports on how Bali and Moore's new book (statistics for life sciences) is working out. Also, about the variety of math that would be appropriate for students in pre-health professions, especially probability (for genetics; for understanding risks).

Environmental and Sustainability themes. Integration of science and non-science teaching to enhance STEM learning.

Public health, global health, epidemiology, etc. as topics to bring students together from different disciplines.

Miscellaneous (4)

Undergraduate research training at the beginning levels--via course work.

Opportunities for research grants in interdisciplinary research (non NSF if possible) for undergraduate

institutions.

A webinar that focuses on laboratory-oriented mathematical biology courses for upper-level undergraduates would be very helpful.

Identifying those issues that challenge and often discourage students who struggle through gateway courses (and how they can be address across the curriculum);, Specific pedagogical techniques that professors can use (with "lowering their standards") that may increase the likelihood that students successfully complete gateway courses, maintain confidence and continue to major and graduate with degrees in math and science., Attitudes that some professors possess about "weeding out" students and only teaching to the very brightest students in math and science instead of looking for more ways to increase the number of students who love and pursue majors and careers in math and science.

Examples of ID programs that are successful (2)

I would like to see webinars similar to this one: practical advice and real-world examples of how ID Learning is occurring elsewhere.

detailed case studies on how interdisciplinary curricular development has been accomplished (institutional differences, structural and political impediments, economic costs, pedagogical outcomes - how measured and by what instruments).

More information on developing interdisciplinary courses (2)

Ways to re-think the mathematics major (or other STEM majors) to facilitate interdisciplinary curricula.

More about the development of interdisciplinary STEM courses and interdisciplinary STEM assessments.

Overcoming administrative issues (2)

leadership issues in transformational change (e.g., ID curriculum change)

Ideas/models for softening departmental barriers.

Please give a 2-5 word description of your main area of business/education/research (e.g. mathematical immunology, high school science teacher, etc.): (n=20)

Biology/Ecology/General science (8)

ecology, environmental science

Biology/Neuroscience/Environmental Sustainability Studies

Undergraduate biology education

plant biology/evolutionary biology

Chemistry, Science educational change

Developmental cell biology

Post-secondary science education.

genetics/microbiology/administrator

Math biology/ecology/general science (5)

mathematical biology, general modeling

science and mathematics education

Mathematical biology

mathematical ecology

Director of a math and science program--at a small liberal arts school.

Miscellaneous (4)

Foundation, government, and corporate support

I am an associate dean of faculty and the director of the grants program. My own background is in 18th-century British literature and critical theory.

sponsored research administration

dean

Math (3)

Math and statistics, interacting widely with e.g., biologists, teacher educators, engineers

Professor of Mathematics, Algebraic Geometry

mathematics & statistics, computational science

Additional comments: (n=2)

Miscellaneous

Jeanne gave a great answer to one of the questions.

Thank you!

Appendix C

List of Participants

Participants

Last name	First name	Institution
Brakke	David	James Madison University
Chu	Joanne	Agnes Scott College
Delesalle	Veronique	Gettysburg College
Dilts	Judy	James Madison University
Duffy	Jeanne	Gettysburg College
Elrod	Susan	California Polytechnic State University
Huibregtse	Mark	Skidmore College
Kerchner	Mike	Washington College
Kuserk	Frank	Moravian College
Matheson	Steve	Calvin College
McConaughay	Kelly	Bradley University
Pellegrini	Maria	W.M. Keck Foundation
Pilger	John	Agnes Scott College
Poston	Muriel	Skidmore College
Pruim	Randy	Calvin College
Ridgway	Judy	Ohio State University
Robic	Srebrenka	Agnes Scott College
Smith	Martha	University of Texas
Swartz	Jim	Grinnell College
Tomlinson	Bill	Skidmore College
Tooley	Brenda	Monmouth College
Walton	Brian	James Madison University
Withers	Michelle	West Virginia University
Wyngaard	Grace	James Madison University
Yurk	Brian	Utah State University
Zobitz	John	Augsburg College
Zumwalt	Rosemary	Agnes Scott College