INTERDISCIPLINARY RESEARCH FORUM ON STEM EDUCATION
DISCUSSION QUESTIONS RECOMMENDATIONS AND SUMMARY SURVEY RESULTS

The Office of the Vice President for Research and Graduate Studies collaborated with the STEM Alliance to host an Interdisciplinary Research Forum on STEM Education Research in September 2015. The gathering was intended to strengthen communication among individuals with an interest in STEM education from all parts of campus so that MSU expertise might be better coordinated to foster collaboration across colleges and disciplines that will improve our educational programs in STEM. The results of the survey completed by forum registrants are summarized on pages 2-3. We developed a set of discussion questions based on or related to these survey results. During the meeting, small groups discussed one question and made recommendations for action and next steps.

Recommendations:

1.) Several survey respondents identified the need for a centralized source of information about STEM Education efforts at MSU. Discuss a model for such an information source. What types of information should be included? Where would it be housed and in what format? How would it be developed and sustained?

- Centralized go-to group about curricular issues.
- We could think about using Diane and Mark Urban-Lurain's alpha version derived from their NSF.
- Tag student performance on learning goals and keep those data in a central place.
- Searchable database on research interests
- Repeat “lightening talks” again at a future STEM Alliance meeting
- Establish a high level committee to talk about ideas about curriculum ideas and reforms; follow up on issues; coordinate across units (made up of associate deans across units).

2.) Survey respondents commented on the need for organized, readily available, and centralized resources used for education research. Discuss a model for centralized resources. What types of resources are needed? Where would the resources be housed and in what formats? Are there existing examples or models from which we can learn?

- Establish a data warehouse with a centralized number (like HR) to direct you to appropriate source for data.
- Catalog what is available and in what format.
- Develop a mechanism for tracking students longitudinally
- Have a centralized resource for all course syllabi (behind some kind of MSU password login). This might be useful for students (because they could compare more readily among electives) but it could also be problematic from the student perspective (students might complain about inconsistencies between sections; this would be a historical system -- going backwards -- so changes in courses might cause problems if students complain that a course they are taking is revamped compared to an earlier version). Maybe only the course objectives and approach would be shared?
- This kind of resource would be valuable for researchers as one piece of data in course alignment or program alignment studies -- would reduce the burden on faculty to provide this data multiple times to multiple projects.
• Overall would want this to be EASY for faculty -- possible to harvest these directly from D2L? Perhaps if instructors could upload the syllabus with a "syllabus" tag then the techies could find it for the aggregated database?
• NOTE: in large group discussion, it was shared that all LCC faculty post their syllabi and historically there have been no student issues.

3.) Several respondents described the need for improved or increased networking opportunities. What specific steps should be taken to improve networking? How do we encourage networking between K-12 researchers and undergraduate educators? Or between STEM researchers and STEM education researchers?

• Include a question in the future along the lines of "What communities would you like to network with?"
• Next meeting - Everyone bring someone with them who has not been to a STEM Alliance meeting before.
• Create a formal liaison list - A list of initiatives and works with contacts (and their information).
• Potentially put in a discussion option on STEM Alliance that could be sent out in a digest format..."
• Discuss further about advertising STEM Alliance meetings to and including graduate students and post-docs in STEM Alliance.
• Build a list of initiatives, projects, courses that include contact people and their information.
• Advertise through graduate student STEM teaching certificate program

4.) What can the STEM Alliance do to broaden participation of faculty and academic staff members who are not currently engaged?

• Advertise these events in the College of Human Medicine, College of Osteopathic Medicine
• Look at the reward structure to encourage participation.
• Go to the departments in their regular seminar slots (e.g. when there is a talk related to assessment); seems to have a positive impact on faculty participation.
• Some faculty may perceive that their efforts to improve 400 level courses, for instance, is too far removed from the focus of this group.
• When discipline based education researchers are brought into a department this may positively affect other departments by encouraging them to attract similar faculty to their own department. At the same time, perhaps the presence of this specialty within the department has the unintended side effect of making an interest in undergraduate curriculum reform something which is this groups' concern, not a concern of the department as a whole.
• Train "first responders" (advisors) to help students understand how the courses they are required to take all fit together, e.g. why does a neuroscience major need to take physics?
• The teaching center at Maryland reached out to faculty in biology to choose one course/problem to work on related to teaching and education with the goal of it leading to a publication---not a leading publication, but just one which was minimally publishable.
• Important to reach grad students, post docs and new faculty to engage them in community and help get them off on the right foot.
• Be part of new faculty orientation agenda and "fair" to introduce STEM Alliance to new faculty
Survey Results

Survey Participants by College

<table>
<thead>
<tr>
<th>College</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture &amp; Natural Resources</td>
<td>7</td>
</tr>
<tr>
<td>Arts and Letters</td>
<td>4</td>
</tr>
<tr>
<td>Education</td>
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<td>Lyman Briggs</td>
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<td>Natural Science</td>
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Survey Question: How can MSU better assist researchers studying STEM education?

Centralized, organized, and readily available resources used for research
- Institutional data
- Alumni records
- Course/instructional materials (e.g. syllabi, exams)
- Support for evaluation efforts

Centralized source of information about STEM Education efforts
- Clearinghouse to which researchers submit descriptions of their projects
- Inform the community about the many, ongoing projects/efforts

Communication and Networking
- Several general comments about increasing communication and opportunities for networking
  - Some pointed to the forum itself as an example of the types of activities that should continue
- Encourage connections between K-12 researchers and higher education
- Encourage connections between STEM researchers and STEM Ed researchers

More financial support to encourage research
- Hire more STEM education faculty
- Internal grants

Recognition of STEM Education research and grants in the tenure and promotion process
- There is a perception that STEM Education papers and grants do not have the same weight as disciplinary papers and grants.
Survey Question: Are you involved in any STEM Education research projects or STEM course reform efforts?

Specific Course Reform Efforts
- ISP209, ISP209L
- MTH124
- MTH132
- CEM121
- CEM141, 142
- CEM161, 162
- LB171/172
- CSE231
- STT200
- PSL450
- LB118
- Physics laboratories

Broad Initiatives at MSU
- Nat Sci Biology Initiative
- Quantitative Literacy Initiative
- DOW STEM Success Program
- AAU STEM Initiative
- HHMI LEVERS Program
- AACR
- INQUIRE

National Efforts/Initiatives
- CIRTL

Areas of Research
- Data mining and analytics
- Effectiveness of MOOCs for professional development for STEM grad students
- Student persistence and success
- Three-dimensional learning
- Interdisciplinary thinking
- STEM student socialization
- Development of STEM education programming for secondary education
- Modeling
- Connections across science disciplines
- Mathematics discourse in secondary education
- Algebra policies in public schools
- Transforming developmental math courses
- Scientific-style critical thinking
- Interdisciplinary problem solving
- Connecting humanities to STEM education
- Robotic telepresence in undergraduate engineering
- Curriculum design and assessment in engineering education
- Technology in education
- Inquiry based learning in physiology laboratories
- Evolution education
- Ethics in science
- Elementary math education
- Carbon cycling and energy flow learning in middle school