PULSE Pilot Certification Results

To the Editor,

We would like to inform the *Journal of Microbiology & Biology Education* readers about the release of the results from the Partnership for Undergraduate Life Sciences Education (PULSE) biology program pilot certification project using rubrics initially described by Aguirre et al. (1).

The pilot certification process is an ambitious, nationwide endeavor designed to motivate important changes in life sciences education that are in line with the recommendations of the 2011 *Vision and Change in Undergraduate Biology Education: A Call to Action* (2). *Vision and Change* details the consensus among life science educators about how to teach and motivate students’ learning, with many recommendations based on an understanding of how learning works from cognitive, neuroscience, and learning science/education research. The *Vision and Change* recommendations place emphasis more on scientific reasoning and the ability to think critically than on the mastery of facts alone. Laboratory work and hypothesis generation and testing are given a new prominence, and the focus shifts from teacher-directed exercises to student-centered ones. It is the goal of the certification process to acknowledge departments that have progressed towards full implementation of the tenets of *Vision and Change* and to motivate departments that have not begun to adopt the recommendations to consider doing so.

The pilot certification effort is widely recognized as important in the life sciences community. Cynthia Bauerle, Senior Program Officer in Precollege and Undergraduate Science Education at the Howard Hughes Medical Institute, states, “The genius of this approach is in authorizing the community of life science educators itself to recognize members who have achieved notable accomplishments in their ongoing work. … The Certification initiative has true potential to transform the practice of undergraduate life science education in the 21st century” (personal communication).

More than 70 life science departments applied to be part of the pilot certification process, funded by a National Science Foundation grant, and eight were selected based on initial evidence of transformed and innovative educational practices, including Gaston College, Whatcom Community College, Davidson College, Stony Brook University, Georgia Southern University, the University of Wyoming, and Morgan State University. The programs chosen represent a wide variety of schools, including two-year colleges, liberal-arts institutions, regional comprehensive colleges, research universities, and minority-serving institutions.

The eight pilot schools provided information including: scores on the PULSE *Vision & Change* Rubrics version 1.0 (1), written justifications for rubric scores, CVs and statements of pedagogical philosophies from department faculty, information about courses and curriculum, course syllabi, and sample exams. The materials were evaluated to obtain a complete picture of the state of each program relative to *Vision and Change* implementation.

To ‘ground truth’ the information provided and determine whether the rubrics effectively evaluated progression towards the ‘ideal department’ as intended, site visits took place during 2014, with teams consisting of two members of the Certification group. Each site visit team included at least one member who is from an institution of the same type as that visited.

Outcomes from this pilot were released June 1, 2015 (www.pulsecommunity.org), with all eight programs being recognized as having progressed along a continuum of change. Five levels of achievement were defined as PULSE Pilot Progression Levels. Every level of PULSE Pilot Progression indicates a dedicated and concerted effort by the department to change their approach to life sciences education and sustain their transformation efforts. In this vein, PULSE Pilot Progression is much like the U.S. Green Building Council’s Leadership in Energy & Environmental Design (LEED) certification, where organizations displaying certain thresholds of achievement are recognized, such as LEED Silver, Gold, and Platinum Certification. The PULSE Pilot Progression levels and their descriptions can be found in Table I.

Of the eight departments in the pilot, one achieved “PULSE Progression Level III: Accomplished”; six departments achieved “PULSE Progression Level II: Developing”; and one pilot department achieved “PULSE Progression Level I: Beginning.” All of the schools have made significant progress toward the recommendations of *Vision and Change* relative to a traditional life sciences curriculum. Overall, the response from the eight pilot schools has been positive.

Another factor that helped with the interpretation of pilot programs’ rubric scores is additional rubric data that were entered via an online rubric portal, which was made available to the community in April 2014 (https://jfe.qualtrics.com/form/SV_5dPeecbH1BP6RpP). Complete data from 18 programs, including the eight pilot schools, were analyzed. While the rubric data entered via the portal are self-reported, with no justifications or ‘ground truthing’ via site visits for the programs other than those in the pilot, these data help provide a broader view of the spectrum of transformation. Having data from these programs also...
allowed some statistical analysis to ensure that the rubrics did not disadvantage or advantage any institution type. The analysis supports the idea that there is no systematic bias that would disadvantage one type of institution or prevent one institution type from being able to achieve the highest level.

From the 18 complete data sets, the PULSE Pilot Progression Level of each program was estimated. These programs included four research universities, three regional comprehensive/master’s granting schools, six liberal arts colleges, and five two-year schools. Overall, among the 18 schools, four are at level I; eleven at level II; two at level III; and one program was very close to the level II-III border (without a site visit and additional information, it is not possible to be certain whether this program would have fallen into level II or III).

Going forward, we plan to use these pilot certification results and the feedback we have received from the pilot certification participants to inform rubric revisions. It is our goal to roll out version 2.0 of our PULSE Vision & Change Rubrics and our certification process by Fall 2015 on our website (www.pulsecommunity.org). At that time, we will be looking for institutions to assist us in continuing to refine our process and to continue to motivate life sciences programs to adopt the tenets outlined in Vision and Change.

Sincerely,

Pamela Pape-Lindstrom
Everett Community College
Everett, WA
ppape@everettcc.edu

Tom Jack
Dartmouth College
Hanover, NH

Kathy Miller
Washington University in St. Louis
St. Louis, MO

Karen Aguirre
Coastal Carolina
Conway, SC

Judy Awong-Taylor
Georgia Gwinnett College
Lawrenceville, GA

Teri Balser
Curtin University
Perth, Western Australia

Loretta Brancaccio-Taras
Kingsborough Community College
Brooklyn, NY

Kate Marley
Doane College
Crete, NE

Marcy Osgood
University of New Mexico School of Medicine
Albuquerque, NM

Marcy Peteroy-Kelly
Pace University
New York, NY

Sandra Romano
University of the Virgin Islands
St. Thomas, USVI

### TABLE 1. PULSE Pilot Progression levels and their characteristics.

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<tr>
<th>PULSE Pilot Progression Level</th>
<th>Pilot Progression Level Descriptors</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>0</td>
<td>Baseline</td>
<td>Indicates the department has made little or no progress toward implementing the principles of Vision and Change.</td>
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<tr>
<td>I</td>
<td>Beginning</td>
<td>Indicates the department has made some progress toward implementing the principles of Vision and Change. Substantial additional progress is needed.</td>
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<tr>
<td>II</td>
<td>Developing</td>
<td>Indicates the department is making progress toward implementing the principles of Vision and Change. There are certain areas of strength where the department has made progress. There are other areas where progress is more limited.</td>
</tr>
<tr>
<td>III</td>
<td>Accomplished</td>
<td>Indicates the department has made substantial progress toward implementing Vision and Change.</td>
</tr>
<tr>
<td>IV</td>
<td>Exemplar</td>
<td>Indicates the department has implemented, at a high level, all of the principles of Vision and Change.</td>
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ACKNOWLEDGMENTS

The work of the PULSE Vision & Change Leadership Fellows has been supported by a joint effort of the NSF, NIH/NIGMS, and HHMI. Specifically, efforts to develop the PULSE Vision & Change Rubrics and the Pilot Certification Process were supported by NSF grants DBI-1350120 and DBI-1323223.

REFERENCES