CESA 4 FINAL REPORT

WISCONSIN CURRICULUM ARTICULATION PROJECT

Sponsored by the Wisconsin Department of Public Instruction and
University of Wisconsin System

I. Working Group Name & Participants

A. Lead Teacher- Scott Cooper, UW-La Crosse

B. Working Group Members

1. **UW System Faculty – Mike Abler, Anne Voyles, Judy Beck**
2. **High School Faculty – Kevin Callen, Tom Kammer, David Myers, Ak Lallas, Brian O'Hern**
3. **CESA4 and/or Other Staff**

II. Working Group Proceedings

A. Focus

Guiding Question/Suggestion: Within the broad areas of curriculum alignment in your subject area, how did you focus your project?

Our group focused on three areas; content covered in high school and college courses, student perception and recollection of curriculum alignment, and student study skills and habits.

B. Process

1. **Meeting dates**

Guiding Question/Suggestion: Attached agendas or meeting notices.

We met three times as a group.

Monday, March 13, 2000. We designed our student survey and decided which materials to gather in comparing high school and college biology courses. We chose to compare syllabi and exams.

Thursday, Sept. 14, 2000. Examined the results from the survey and modified some of the questions. Also compared materials in genetics and cellular respiration covered in courses.

Tuesday, Oct. 10, 2000. Continued to discuss materials from genetics and cellular respiration. We also began to discuss other determinants of student success in college courses, i.e. time management and student study skills.

2. **Sources of information**

Guiding Question/Suggestion: What informed the work of your group? This will include such things as Wisconsin Model Academic Standards, course descriptions, curriculum guides, samples of assessment instruments, samples of student work, etc.

We examined course outlines, lecture notes and exam questions to determine content overlap. We did not examine examples of student work, but most teachers could examine an exam and predict how well their students would do on such an assignment.

3. **Data collected**

Guiding Question/Suggestion: Did you do interviews or surveys? If so, append the survey instrument and/or questions used.

We surveyed almost 1000 students in the UW-La Crosse introductory biology laboratory. The survey included questions related to science and math courses taken in high school (see appendix). Specifically we were interested in when these courses were taken and how many credits of each subject students had taken. Next we asked how well these courses prepared students for similar courses in college and how much the content overlapped. Finally, we asked them to report on their study habits and attendance record.

C. Findings and Results

1. **Observations**

Guiding Question/Suggestion: Summarize what you learned from the sources of information described above.

Examination of course materials, student surveys, and discussions among instructors suggest that the content in the curriculum is fairly well aligned between high school and introductory college biology courses. It appears that the major problems college students encounter in introductory level biology is how to deal with poor time management and study skills.

2. **Summary of data**

Guiding Question/Suggestion: Summarize the finding from data collected, including patterns and trends

For most subject areas, students said that their high school biology course prepared them well for college and that materials were covered in more depth in college. Student grades were also a full letter grade lower in college than in high school, reflecting in part that the material was taught at a more difficult level. Examination of exams and discussion among teachers also suggest that materials are covered in more depth and more quickly in college courses than in high school courses. We felt that there was an appropriate level of overlap between high school and college courses in biology with respect to content.

Another trend that we observed was that student's time management and study skills were probably a major determinant of success in college. Students reported that high school prepared them least for study skills compared with use of the scientific method, laboratory skills, and data analysis. While student-reported study time per week doubled from high school to college, average study time was still only seven hours per week. Teachers had many anecdotal examples of student lack of time management and study skills. There are a plethora of reasons for these observations, ranging from employment and social obligations of high school students to the distractions of being away from home for the first time for college freshmen.

D. Actions/Revisions

Guiding Question/Suggestion: Describe any revisions in course content, an assessment instruments, pedagogy, etc. as a result of this initiative. Append examples.

Given our observations outlined above, we do not foresee any changes in course content or assessment instruments, etc. We are proposing to host a workshop/problem-solving session for high school science teachers in CESA 4 and UW-La Crosse instructors of introductory science and mathematics courses. The workshop will address three goals.

1. Make participants aware of the findings from the state-wide curriculum articulation project, which are primarily that content alignment does not seem to be a problem, but rather effective time management and study skills are lacking in both college-bound high school students and incoming college freshmen.

2. In small work groups organized by discipline, engage high school and university instructors in a discussion about their respective educational cultures and the challenges that they face in the classroom. Develop a realistic set of expectations for incoming college freshmen in terms of the following: (a) general note taking skills, (b) general study skills, (c) general time-management skills, (d) general skills specific to the discipline, (e) other.

3. Within each discipline, create strategies to achieve these expectations, to help students make the transition from high school to college, and to support the success and retention of college freshmen. Each strategy will either be a concrete idea, technique, or activity that can be implemented in the classroom. These strategies will be used in both college preparatory high school courses and introductory science and mathematics courses at UW-La Crosse. These strategies will also be made available on a website. Instructors can choose which strategies to implement in their own teaching, demonstrate all strategies to students, and/or refer students to this website.

By involving many instructors from both the high schools and the university, they will gain an appreciation of the struggles each face in educating students and what disparity exists in the transition from high school to college. Furthermore, in addressing these problems by developing a set of common expectations and classroom strategies to meet these expectations, these instructors will feel ownership of the produced solution and will be more likely to implement it in their courses.

E. Reflections and Recommendations

1. Any plans for next steps with your working group

See above.

2. Advice to UWS/DPI for next initiatives in your content area

Guiding Question/Suggestion: What things worked well in your group? What products/processes did you develop that are valuable and replicable? What professional groups would find this information useful?

We gathered a large data set of self-reported student information, and the statistical results of this data are compelling for Wisconsin secondary science educators as well as Wisconsin colleges and universities. As a follow-up activity, we hope to create study skill/time management materials for use in both college preparatory high school courses and introductory science and mathematics courses, and we intend to publish these materials on a website. These materials could then be accessed by educators in Wisconsin and beyond.

3. Advice for UWS/DPI for additional articulation initiatives

It seemed to be a general consensus among all disciplines that presented at the final meeting that content was not the problem, but that student habits need to be addressed. Given these results, it makes sense to address this issue in greater depth and perhaps on a larger scale. For example, how do we need to train students differently to improve their performance? This could include examples of good note-taking, examples of college-level test questions, tutorials, videotaped interviews with college juniors or seniors describing the higher expectations in college courses and how they learned to develop good study habits, etc.

Appendix: Alignment of High School and University Biology Courses

1. Are you interested in a career in Science or Health Care?
   A. Yes B. No

How many credits of each the following subjects did you take in high school.

2. Physical Science A. 0 B. 0.5 C. 1 D. 1.5 E. 2 or more

3. Life Sciences A. 1 B. 1.5 C. 2 D. 2.5 E. 3 or more

4. Chemistry A. 0 B. 0.5 C. 1 D. 1.5 E. 2 or more

5. Physics A. 0 B. 0.5 C. 1 D. 1.5 E. 2 or more

6. Other Sciences (Astronomy, Earth Science) A. 0 B. 0.5 C. 1 D. 1.5 E. 2 or more

7. Math A. 2 B. 2.5 C. 3 D. 3.5 E. 4 or more

8. In how many courses that you took in high school did you earn college credit?
   A. 0 B. 1 C. 2 D. 3 E. 4 or more

9. Did you take an AP-Biology course in high school?
   A. Yes B. No

10. How many years has it been since you last took a life science course?
    A. 0 B. 1 C. 2 D. 3 E. 4 or more

11. What was your grade in $9^{th}/10^{th}$ grade high school biology?
    A. A B. B C. C D. D E. Can't recall

12. What is your current grade in this course?
    A. A B. B C. C D. D E. Can't recall

13. How many hours a week did you study in high school?
    A. 0-2 B. 3-5 C. 6-8 D. 9-11 E. 12 or more

14. How many hours a week are you studying in college?
    A. 0-2 B. 3-5 C. 6-8 D. 9-11 E. 12 or more

15. How many introductory biology lectures have you missed this semester?
    A. 0-2 B. 3-5 C. 6-8 D. 9-11 E. 12 or more

How well did your high school science courses prepare you for each of the following tasks?

16. Study skills (reading, note taking, time management) A. Very Good B. Good C. Average D. Poor E. Not at all

17. Problem solving skills A. Very Good B. Good C. Average D. Poor E. Not at all

18. Laboratory skills A. Very Good B. Good C. Average D. Poor E. Not at all

19. Use of the Scientific Method A. Very Good B. Good C. Average D. Poor E. Not at all

20. Data analysis and graphing A. Very Good B. Good C. Average D. Poor E. Not at all

21. Use of computers A. Very Good B. Good C. Average D. Poor E. Not at all

How do you feel your high school Life Science courses prepared you for each of the following topics?

22. Cell Biology	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
23. Respiration	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
24. Photosynthesis	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
25. Genetics	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
26. Evolution	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
27. Microbiology	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
28. Plant Biology	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
29. Animal Biology	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all
30. Ecology	A. Very Good	B. Good	C. Average	D. Poor	E. Not at all

Compared to this course, my $9^{th}/10^{th}$ grade high school biology course covered the following topics _____.

31. Cell Biology	A. in more depth	B. at the same depth	C. in less depth	D. not at all
32. Respiration	A. in more depth	B. at the same depth	C. in less depth	D. not at all
33. Photosynthesis	A. in more depth	B. at the same depth	C. in less depth	D. not at all
34. Genetics	A. in more depth	B. at the same depth	C. in less depth	D. not at all
35. Evolution	A. in more depth	B. at the same depth	C. in less depth	D. not at all
36. Microbiology	A. in more depth	B. at the same depth	C. in less depth	D. not at all
37. Plant Biology	A. in more depth	B. at the same depth	C. in less depth	D. not at all
38. Animal Biology	A. in more depth	B. at the same depth	C. in less depth	D. not at all
39. Ecology	A. in more depth	B. at the same depth	C. in less depth	D. not at all

How could your high school better prepare you for this class?

Describe the major differences between your $9^{th}/10^{th}$ grade high school biology course and your present course.

High school general biology course

Current biology course

Spring 2000 biology lab survey

		Average
considering a career in sci	1	0.35
Credits in:		
phys. Sci	2	1.00
life sci	3	1.67
chem	4	1.13
physics	5	0.67
other sciences	6	0.65
math	7	3.71
courses earned college credit for	8	0.48
AP BIO	9	0.22
yrs since last bio course	10	2.06
grade in H.S. bio	11	3.32
grade in BIO 101	12	2.45
H.S. in SW WI	13	0.22
ave size of H.S.	14	260
How well did H.S. prepare for		
study skills	15	2.40
problem solving	16	2.56
lab skills	17	2.62
sci method	18	2.77
data analysis and graphing	19	2.71
use of computers	20	2.38
How well did H.S. bio course prepare you for:		
Cell bio	21	2.51
respiration	22	2.19
photosynthesis	23	3.35
genetics	24	2.54
evolution	25	2.13
micro	26	1.68
plant bio	27	2.31
animal bio	28	2.51
ecology	29	2.08
depth of H.S. bio course compared with BIO 101		
Cell bio	30	2.66
respiration	31	2.44
photosynthesis	32	2.66
genetics	33	2.65
evolution	34	2.42
micro	35	2.22
plant bio	36	2.70
animal bio	37	2.80
ecology	38	2.43

Fall 2000 biology lab survey

considering a career in sci	1	277	200	477	
		maj	**non-maj**	**total**	**maj/nm**
Credits in:					
phys. Sci	2	0.88	0.94	0.90	0.94
life sci	3	1.84	1.67	1.77	1.11
chem	4	1.21	1.06	1.15	1.14
physics	5	0.76	0.65	0.71	1.17
other sciences	6	0.56	0.58	0.57	0.96
math	7	3.71	3.63	3.67	1.02
Courses earned college credit for	8	0.48	0.51	0.49	0.93
AP BIO	9	0.30	0.14	0.23	2.12
yrs since last bio course	10	1.63	2.20	1.87	0.74
grade in H.S. bio	11	3.59	3.17	3.41	1.13
grade in BIO 101	12	2.41	2.17	2.31	1.11
hrs/wk study in H.S.	13	3.61	3.62	3.61	1.00
hrs/wk study in UWL	14	7.58	6.86	7.28	1.11
Intro bio lectures missed	15	1.82	2.41	2.07	0.76
How well did H.S. prepare for					
study skills	16	2.23	2.15	2.20	1.04
problem solving	17	2.70	2.55	2.64	1.06
lab skills	18	2.81	2.55	2.70	1.10
sci method	19	2.88	2.75	2.82	1.05
data analysis and graphing	20	2.82	2.64	2.74	1.07
use of computers	21	2.57	2.50	2.54	1.03
How well did H.S. bio course prepare you for:					
Cell bio	22	2.67	2.31	2.52	1.15
respiration	23	2.28	2.02	2.17	1.13
photosynthesis	24	2.50	2.33	2.43	1.08
genetics	25	2.66	2.34	2.52	1.13
evolution	26	2.16	2.07	2.12	1.05
micro	27	1.89	1.72	1.82	1.10
plant bio	28	2.42	2.23	2.34	1.09
animal bio	29	2.62	2.37	2.52	1.10
ecology	30	2.15	2.08	2.12	1.03
depth of H.S. bio course compared with BIO 101					
Cell bio	31	2.61	2.64	2.62	0.99
respiration	32	2.40	2.42	2.41	0.99
photosynthesis	33	2.57	2.58	2.57	1.00
genetics	34	2.62	2.65	2.63	0.99
evolution	35	2.30	2.38	2.34	0.97
micro	36	2.24	2.16	2.21	1.04
plant bio	37	2.58	2.59	2.58	1.00
animal bio	38	2.66	2.63	2.65	1.01
ecology	39	2.31	2.44	2.37	0.95