Evaluation Summary for *Genomics & Society: A Community of Learning*

Problem Abstract

It was proposed that Genomics and Society cluster of new courses be designed so that undergraduates could explore topics relating to genomics and society while completing three areas of the required University of Georgia System Core Curriculum. The biological laboratory science fulfills a requirement in Area D of the core, the associated philosophy course would fulfill the humanities requirement in Area C of the core, and the second semester of freshman composition would be applied to Area A of the core curriculum. An additional one semester hour credit freshman seminar course is included in the cluster of proposed courses.

It is hoped that the creation of the Genomics and Society cluster courses would serve to attract better undergraduate students into graduate careers in genomics and computational biology. Additionally, these courses would improve the abilities of the students to critically evaluate the applications of science applicable to their daily lives. Further, the cluster of courses would create an interdisciplinary problem-solving style that allows informed students/citizens to address the important personal and societal issues created by science and technology. The proposed courses would serve as the centerpiece to an undergraduate curriculum in genomics and computational biology. Participation in these courses should provide students with an awareness of alternative career paths in biology and mathematics. Students would also gain new insights into the nature of science. The small number of students moving through the cluster of courses as an instructional cohort would create a community of learning, essentially providing a small college environment within a large research university. The benefits provided the students by more individualized instruction and a cross-disciplinary curricular approach would be further augmented by the large number of research faculty who could potentially serve as teachers, mentors, and/or advisors to the students later

The first group of students enrolled in the core cluster of courses completed their work at the end of the Spring 2001 semester. Unfortunately, even with vigorous recruitment efforts, the student numbers were very small. Four students enrolled and completed all four cluster courses associated with the project. The researchers were unable to gain access to student performance data for students enrolled in alternative sections of BIOL 1107/1107H, ENGL 1050H, and PHIL 2400H. Therefore, student performance and attitude toward contextual learning were compared within each course among the students enrolled in all of the Genomics and Society cluster courses and the students who were not participating in the core cluster. The results presented here serve to describe the outcomes of a small group of students; these results are not generalizable to the larger population of students from which they were drawn. Further, it will be Fall 2001 or Spring 2002 before the follow-up data collection assessing longitudinal student academic performance will be completed. The summaries of the student surveys, student social interaction, and comparisons of student performance are presented by course by curriculum type, core cluster students versus traditional students. It is hoped that a larger number of students will elect to participate in the course cluster during the Spring 2002 semester, supplying additional data points for inclusion in future analyses.

Initially, several expected outcomes were identified for evaluation. Student performance in BIOL 1107 and ENGL 1050H was measured as the numerical course grade. No numerical grades were given in PHIL 2400H. The course grades were converted to numerical scores using the four point grading scale for statistical comparison.

(1). Students enrolled in the core Genomics and Society cluster courses will experience an improved quality of social interaction with their peers as compared to students enrolled in traditional format courses.
(2). Participation in the Genomics and Society cluster courses will result in an improved knowledge about the nature of science.
(3). Students enrolled in the Genomics and Society cluster courses will develop better writing skills than students enrolled in a traditional format course.
(4). Students enrolled in the Genomics and Society cluster courses will report improved contextual learning in their academic program.
(5). Students enrolled in the Genomics and Society cluster courses will report improved problem solving skills as a result of program participation.

Students enrolled in BIOL 1107/1107L/1107H (Arnold & Barstow), ENGL 1050H (Hart), PHIL 2400H (Kleiner), and Freshman Seminar (Condit) completed the *Student Social Interaction Survey*. This instrument asked students to detail the frequency and types of extracurricular social and academic peer interaction resulting from their participation in one or more of the Genomics and Society cluster courses. Twenty-six students completed the *Student Social Interaction Survey* during their first assessment. The second instrument asked the students to describe their perceptions regarding any impact that their participation in one or more of the cluster courses had produced with respect to contextual learning in their academic program and in the specific course using a five-point Likert scale (Crocker & Algina, 1986; Fraenkel & Wallen, 1996). The instrument included fourteen items which addressed different aspects of contextual learning: problem-solving skills, academic interaction and group work within the context of the specific course, the applicability of the course content to daily life, and the degree of internal motivation for the course material demonstrated by the students. The instrument was administered during the last scheduled class meeting for each of the four cluster courses during the Spring 2001 semester.

Student Social Interaction

Table 1. Summary of social interaction for all students enrolled in one or more of the Genomics and Society cluster courses.

Item 1: *How many times during a semester do you see one or more of your classmates outside of your scheduled classes?*

Never	19.2% (n=5)
Sometimes	26.9% (n=7)
Once a week	7.7% (n=2)
Frequently	23.1% (n=6)
Daily	23.1% (n=6)

Item 2: *Are any of the students enrolled in the core courses your roommate?*

Yes	0% (n=0)
No	100% (n=26)

Item 3: *Are any of the students enrolled in the core courses in the same Fraternity or Sorority?*

Yes	0% (n=0)
No	100% (n=26)

Item 4: *Are any of the students enrolled in the core courses in the same UGA student organization?*

Yes	30.8% (n=8)
No	69.2% (n=18)

Item 5: *Are any of the students enrolled in the core courses in the same Honor Society?*

Yes	23.1% (n=6)
No	76.9% (n=20)

Item 6: *Are any of the students enrolled in the core courses on the same UGA intermural team?*

Yes	0% (n=0)
No	100% (n=26)

Item 7: *Have you provided assistance to the other members of your research team on projects relating to other courses?*

Yes	30.8% (n=8)
No	69.2% (n=18)

Item 8: *Have you attended any fine arts performances or exhibits with classmates?*

Yes	7.7% (n=2)
No	92.3% (n=24)

Item 9: *Have you participated in any other extracurricular activities with your classmates lately?*

Yes	15.4% (n=4)
No	84.6% (n=22)

It was interesting to note that 21 of the 26 students enrolled in one or more of the cluster courses reported having out of class interactions with the other students at some point in the term. Fourteen of the twenty-six indicated that they meet with at least one of their classmates outside of class at least once a week. This suggests that the students enrolled in these small honors classes do establish a pattern of social interaction which includes the other students in their courses.

Two by two Chi-Square contingency tables were computed for each of the *Student Social Interaction Survey* items to compare the frequency of responses as a function of curriculum type (traditional versus cluster core courses). It should be noted that the large difference in group membership (22 students in the traditional curriculum and 4 students enrolled in the cluster core courses) suggests that where statistical differences exist, they may reflect relative sample size effects instead of differences in observed student behaviors. That being said, the analyses produced statistically significant differences

("=0.05) for Item 5 (Honor Society membership, Table 2), Item 7 (Outside assistance to classmates for other courses, Table 3), and Item 8 (Attendance at fine arts performances/exhibits, Table 4).

Table 2. Chi-Square test of independence for Honor Society membership as a function of curriculum type.

Honor Society Membership	Curriculum type		Total
	Traditional	Cluster Core	
No	20	0	20
Yes	2	4	6
Total	22	4	26

Chi-Square value = 15.758 (1 df) p = 0.001

Inspection of the results in Table 2 suggests that the students enrolled in the Genomics and Society cluster courses are more likely to be members of the same Honors societies. This may be a result of recruitment for the courses and/or it may be that the type students who are willing to enroll in a four-course curriculum with a nontraditional instructional approach are more likely to be members of Alpha Lambda Delta (3 of 4 cluster core students) or the National Society for Collegiate Scholars (2 of 4 cluster core students).

Table 3. Chi-Square test of independence for out of class assistance as a function of curriculum type.

Provided out of class assistance for other courses	Curriculum type		Total
	Traditional	Cluster Core	
No	18	0	18
Yes	4	4	8
Total	22	4	26

Chi-Square value = 10.636 (1 df) p = 0.005

Inspection of the data in Table 3 suggest that students who are enrolled in the Genomics and Society cluster courses are more likely to provide out of class assistance to their classmates for other courses. These results provide evidence which suggests that the cluster core students feel sense of academic responsibility for their peers, and they are building an academic community within the UGA Honors Program.

The data in Table 4 imply that students who are enrolled in the cluster core courses are more likely to attend fine arts performances and/or exhibits with their classmates than students who are enrolled in traditional Honors courses at UGA. It should be noted that the disparity in group sample size effect may negate the relevance of these results. The Chi-Square analyses for the other social interaction items produced no statistically significant differences between students enrolled in traditional Honors courses and the students enrolled in the four cluster core courses.

Table 4. Chi-Square test of independence for Fine Arts exhibit and/or performance attendance as a function of curriculum type.

Attended a Fine Arts Exhibit and/or Performance	Curriculum type		Total
	Traditional	Cluster Core	
No	22	2	24
Yes	0	2	2
Total	22	4	26

Chi-Square value = 11.917 (1 df) p = 0.018

Validation of Student Contextual Learning Survey

The *Student Contextual Learning Survey* consisted of 15 items which asked the students to rate their perceptions about the impact of the curriculum and course content of their current academic program using a five-point Likert scale. The attitudinal data collected were directionally recoded (1-least, 5-greatest). Scale scores were computed for each test administration. Content validity (Anastasi & Urbina, 1997; Cronbach, 1984; Cronbach, 1982) was assessed by Dr. Dorothy Harnish (College of Education, University of Georgia). Face validity was addressed by the solicitation of comments from the students enrolled in the Honors courses surveyed. Reliability coefficients (Crocker & Algina, 1986; Cronbach, 1984; Cronbach, 1982) were calculated to assess the internal consistency of the instrument for each *Student Contextual Learning Survey* by course/content are summarized in Table 5.

Table 5. Reliability coefficients for the *Student Contextual Learning Survey*.

Survey Administration	**Number of Items**	**Cronbach's "**
English 1050H	15 items	0.2486 (n=13)
Philosophy 2400H	15 items	0.2397 (n=9)
Biology 1107/1107L/1107H	15 items	0.1915 (n=12)
Freshman Seminar	15 items	0.4821 (n=6)

Spearman-Brown correlation coefficients were computed for each of the 15 items with the total scale score (Gibbons, 1985; Glass & Hopkins, 1996). Since their were no discernable patterns among the items which were poorly related to the contextual learning scale score, it is assumed that the students who completed the survey were responding to each item in the context of the specific course. Inspection of the data suggests that some of the courses included in the Genomics and Society cluster core include content and concepts which are not directly applicable to "real world" situations or everyday life. Further, while some of the academic and social skills learned in the courses are cross-disciplinary, other skills are specific to the discipline. The small sample sizes also suggest that this preliminary study needs to be duplicated with a larger student population.

Genomics and Society and the Nature of Science

Nine students enrolled and completed PHIL 2400H (Kleiner) during the Spring 2001 semester. Four of the nine students were registered for all four of the Genomics and Society cluster courses. To assess student perceptual differences regarding contextual learning in PHIL 2400H, a Chi-Square test of independence was conducted for each of the 15 items (five-point Likert scale) in the *Student Contextual Learning Survey* as a function of group membership, traditional Honors student versus cluster core student. No statistically significant differences ("=0.05) were observed in student reported perceptions about contextual learning in the Philosophy of Science and Nature Honors course.

To compare student differences in course performance and contextual scale scores as a function of curriculum type, an Analysis of Variance (ANOVA) was performed on the variable of interest using a General Linear Model solution. Hartley's F-max test was used to ensure that the underlying assumption of homogeneity of variances was met. For the test of the hypothesis that contextual learning is related to curriculum type in PHIL 2400H, no statistically significant differences in contextual learning scale scores were observed (F=0.20, p=0.6686). The R-square value, 0.027705, suggests that only 0.27705% of the total variability in contextual scale score can be attributed to curriculum type. For the test of the hypothesis that PHIL 2400H course grade is related to curriculum type, the test statistic could not be calculated (Spearman-Ranks ANOVA) as there was no variability in the course grades by curriculum type. No statistically meaningful differences in PHIL 2400H course performance could be attributed to student participation in the cluster core courses.

Table 6. Spearman-Brown Rank correlation coefficients for *Student Contextual Learning Survey* items and PHIL 2400H course grade and contextual learning scale score, n=9. Associated probability values are in parentheses. Statistically significant correlation coefficients are bolded.

***Contextual Learning Survey* Item Number**	***Course***	***Contextual Learning Scale Score***
Item 1 *Increase in problem-solving skills*	*0.28475* *(0.4577)*	**0.66843** *(0.0490)*
Item 2 Opportunities to work on class activities with other students in the class	-0.28868 *(0.4512)*	0.21260 *(0.5829)*
Item 3 Understanding of how the subject (PHIL 2400H) relates to "real world" social issues	0.14434 *(0.7110)*	-0.53149 *(0.1409)*
Item 4 How subject (PHIL 2400H) relates to people's everyday life experiences in the context of the community	-0.04746 *(0.9035)*	**0.89125** *(0.0013)*
Item 5 Encouraged to make choices and be responsible for my own learning in course	-0.10000 *(0.7980)*	**0.76408** *(0.0165)*
Item 6 Learned from other students through class projects & discussions	0.28868 *(0.4512)*	0.55807 *(0.1184)*
Item 7 Class (PHIL 2400H) was connected to other experiences: other classes, work, family, and community life.	-0.13927 *(0.7208)*	**0.74326** *(0.0216)*
Item 8 Assessments in class (PHIL 2400H) were connected to "real world" situations and tasks	0.00000 *(1.0000)*	**0.89756** *(0.0010)*

Item 9 I will use what I have learned in this class in my future life and work.	0.04746 *(0.9035)*	**0.96989** *(0.0001)*
Item 10 Course (PHIL 2400H) emphasized higher order thinking and problem-solving skills	-0.19426 *(0.6165)*	**0.90308** *(0.0008)*
Item 11 Classroom context, social climate, and interaction conducive for learning	-0.24282 *(0.5290)*	0.64378 *(0.0613)*
Item 12 Instructor(s) used "real life" examples and situations to make material relevant	0.23729 *(0.5387)*	0.63785 *(0.0604)*
Item 13 Course (PHIL2400H) learning materials incorporated "real life" science applications in other contexts	0.10206 *(0.7939)*	0.13154 *(0.7359)*
Item 14 Connections with this course (PHIL2400) and other disciplines	0.38851 *(0.3014)*	0.57225 *(0.1074)*
Item 15 Understand how science knowledge can be used outside of the course (PHIL2400H) context	0.14569 *(0.7084)*	**0.94779** *(0.0001)*

Spearman-Brown rank correlation coefficients were computed for each of the 15 items with the total scale score and overall course performance in PHIL 2400H. None of the 15 items included in the *Student Contextual Learning Survey* were related to overall student performance in PHIL 2400H. *Student Contextual Learning Survey* items which were statistically significantly correlated with the contextual learning scale score related to the constructs of problem-solving/higher order thinking skills in the context of PHIL 2400H (Item 1 and Item 10), life experiences (Item 4, Item7, and Item 9), "real world" situations and tasks (Item 8), and applicability of science knowledge in other contexts (Item 15). These results imply that PHIL 2400H, the Philosophy of Science and Nature, did improve student knowledge of the nature of science and its applicability to other contexts.

Genomics and Society and Writing Skills

Thirteen students enrolled and completed ENGL 1050H (Hart) during the Spring 2001 semester. Four of the nine students were registered for all four of the Genomics and Society cluster courses. To assess student perceptual differences regarding contextual learning in ENGL 1050H, a Chi-Square test of independence was conducted for each of the 15 items (five-point Likert scale) in the *Student Contextual Learning Survey* as a function of group membership, traditional Honors student versus cluster core student. No statistically significant differences ("=0.05) were observed in student reported perceptions about contextual learning in the Freshman Composition Honors course.

To compare student differences in course performance and contextual scale scores as a function of curriculum type, an Analysis of Variance (ANOVA) was performed on the variable of interest using a General Linear Model solution. Hartley's F-max test was used to ensure that the underlying assumption of homogeneity of variances was met. For the test of the hypothesis that contextual learning is related to curriculum type in ENGL 1050H, no statistically significant differences in contextual learning scale scores were observed (F=1.32, p=0.2726). The R-square value, 0.099243, suggests that only 0.99243% of the total variability in contextual scale score can be attributed to curriculum type. For the test of the hypothesis that ENGL 1050H course performance is related to curriculum type, no statistically significant differences in course grades were observed (F=1.47, p=0.2438). The R-square value, 0.109286, suggests that only 10.9286% of the total variability in course performance can be attributed to curriculum type.

Table 7. Spearman-Brown Rank correlation coefficients for *Student Contextual Learning Survey* items and ENGL 1050H course grade and contextual learning scale score, n=13. Associated probability values are in parentheses. Statistically significant correlation coefficients are bolded.

Contextual Learning Survey **Item Number**	***Course***	***Contextual Learning Scale Score***
Item 1 *Increase in problem-solving skills*	*0.06228* *(0.8325)*	**0.61586** *(0.0190)*
Item 2 Opportunities to work on class activities with other students in the class	0.08979 *(0.7602)*	**0.54733** *(0.0428)*
Item 3 Understanding of how the subject (ENGL 1050H) relates to "real world" social issues	-0.02740 *(0.9259)*	**-0.60519** *(0.0218)*
Item 4 How subject (ENGL 1050H) relates to people's everyday life experiences in the context of the community	0.48762 *(0.0769)*	**0.62280** *(0.0174)*
Item 5 Encouraged to make choices and be responsible for my own learning in course	0.36198 *(0.2034)*	**0.76905** *(0.0013)*
Item 6 Learned from other students through class projects & discussions	0.11160 *(0.7041)*	**0.70839** *(0.0046)*
Item 7 Class (ENGL 1050H) was connected to other experiences: other classes, work, family, and community life.	0.17003 *(0.5611)*	**0.82571** *(0.0003)*
Item 8 Assessments in class (ENGL 1050H) were connected to "real world" situations and tasks	0.45518 *(0.1020)*	0.45164 *(0.1050)*
Item 9 I will use what I have learned in this class in my future life and work.	0.41536 *(0.1397)*	**0.88530** *(0.0001)*
Item 10 Course (ENGL 1050H) emphasized higher order thinking and problem-solving skills	0.24725 *(0.3746)*	**0.68765** *(0.0066)*
Item 11 Classroom context, social climate, and interaction conducive for learning	0.50110 *(0.0679)*	**0.81803** *(0.0003)*
Item 12 Instructor(s) used "real life" examples and situations to make material relevant	0.43602 *(0.1191)*	**0.917321** *(0.0001)*
Item 13 Course (ENGL 1050H) learning materials incorporated "real life" science applications in other contexts	**0.65538** *(0.0109)*	**0.68647** *(0.0067)*
Item 14 Connections with this course (ENGL 1050H) and other disciplines	0.44147 *(0.1140)*	**0.85445** *(0.0001)*
Item 15 Understand how science knowledge can be used outside of the course (ENGL 1050H) context	0.47421 *(0.0867)*	**0.88136** *(0.0001)*

Spearman-Brown rank correlation coefficients were computed for each of the 15 items with the total scale score and overall course performance in ENGL 1050H. Item 13, the incorporation of science

applications in learning materials, included in the *Student Contextual Learning Survey* was statistically related to student performance in ENGL 1050H ($p=0.0109$). Fourteen of the fifteen items contained in the *Student Contextual Learning Survey* were statistically significantly correlated with the contextual learning scale score. The exception was Item 8, where students did not feel that assessments in ENGL 1050H were related to "real world" situations and tasks, therefore the item was not correlated with total contextual scale score. This result suggests that the assessments used in ENGL 1050H were content specific.

Genomics and Society and Problem-Solving Skills

Inspection of student responses for students enrolled in the special problem-solving section of BIOL 1107/1107L/1107H provides direct support that the problem-solving paradigm incorporated in both the laboratory and lecture course components improves student perceptions regarding contextual learning when the students are enrolled in all four of the cluster core courses. Twelve students enrolled and completed BIOL 1107/1107L/1107H (Arnold & Barstow) during the Spring 2001 semester. Four of the twelve students were registered for all four of the Genomics and Society cluster courses. To assess student perceptual differences regarding contextual learning in BIOL 1107/1107L/1107H, a Chi-Square test of independence was conducted for each of the 15 items (five-point Likert scale) in the *Student Contextual Learning Survey* as a function of group membership, traditional Honors student versus cluster core student. Statistically significant differences in student reported perceptions and curriculum type were observed for Item 4 (Table 8) and Item 7 (Table 9). Inspection of these data suggests that students who are enrolled in all four of the cluster courses feel more strongly that the course content in the experimental section of BIOL 1107/1107L/1107H is applicable to everyday life and "real world" situations.

Table 8. Chi-Square test of independence for Item 4 in the *Student Contextual Learning Survey* as a function of curriculum type.

Item 4 How subject (BIOL 1107) relates to people's everyday life experiences in the context of the community	Curriculum type		Total
	Traditional	Cluster Core	
Undecided	1	0	1
Agree	7	1	8
Strongly Agree	0	3	3
Total	8	4	12

Chi-Square value = 8.063 (2 df) p = 0.018

Table 9. Chi-Square test of independence for Item 7 in the *Student Contextual Learning Survey* as a function of curriculum type.

Item 7 Class (BIOL 1107) was connected to other experiences: other classes, work, family, and community life.	Curriculum type		Total
	Traditional	Cluster Core	
Disagree	1	0	1
Undecided	5	0	5
Agree	2	4	6
Total	8	4	12

Chi-Square value = 6.000 (2 df) p = 0.050

To compare student differences in course performance and contextual scale scores as a function of curriculum type, an Analysis of Variance (ANOVA) was performed on the variable of interest using a General Linear Model solution. Hartley's F-max test was used to ensure that the underlying assumption of homogeneity of variances was met. For the test of the hypothesis that contextual learning is related to curriculum type in BIOL 1107/1107L/1107H, students enrolled in all four of the cluster core courses had statistically significantly higher contextual scale scores than students enrolled in traditional Honors courses (refer to Table 10). The omnibus F test was statistically significant ("=0.05). The probability associated with the calculated test statistic was less than or equal to 0.0438. The R-square value, 0.347078, suggests that 34.7078% of the total variability in contextual scale score for BIOL 1107 students can be attributed to curriculum type. For the test of the hypothesis that BIOL 1107 course performance is related to curriculum type, no statistically significant differences in course grades were observed. There was so little variability in course grades among the students enrolled in traditional Honors courses and the four students enrolled in the cluster core courses, the F statistic was not valid.

Table 10. Analysis of Variance for contextual scale score as a function of curriculum type.

Source	DF	Sum of Squares	Mean Square	F value	Pr > F
Model	1	108.375	108.375	**5.32**	*0.0438*
Error	10	208.875	20.3875		
Corrected Total	11	312.250			

R-Square	Coefficient of Variation	Root MSE
0.347078	7.432513	4.151525

Source	DF	Type III Sum of Squares	Mean Square	F value	Pr > F
GROUP	1	108.375	108.375	**5.32**	*0.0438*

GROUP	CONTEXT LSMEAN	Std Err LSMEAN	Pr > *T* H_0:lsmean=0	Pr > *T* H_0: LSMEANS1=LSMEAN2
0	58.625	1.59638	**0.0001**	**0.0438**
1	65.000	2.25761	**0.0001**	

Table 11. Spearman-Brown Rank correlation coefficients for *Student Contextual Learning Survey* items and BIOL 1107 laboratory grade, course grade, and contextual learning scale score, n=12. Associated probability values are in parentheses. Statistically significant correlation coefficients are bolded.

***Contextual Learning Survey* Item Number**	**Course Grade**	**Laboratory Course Grade**	**Contextual Learning Scale Score**
Item 1 Increase in problem-solving skills	0.08759 *(0.7866)*	0.22522 *(0.4816)*	0.48551 *(0.1096)*
Item 2 Opportunities to work on class activities with other students in the class	0.06478 *(0.8415)*	-0.25910 *(0.4161)*	0.29251 *(0.3562)*
Item 3 Understanding of how the subject (BIOL 1107) relates to "real world" social issues	0.20231 *(0.5283)*	0.49021 *(0.1057)*	-0.42946 *(0.1635)*
Item 4 How subject (BIOL 1107) relates to people's everyday life experiences in the context of the community	-0.24793 *(0.4372)*	-0.21852 *(0.4950)*	**0.76339** *(0.0037)*
Item 5 Encouraged to make choices and be responsible for my own learning in course	0.92726 *(0.7636)*	-0.26456 *(0.4060)*	0.07223 *(0.8235)*
Item 6 Learned from other students through class projects & discussions	-0.49434 *(0.1023)*	**-0.65779** *(0.0201)*	0.07401 *(0.8192)*
Item 7 Class (BIOL 1107) was connected to other experiences: other classes, work, family, and community life.	-0.29568 *(0.3508)*	-0.12061 *(0.7089)*	**0.62272** *(0.0306)*
Item 8 Assessments in class (BIOL 1107) were connected to "real world" situations and tasks	-0.24387 *(0.4450)*	0.03933 *(0.9034)*	**0.57629** *(0.0499)*
Item 9 I will use what I have learned in this class in my future life and work.	-0.06614 *(0.8382)*	-0.08559 *(0.7914)*	**0.78865** *(0.0023)*
Item 10 Course (BIOL 1107) emphasized higher order thinking and problem-solving skills	-0.14352 *(0.6563)*	-0.47441 *(0.1192)*	0.25604 *(0.4218)*
Item 11 Classroom context, social climate, and interaction conducive for learning	**-0.62967** *(0.0282)*	-0.45597 *(0.1363)*	0.40128 *(0.1961)*
Item 12 Instructor(s) used "real life" examples and situations to make material relevant	-0.25910 *(0.4161)*	-0.32388 *(0.3044)*	0.16251 *(0.6138)*

Item 13 Course (BIOL 1107) learning materials incorporated "real life" science applications in other contexts	-0.25087 *(0.4316)*	-0.52962 *(0.0766)*	0.00000 *(1.0000)*
Item 14 Connections with this course (BIOL 1107) and other disciplines	-0.5125 *(0.8743)*	0.8278 *(0.7981)*	**0.79119** *(0.0022)*
Item 15 Understand how science knowledge can be used outside of the course (BIOL 1107) context	0.02262 *(0.9444)*	0.32423 *(0.3039)*	0.55236 *(0.0626)*

Inspection of the data contained in Table 11 suggests that overall BIOL 1107 course performance was negatively correlated (p=0.0282) with Item 11 (classroom context, social climate, and interaction conducive for learning) in the *Student Contextual Learning Survey*. Further, laboratory course performance was negatively correlated (p=0.0201) with Item 6 (learned from other students through class projects and discussions) in the *Student Contextual Learning Survey*. The Contextual Learning Scale score was significantly positively correlated with Item 4, Item 7, and Item 9 which relate to the applicability of the BIOL 1107 curriculum to everyday life. Item 8, the relationship of assessments to real world situations and tasks, showed a positive correlation (p=0.499) with the Contextual Learning Scale score. Item 14, the applicability of the BIOL 1107 curriculum to other disciplines, was positively correlated (p=0.0022) with Contextual Learning Scale score.

Genomics and Society and Communication Skills

Six students enrolled and completed Honors Freshman Seminar (Condit) during the Spring 2001 semester. Four of the six students were registered for all four of the Genomics and Society cluster courses. To assess student perceptual differences regarding contextual learning in PHIL 2400H, a Chi-Square test of independence was conducted for each of the 15 items (five-point Likert scale) in the *Student Contextual Learning Survey* as a function of group membership, traditional Honors student versus cluster core student. No statistically significant differences ("=0.05) were observed in student reported perceptions about contextual learning in the Honors Freshman Seminar course.

To compare student differences in contextual scale scores as a function of curriculum type, an Analysis of Variance (ANOVA) was performed on the variable of interest using a General Linear Model solution. Hartley's F-max test was used to ensure that the underlying assumption of homogeneity of variances was met. For the test of the hypothesis that contextual learning is related to curriculum type in Honors Freshman Seminar, no statistically significant differences in contextual learning scale scores were observed; the calculation of the F statistic was invalid due to the lack of variability among the student responses.

Table 12. Spearman-Brown Rank correlation coefficients for *Student Contextual Learning Survey* items among Honors Freshman Seminar students and contextual learning scale score, n=6. Associated probability values are in parentheses. Statistically significant correlation coefficients are bolded.

***Contextual Learning Survey* Item Number**	***Contextual Learning Scale Score***
Item 1 *Increase in problem-solving skills*	***0.83666*** *(0.0378)*
Item 2 Opportunities to work on class activities with other students in the class	0.52463 *(0.2853)*
Item 3 Understanding of how the subject (Freshman Seminar) relates to "real world" social issues	unable to calculate due to lack of variability in the student responses
Item 4 How subject (Freshman Seminar) relates to people's everyday life experiences in the context of the community	unable to calculate due to lack of variability in the student responses
Item 5 Encouraged to make choices and be responsible for my own learning in course	0.27775 *(0.5941)*
Item 6 Learned from other students through class projects & discussions	0.62106 *(0.1882)*
Item 7 Class (Freshman Seminar) was connected to other experiences: other classes, work, family, and community life.	0.39279 *(0.4411)*
Item 8 Assessments in class (Freshman Seminar) were connected to "real world" situations and tasks	-0.13093 *(0.8047)*
Item 9 I will use what I have learned in this class in my future life and work.	0.65465 *(0.1583)*
Item 10 Course (Freshman Seminar) emphasized higher order thinking and problem-solving skills	**0.87831** *(0.0213)*
Item 11 Classroom context, social climate, and interaction conducive for learning	0.00000 *(1.0000)*
Item 12 Instructor(s) used "real life" examples and situations to make material relevant	**0.83324** *(0.0394)*
Item 13 Course (Freshman Seminar) learning materials incorporated "real life" science applications in other contexts	-0.03381 *(0.9493)*
Item 14 Connections with this course (Freshman Seminar) and other disciplines	0.65465 *(0.1583)*
Item 15 Understand how science knowledge can be used outside of the course (Freshman Seminar) context	unable to calculate due to lack of variability in the student responses

Spearman-Brown Rank correlation coefficients were computed for each of the 15 items with the total scale score for students enrolled in Honors Freshman Seminar (refer to Table 12). *Student Contextual Learning Survey* items which were statistically significantly correlated with the contextual learning scale score related to the constructs of problem-solving/higher order thinking skills in the context of Freshman Seminar (Item 1 and Item 10), and life experiences (Item 12). The results of these analyses suggest that Freshman Seminar improved students' problem-solving skills. Additionally, Dr. Condit made effective use of real life situations which made the course content relevant to the students.

Summary and Recommendations

Statistical analyses suggest that students who were enrolled in one or more of the four cluster core courses comprising the Genomics and Society cluster report an increase in contextual learning within their academic program of study. The results of these analyses are not generalizable to the general population of Honors students at UGA due to the nonrandom nature of group membership among the students included in this study. Students were given the option of enrolling in one or more of the cluster core courses. In a sense, the students enrolled in all four cluster core courses were self-selected. Further, the small sample size severely restricts the sampling of the variability inherent in the underlying constructs of interest. If the group of students were larger, in excess of sixty to one hundred, then the effects of student self-selection with respect to curriculum type may be mitigated. It is necessary to repeat the evaluation with the next group of students in Spring 2002.

The researchers were not able to gain access to student standardized test score data which may have provided a means for utilizing a matched sampling strategy, provided that the sample sizes were adequate. During the Spring 2002 semester, it is hoped that we will have access to student data from alternative Honors course sections for ENGL 1050H, PHIL 2400H, and BIOL 1107H. Students who were enrolled in the Spring 2001 BIOL 1107/1107L/1107H cluster course will be followed as they progress through BIOL 1108/1108L/1108H to see if the experience in the Genomics and Society cluster core courses produced better learning outcomes among the four students in the following academic semesters. It will also be interesting to see if they established social interaction patterns with their peers during the which will persist after the end of the Spring 2001 term.

Literature Cited

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STUDENT SOCIAL INTERACTION & GENOMICS AND SOCIETY

Directions: As a result of your enrollment in the Genomics and Society cluster of core curriculum courses, we would like to get your feelings regarding the kinds and frequency of social interaction with the other students enrolled in these courses. Additionally, we are interested in your perceptions regarding any impact that your participation in this learning environment has produced. The survey will be administered at the end of your BIOLOGY 1107L course and again at the end of your BIOLOGY 1108L course, and your time investment for each survey should be no more than 20 minutes.

Your participation in this survey is voluntary. All responses are confidential and will not be released in any individually identifiable form without your prior consent, unless otherwise required by la. Your responses will be used by the researchers to evaluate the merits of a new instructional approach in which students involved in a cluster of courses focusing on a common theme, Genomics and Society in this example, develop better problem-solving skills, engage more frequently in cross-disciplinary learning opportunities, and develop a sense of community with the other students who are enrolled in the cluster courses. Your responses to this survey will not be shared with any of the course instructors or laboratory instructors. The course instructors will not receive copies of the survey responses until the semester is complete and final course grades have been submitted to the Registrar's Office. There are no risks to you resulting from your participation in this study. The researchers will answer any additional questions about the research, now or during the course of the project, and can be reached at (706) 542-1449 or (706) 583-0862.

It is hoped that your participation in this study will provide the researchers with information that will be used to greatly enhance the quality of the undergraduate experience at the University of Georgia. Further, in reviewing the findings of this study and comparing the results to similar studies at other colleges and universities, it is hoped that the publication of research findings will lead to the development of additional programs such as the Genomics and Society core cluster at other institutions of higher learning.

I understand the purpose of this survey and the subsequent study, and I give my consent to the researchers to use this information for the purposes as they have been explained.

Please sign both copies of this form. Keep one for your records and return the other form to the investigator with the completed survey.

_____

Participant Signature Social Security Number

Date

Dr. Jonathan Arnold	Genetics Department	(706)542-1449
Dr. Catherine Teare Ketter	School of Marine Programs	(706)583-0862

For questions or problems about your rights please call or write: Ms. Julia Alexander, Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

Study Identification No.
Survey Administration No.

STUDENT SOCIAL INTERACTION

Directions: Please respond to each survey question accurately. Your responses will be compiled with those of your classmates; your individual responses will be identifiable to the evaluator only. Write your responses as clearly as possible on the survey form. Thank you very much for your participation.

1. How many times during a semester do you see one or more of your classmates outside of your scheduled classes?

Questions 2-9. CIRCLE the appropriate response to following which apply to your interaction with the other students in the Genomics and Society core courses. Complete the sentence "Are any of the students enrolled in the core courses":

1. Your roommate? YES NO

1. In the same Fraternity or Sorority? YES NO

1. In the same UGA student organization? YES NO

Please list the student organization

1. In the same Honor Society? YES NO

Please list the Honor Society

1. On the same UGA intermural team? YES NO

1. Have you provided assistance to the other members of your research team on projects relating to other courses?

YES NO

1. Have you attended any fine arts performances or exhibits with classmates?

YES NO

1. Have you participated in any other extracurricular activities with your classmates recently?

YES NO

Please list the extracurricular activity(ies)

Questions 10-24. Please CIRCLE the response which most closely matches your perceptions regarding any impact that your participation in the Genomics and Society core curriculum has produced with respect to contextual learning in your academic program.

1. I increased my problem-solving skills in this class.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

1. I did not have opportunities to work on class activities with other students in this class.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

12. I did not develop a stronger understanding of how this subject relates to "real world" social issues.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. I understand how this subject relates to people's everyday life experiences in various community contexts.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. I was encouraged to make choices and be responsible for my own learning in this course.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Through class projects and discussions, I did not learn from other students in t his course.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Ideas in this class were clearly connected to experiences in other classes, work, family, and community life.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Assessments in this class were not connected to "real world" situations and tasks.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. I will not be able to use what I have learned in this class in my future life and work.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Higher order thinking and problem-solving skills were emphasized in this course.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. The classroom context, social climate, and personal interactions were conducive to my learning in this course.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Instructors in this course effectively used examples from "real life" situations to teach new concepts and make them relative to students.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. Learning materials in this course did not effectively incorporate “real life” applications of science to other contexts where it is used.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. I am able to see the connections between the topics taught in this course and in other disciplines.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree

13. I understand better how knowledge in science can be used outside of the context of this course.
A. strongly disagree B. disagree C. undecided D. agree E. strongly agree