the CLIPPER PROJECT

Report to the Andrew W. Mellon Foundation Regarding Initial Activities, Expenditures, and Results

October 15, 2001

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Summary

The Clipper Project was conceptualized by Lehigh University and funded by the Andrew W. Mellon Foundation to create unique educational opportunities for high school seniors matriculating to Lehigh. As proposed, Lehigh developed and offered two web-based courses (Calculus I and Economics I) to high school seniors during the first 18 months of the project. A total of 78 students enrolled in one of the web-based sections of Calculus I or Economics I, and these students tended to be high achieving and technologically proficient. Students who completed their web-based course achieved as well as students who participated in on campus sections of Calculus I or Economics I, and feedback from these students was positive for both of the initial course offerings.

Although many students experienced success, some students experienced difficulty and withdrew from their web-based course. Feedback from these students indicated that the primary factor leading to withdrawal was a lack of time for participation due to the competing demands of high school course requirements and extra-curricular activities. Additional issues impacting course participation and performance will be explored in a second phase of the project that will be submitted to the Andrew W. Mellon Foundation's Technology and Teaching program.

Overview

The Clipper Project was conceptualized to enhance the collegiate experience of Lehigh freshman students by accelerating their entry into advanced studies in their specialties and complementary fields. The primary goal of the project is to design and offer typical freshman year courses (i.e., Calculus I, Economics I, etc.) via the web to high school seniors who are accepted for early admission into Lehigh. The Project uses a quasi-experimental research design employing both qualitative and quantitative measures to explore student achievement in web-based courses, the extent to which participation in web-based courses has prepared students for advanced course work, whether this vehicle indeed opens broader learning experiences to them, and the effects of such a project on the faculty engaged in the process.

The following interim report to the Andrew W. Mellon Foundation has three specific objectives.

- Provide an update regarding the status of the Clipper Project, including completion of project-related activities and budgetary expenditures during the 18-month period since the initial receipt of funds.
- Highlight the findings from the initial offerings of the first two Clipper courses (Calculus I and Economics I) in the Spring of 2001.
- Share the goals for the future of the Clipper Project.

Project Update

Tasks Completed To Date

In the original proposal, ten primary activities were identified as necessary for successful completion of the project. As displayed in Table 1, two of these activities were completed as of Spring, 2001. Most of the remaining activities were initiated during the first 18 months of the grant and will continue for the duration of the project. The only activity that has yet to begin is the collection of follow-up data from students who participated in Clipper courses. Because the first web-based courses were completed at the end of June, collection of follow-up data will not occur until the beginning of the Spring semester in 2002. In sum, the project achieved its objectives for Year 1 and currently is on schedule to offer the full complement of courses in Spring, 2002.

Table 1. Status of major activities associated with the Clipper Project.

Activity	Status
Hire personnel	Completed Spring 2000
Design surveys & other measures for data collection	Completed Fall 2000
Develop instructional activities for Web courses	Economics and Calculus: Completed Fall 2000 English, Chemistry, and Engineering 1: began Spring 2001
Recruit student participants	First web cohort completed Spring 2001 On campus and second Web cohort recruitment in Fall 2001
Teach Web-based and traditional courses	Economics and Calculus: Offered Spring 2001 Five courses to be taught in Spring 2002
Collect student data	Completed first Web cohort in Summer 2001 Begin collect for second cohort in Fall 2001
Collect faculty data	Began Spring 2000; Continues until 2004
Collect follow-up data	Scheduled to begin Spring 2002
Data analysis	Began Summer 2001; Continues until 2004
Dissemination of results	Began Summer 2001; Continues until 2004

Expenditures

The Andrew W. Mellon Foundation awarded $670,000 for completion of the first two years of the Clipper project in December 1999. Appendix A displays the actual project-related expenses incurred during the first 18 months of this 2-year period. In addition, this Appendix includes projected expenses for the last six months of the initial funding cycle. As displayed in the Appendix, there is an anticipated surplus of approximately $188,000 at the end of the current funding cycle. Approximately one fifth of this amount can be attributed to the interest accrued on the original award. The remainder of the surplus, however, can be attributed to cost savings resulting from increased use of existing institutional resources to design, develop, and support the web-based courses offered as part of the project. As discussed in the conclusion of this report, a no-cost extension is requested to complete the work, utilizing the $188,000 remaining from the grant.

Initial Results

During the conceptualization phase of the initial proposal, sources of data were identified to provide insight regarding implications of the project at the student, faculty, and institutional levels. This section reports a preliminary analysis of data collected during the first 18 months of the project. For the purposes of this report, the focus is on the short-term student outcomes, given that the primary objective of the Clipper project is to explore the effects of providing students with a unique opportunity to pursue college courses prior to their first day on campus.

Student Recruitment

In the latter half of December 2000, 309 students were offered early admission into Lehigh University. Shortly after receiving offers of early admission (typically within three days), each of these students received information about the two web-based courses —Calculus I and Economics I—scheduled to be offered through the Clipper Project during the Spring semester of 2001. From this pool of potential high school applicants, 89 students applied to enroll in one of the two courses. Although 80 of these high school students officially enrolled in a section of web-based Calculus or Economics, 10 students (8 from Calculus and 2 from Economics) dropped before their class began. (Several of the high school students who chose either not to enroll or not to begin the course indicated that their decision resulted from having insufficient time to participate in the Clipper course while participating in high school courses and extra-curricular activities).

As specified in the original proposal, two sections of each Clipper course were offered in the Spring of 2001. One section was comprised exclusively of high school students, and a second "mixed" section was comprised of high school seniors and Lehigh freshmen. To realize this goal, the project recruited a small number of on-campus students to enroll in the mixed section of Calculus or Economics. Specifically, five freshmen participated in the mixed section of Calculus, and three freshmen participated in the mixed section of Economics. Originally, the goal was to recruit 10 freshmen for each of these sections; however, the vast majority of freshmen had already completed these courses during the first semester of the academic year. Thus, because we could only offer the web-based courses after early admits were identified (i.e., during the second semester), our potential applicant pool for on-campus students was significantly reduced. During 2001-2002, we plan to more aggressively recruit on-campus students earlier in the Fall semester in an effort to identify students for one web-based section of each Clipper course scheduled to be taught in Spring 2002. One positive benefit of having fewer on-campus students enroll in the initial Clipper courses was that we were able to offer enrollment to a larger number of high school students than originally planned (i.e., 72 students instead of 60).

Characteristics of Participating Students

Table 2 presents information regarding some key demographic/background characteristics for all students who participated in the courses. (Participation is defined as a student who was enrolled in the course after the final deadline for dropping a course with no record on their transcript. For traditional on-campus courses, this is defined as the 10th day of the academic semester. For Clipper courses, this date was the 10th day after students were first expected to log into the course.) As displayed in the table, with the exception of the high school-only section of Economics I, the percentage of males and females was approximately equally distributed in each web-based section. Similar patterns were observed across the four sections with regard to high school location, with the majority of students matriculating from suburban districts. A high percentage of students in the Calculus sections were taking (or had taken) Advanced Placement (AP) Calculus by the time of their enrollment in Clipper Calculus. A much smaller percentage of the students in Economics, however, had taken an AP Economics course. Participating students' college of enrollment varied widely across each of the sections.

Table 2. Percentage of Students in Web-based Sections of Calculus I and Economics I by Sex, College of Enrollment, High School Location, and AP Course Participation.

	Economics I		Calculus I	
	High School-Only Section	Mixed Section	High School-Only Section	Mixed Section
	N=21	N=22	N=15	N=20
Sex				
Male	81	55	53	50
Female	19	45	47	50
College of Enrollment				
Arts/Science	14	23	53	35
Engineering	38	45	27	20
Bus./Econ.	48	32	20	45
HS Location				
Rural	5	14	7	10
Suburban	85	68	73	75
Urban	5	14	13	10
No Report	5	4	7	5
AP Course				
No	95	89	60	45
Yes	5	11	40	30
No Report	--	--	--	25

N= Number of students who were enrolled in the Clipper course as of the final date to drop the course with no record on their transcript.

Students enrolled in Clipper courses were asked to provide information about their academic and technical competence prior to their participation in the Clipper courses. This information included commonly reported indicators such as high school GPA and SAT scores. In addition, students were asked to provide a self-assessment of their current academic skills and academic enablers (i.e., non-academic skills that are related to academic success) using the Academic Competence Evaluation Scales (DiPerna and Elliott, 2001; see Appendix B), a nationally-normed, standardized self-report instrument for college students. Students also provided a self-assessment of their skill proficiency and level of comfort with the use of specific technologies (e.g., email, discussion board, word processing, etc.) via a standardized instrument created for the project (see Appendix B). Descriptive statistics for each indicator is reported in Table 3.

Table 3. Indicators of Students' Academic and Technical Competence for Web-based Sections of Calculus I and Economics I .

		Economics I		Calculus I	
		High School-Only Section	Mixed Section	High School-Only Section	Mixed Section
	Range Possible	M/SD	M/SD	M/SD	M/SD
High School GPA	0-4	3.7 (0.5)	3.6 (0.4)	3.7 (0.5)	3.7 (0.4)
SAT Scores					
Verbal	200-800	602.4 (46.5)	587.3 (80.5)	620.7 (49.4)	629.5 (53.5)
Mathematics	200-800	631.9 (68.7)	632.3 (52.1)	671.3 (45.3)	662.0 (58.0)
Academic Skills					
Reading/Writing	10-50	37.3 (4.8)	39.1 (6.5)	39.4 (6.1)	38.2 (5.7)
Math & Science	10-50	40.6 (5.7)	38.8 (6.1)	44.0 (6.1)	39.6 (4.3)
Critical Thinking	10-50	39.2 (4.8)	38.8 (5.9)	39.0 (6.7)	39.1 (4.7)
Total	30-150	119.5 (11.4)	117.0 (16.9)	126 (18.6)	115.2 (14.7)
Academic Enablers					
Motivation	10-50	40.5 (6.2)	43.5 (4.7)	44.3 (6.3)	43.5 (5.7)
Study Skills	10-50	43.3 (4.6)	45.0 (3.3)	45.0 (7.8)	44.1 (4.9)
Engagement	8-40	30.7 (4.7)	33.9 (4.0)	32.1 (5.9)	30.7 (5.3)
Interpersonal	8-40	34.8 (3.5)	34.3 (2.8)	36.6 (3.3)	34.6 (3.6)
Total	36-180	149.8 (16.4)	154.8 (10.8)	157.3 (22.4)	152.9 (16.6)
Technology					
Skill Proficiency	8-40	30.0 (5.8)	29.9 (4.6)	29.0 (6.0)	30.2 (5.5)
Level of Comfort	8-40	32.3 (6.0)	30.9 (4.2)	29.4 (6.4)	31.2 (5.1)

The data presented in Table 3 indicates that students who participated in the Clipper courses had high cumulative Grade Point Averages (GPAs) during high school. They also have strong verbal and mathematic aptitude as measured by the SAT. In addition, students' self-ratings indicated that they perceive their academic skills in (reading/writing, mathematics/science, and critical thinking) as being higher than typical college freshmen. Participating students also perceive themselves as competent, or exhibiting similar levels of skills to other college freshmen, in four academic enabler domains (motivation, study skills, engagement, and interpersonal skills). Finally, across both sections of Calculus and Economics, students characterized their proficiency and level of comfort with using web-based technology as moderate to high.

In sum, the results of these measures indicate that, like the general student population at Lehigh, students who participated in the Clipper courses appear to have higher levels of academic and cognitive skills when compared to the national college student population. In addition, they have similar levels of academic enablers to other students who attend post-secondary institutions throughout the United States.

Student Outcomes

One of the primary outcomes of interest is how students achieve academically in the web-based Clipper courses. Tables 4 and 5 display the withdrawal rates as well as the final grades of students who participated in Clipper courses during the Spring of 2001. In addition, these tables display the performance of students who participated in the "traditional" sections (i.e., on-campus face-to-face instruction) of Calculus I and Economics I taught by Clipper faculty during Fall 2000. (It is important to note that the best comparison group for the first cohort of high school senior participants are the freshmen who are taking the on-campus sections of Calculus I and Economics I in the Fall of 2001; however, given the timing of this report, we decided to use data from Fall 2000 to conduct a preliminary comparison of student performance.)

Table 4. Academic Performance of Students in Web-based and On-campus Sections of Economics I.

	High School-Only Section	Mixed Section	On-campus
	N=21	N=22	N=195
Completion Rate*			
Withdrew	2 (9.5)	6 (27.3)	6 (3.1)
Completed	19 (90.5)	16 (72.7)	189 (96.9)
Grades			
Mean	2.8 (B-)	2.4 (C+)	2.5 (B-/C+)
Range	4.0-2.3 (A to C+)	4.0-1.7 (A to C-)	4.0-0.0 (A to F)

* Percentage of total students enrolled appears in parentheses.

In the Economics I course, both web-based sections experienced higher withdrawal rates than the traditional on-campus section of the course. Although the high school-only section demonstrated a slightly higher rate of withdrawal than the traditional section, the mixed section demonstrated a substantially higher rate of withdrawal than its traditional counterpart. With regard to end-of-semester academic performance, students in the high school-only section demonstrated higher average achievement than students in the mixed web-based or traditional sections. In addition, the lower bound of the grade range was highest in the web-based high school-only section, followed by the mixed web-based section, and the on-campus traditional section.

Table 5. Academic Performance of Students in Web-based and On-campus Sections of Calculus I.

	High School-Only Section	Mixed Section	On-campus
	N=15	N=20	N=81
Completion Rate*			
Withdrew	7 (46.7)	8 (40)	7 (8.6)
Completed	8 (53.3)	12 (60)	74 (91.4)
Grades			
Mean	3.3 (B+)	2.7 (B-)	2.5 (B-/C+)
Range	4.0-2.0 (A to C)	4.0-1.0 (A to D)	4.0-0.0 (A to F)

* Percentage of total students enrolled appears in parentheses.

Similar to the Economics I course, students in the web-based sections of Calculus I demonstrated lower levels of retention but higher levels of academic performance relative to students who participated in the on-campus sections of the course. As displayed in Table 5, a large percentage of students withdrew from both sections of the web-based Calculus course. Students who completed the web-based sections of the course, however, demonstrated higher average achievement at the conclusion of the course than the students in the traditional on-campus version of the course. Specifically, students in the high school-only section demonstrated the highest average achievement as well as highest range of grades received in the class. Students in the web-based mixed section also demonstrated slightly higher levels of average achievement and range of grades than students in the on-campus section of the course.

Taken together, the performance data indicates that those students who *completed* the web-based sections of the Clipper courses fared as well or slightly better than those students participating in the traditional face-to-face section; however, students in the web-based sections who were experiencing difficulty appeared to more readily choose not to complete the course rather than risk receiving a low or failing grade.

In an attempt to ascertain why students decided to withdraw from their Clipper course, we electronically distributed a brief questionnaire (see Appendix B) to each student shortly after receiving notification of the student's intent to drop a course. To date, 48% (11 of 23) of the students who dropped their Clipper course have responded to this questionnaire. Preliminary analysis of students' responses indicated that the most common reason (n=5) for dropping a course was that students found it too difficult to take an online college course in addition to the academic and extra-curricular demands placed on them as high school seniors. Three students indicated that it was difficult for them to grasp concepts via the web-based instructional approach utilized within the course, and two students indicated that technical difficulties with their Internet Service Provider or hardware prevented them from completing the course. Finally, one student decided to withdraw from the Calculus course due to logistical difficulties (i.e., the student was unable to locate a teacher or guidance counselor to proctor exams.) Further exploration of students' reasons for not completing Clipper courses is one of the primary objectives for the remainder of the Project.

Feedback Regarding Course Experiences

There are few quality measures that have been developed to assess teaching effectiveness at the post-secondary level for either web-based or face-to-face instruction. As a result, we developed a measure to be piloted and used within the Clipper Project. The initial version of this instrument, the Survey of Course and Teaching Effectiveness (SCATE), includes 79 items measuring students' perceptions of their experience within a course. Specifically, students use a 5-point scale to evaluate instructional delivery, assessment and feedback, instructor-student interactions, and overall impression of the instructor and course experience. In addition, the SCATE (see Appendix B) includes items that assess changes in students' academic skills as well as their proficiency with technology at the completion of the course. The SCATE has been developed for use in traditional, web-enhanced, and web-based courses, and its psychometric properties will be explored and refined over the course of the project.

Student feedback obtained via the SCATE was positive for each web-based section of Clipper Calculus and Economics. For the Instructional Delivery Scale, average total scores indicated that both instructors often utilized strategies and tactics that are effective in facilitating learning. Average scores on the Assessment and Feedback Scale also indicated that both instructors frequently engaged in high-quality assessment practices, and mean scores in the Instructor-Student Interaction Scale suggested that both faculty developed positive working relationships with their students. Scores in the Overall Evaluation Scale indicated that students characterized the quality of the overall course experience as good. Finally, students' ratings of changes in their academic skills demonstrated that their skills improved as a result of participating in their Clipper course. In sum, students who completed their Clipper course viewed the experience favorably.

Synthesis of Student Performance and Course Feedback

Taken as a whole, data collected regarding the Clipper participants indicates that they had strong academic skills and enablers (e.g., motivation, study skills) at the time of their enrollment in a Clipper course. They also were proficient in using (and comfortable with) technologies that are commonly employed in web-based course offerings. In addition, a significant number of students who enrolled in the Calculus I course also had completed (or were simultaneously enrolled in) an AP Calculus course. With regard to student achievement in Clipper web-based courses, students who completed their course achieved at a level commensurate with those students who participated in on-campus sections of the course. Feedback from students who completed their web-based course indicated that the overall experience was positive, and participation in the course favorably impacted their academic skills. Although higher percentages of students withdrew from the web-based sections than on-campus sections of both Calculus I and Economics I, the primary factor contributing to attrition appears to be the challenge of finding time to participate in a college-level course while completing high school requirements and extra-curricular activities.

Consequently, the initial results indicate that a significant number of high school seniors can successfully complete academically rigorous web-based courses *in addition to* their existing academic and extra-curricular commitments. There is a substantial minority of students, however, who cannot find the time within their existing schedule to complete (or even attempt) one web-based college-level course. Further exploration of this potential barrier to participation (as well as identifying a means to address it) is a critical goal for the second phase of the project.

The Future of the Clipper Project

In the original proposal, Clipper was conceptualized as a five-year project. The Andrew W. Mellon Foundation initially agreed to provide funding for the first two years of the project, and this funding has allowed us to develop the two web-based courses (Calculus and Economics) offered during the Spring of 2001. In addition, this funding has allowed us to develop three new web-based courses (English, Engineering, and Chemistry) during the Summer of 2001. Currently, we are planning to offer one section of each of the five Clipper web-based courses in the Spring of 2002. As such, we are requesting a six-month, no-cost extension of the Clipper Project that will allow us to evaluate this second round of Clipper courses. If this extension is granted, the first phase of the Clipper Project will end on June 30, 2002.

A New Direction

Lehigh University currently is developing plans to implement a second phase of the Clipper Project that addresses some of the challenges associated with offering web-based college courses to high school seniors. Data collected during the first phase of the project suggested that the most significant challenge facing high school participants was finding sufficient time for their Clipper course while meeting the academic and extra-

curricular demands of their high school senior year. For the next phase of the Clipper Project, we will explore a potential solution to overcoming the barrier of time availability through a partnership with the Lehigh University High School Scholars Program. For many years, Lehigh has offered the High School Scholars Program to a limited number of high school seniors in the Lehigh Valley. High School Scholars enroll in one Lehigh University course per semester as part of their senior course schedule. The High School Scholars Program affords the Clipper Project a unique opportunity to explore one model that may allow more seniors to participate in, and successfully complete, web-based introductory collegiate courses. This model allows Lehigh to enhance the educational experiences of motivated high school seniors while creating a wider variety of course offerings for students on Lehigh's campus.

Lehigh University intends to apply for funding under the Andrew W. Mellon Foundation's program in Technology and Teaching, and we will be submitting a separate request to this program that will focus on the second phase of the Clipper Project. This follow-up project will allow us to offer additional cycles of all five Clipper courses, to further explore pedagogical and time barrier issues identified during our initial experiences, and to explore other institutional implications that have been revealed through Lehigh's Clipper Project.

References

DiPerna, J. C., & Elliott, S. N. (2001). The academic competence evaluation scales (college edition). San Antonio, TX: The Psychological Corporation.

Appendix A

Current Expenditures for the Clipper Project (Years 1 & 2)

Appendix B

Measures Used to Assess Students' Skills and Course Feedback