the CLIPPER II PROJECT

A Web-based Curriculum Research and Development Initiative

Final Report

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Project Summary

Named after the *Pan Am* Clipper --the plane that crossed the Atlantic and forever altered transportation-- the central focus of Lehigh University's Clipper Project was to help change the future of teaching and learning by seeking scientifically based answers to the questions about Web-based educational technologies. Specifically, Clipper collected data on the short- and long-term effects of offering five Web-based, college-level introductory courses to early-decision, non-matriculated high school seniors for 1) the *students* who participated; 2) the *faculty* who developed the courses and taught them online; and 3) the *institution* that offered Web-based courses to incoming high school seniors.

Method

The Clipper Project was designed to allow within- and between-group comparisons across time. In addition, the project used replication to test for cohort effects. As such, three instructional conditions were implemented --a traditional face-to-face "control" group (F2F), online with only high school (HSOnline) students, and online with a mix of high school and on-campus (MixedOnline) students-- across each of the five academic courses offered (English I, Calculus1, Engineering I, Chemistry I, and Economics I). The last Clipper course cycle ran during the 2003-2004 academic year. Overall, 451 high school and on-campus college students participated in the project. See Table 1 for a breakdown of the participants by type and instructional condition.

Table 1: Total number of Clipper participants by instructional condition and participant type.

		Participant Type		
		College student	High school student	**Total**
Instructional condition	F2F	111	--	**111**
	HSOnlyOnline	--	201	**201**
	MixedOnline	47	92	**139**
	Total	**158**	**293**	**451**

Data Collected

In a *Background Information Survey*, prospective participants were asked to provide general background and demographic information as well as information about their academic and technical competence and to rate their skill, proficiency, and level of comfort with the use of specific technologies. Students were also asked to assess their academic skills and enablers, and dispositional goal orientations through two instruments: 1) the *Academic Competence Evaluation Scales* (DiPerna & Elliott, 2001) and 2) the *Perceptions of Learning Success Questionnaire* (an adapted version of the Task and Ego Orientation in Sport Questionnaire, Duda & Nicholls, 1992).

To assess short-term outcomes for students who completed their Clipper course, the researchers collected final grades as well as data from the *Survey of Course and Teaching Effectiveness*, an end-of-semester questionnaire designed to assess students' perceptions of technology use in the course, the value of instructional activities, and the quality of the course as a whole. Students who withdrew from their Clipper course prior to completion were asked to respond to the *Drop Survey*. Both of these instruments were created specifically for the Clipper project.

Ongoing academic achievement was assessed via first-semester GPAs and grades for subsequent courses within the content area. To assess the effect Clipper courses might have had on the high school students' subsequent adjustment to college, the researchers administered the *Student Adaptation to College Questionnaire* (Baker & Siryk, 1989) in the 6th week of the high school participants' first semester. In addition, reflective *Senior Year Follow-up Surveys* are being distributed to the high school participants at the end of their Lehigh careers in order to assess their perceptions of the short- and long-term impact that their Clipper experiences may have had.

To assess faculty outcomes –such as increased competence in the use of instructional technology, incorporation of technology-based instructional methods in other courses, and changes in pedagogical styles– the researchers conducted interviews and distributed the *End-of-Semester Clipper Faculty Questionnaire* at the conclusion of each academic year. This assessment asked faculty to reflect on their experiences and compare the online course they designed to their traditional courses.

To assess Clipper's institutional impact, the researchers recorded and transcribed all meetings with representatives from the many administrative units that were affected by the project. In addition, the researchers maintained a detailed log of various interactions and correspondences related to the administration of the courses.

Participants

Analyses of the background data collected from the HSOnlyOnline, MixedOnline, and F2F students prior to their participation in the project indicated that there was no significant difference between the treatment groups on demographic variables such as gender, race, college of enrollment, location of high school, number of AP courses taken, comfort or proficiency with technology, or academic competencies. However, like most research volunteers who tend to be more intelligent than the general population (Rosenthal & Rosnow, 1975), the F2F students in our project had significantly higher SAT scores than the online groups (HSOnlyOnline and MixedOnline). In light of this, we have approached direct comparisons between the F2F and online groups with caution and, where possible and appropriate, controlled for this sampling error in our data analyses.

Discussion of Important Findings

As is often the case with long-term longitudinal projects, Clipper identified many questions to examine and collected a great deal of data. These questions and, hence, our findings were organized into three broad categories: 1) *student outcomes*; 2) *faculty outcomes*; and 3) *institutional outcomes*. In this summary we provide what we believe to be the one or two most important findings from each of these categories. More detailed data presentations, analyses, and discussions for each area can be found in the main body of this report.

1. Student Outcomes

Higher education institutions are under mounting pressure to increase retention rates by easing incoming students' academic and social transition to college (ACT, 2001; Burd, 2001; Consortium for Student Retention Data Exchange, 2001). Unfortunately, colleges and universities are discovering that it can be difficult to find effective ways to enhance the "first-year experience" when students' academic schedules are already filled to capacity (Gardner, 2005). One potential solution, according to some, would be to reclaim the "lost opportunity" of the high school senior year --when many suffer from "senioritis" and drift aimlessly-- and use that time instead to help students prepare for college (National Commission on the High School Senior Year, 2001).

With this in mind, the Clipper Project set out to test whether offering online courses to early-decision high school seniors might be one way for post-secondary institutions to "reach out" to incoming students and help them begin their transition to college. What we found was that a) early engagement with the University can help participants adjust more quickly; however, b) the best time to engage incoming students may not be during the high school senior year.

a. Early engagement can help ease the high school to college transition.

Analyses of Clipper's student adaptation to college data indicated that students who had the opportunity to participate in an online, college-level course prior to matriculation generally were adjusting more easily to college in their first semester than their colleagues. Clipper high school students' mean scores were higher on every adaptation to college indicator (academic adjustment, social adjustment, personal-emotional adjustment, and attachment) and reached statistical significance on all but one (personal-emotional adjustment). Students who were involved in online sections that included a mixture of high school and college students seemed to have an additional advantage, perhaps because they learned from their matriculated classmates a bit about what college would be like.

Further, data gathered from post-matriculation focus group meetings with students from the high school group revealed that many of the participants believed that Clipper helped them prepare both academically and socially for college. One student reported that:

> *[Clipper] helps you get prepared for what the pace is going be with the classes. How fast you're going have to do homework and prepare for tests. So I thought it was really useful.*

Similarly, faculty have observed:

> *This program provides a tremendous opportunity to enhance the freshmen year experience for our students. It can lighten their first year load or jumpstart them into their major. It enables us to offer kids options...*
>
> *It provides an opportunity for early adjustment to college life. It signals the type of academic expectations that faculty have here for students. It is helping us to reach high school scholars, the best students, in better ways…*

So, while it was also important to have found, as we did, that the online students achieved at levels commensurate with the F2F students and that their experience was positive overall, Clipper's role in helping students "connect" with one another and the institution prior to matriculation may have been equally as important in acclimating participants to the academic rigors of college (Consortium for Student Retention Data Exchange, 2001). Anecdotal examples of how Clipper helped students make social connections abound:

- Two male students became friends during a Clipper Economics course. They met face-to-face during the summer and then decided to be roommates in the fall as freshman.
- A male and female student became friends during Clipper English. Eventually the male student asked the female student to go to his high school prom. She accepted.
- One English class of online Clipper high school students met over the summer before they matriculated at one of the student's homes for a party. They still remain close and report that the transition to college life was made easier knowing they had friends from the start.

These data appear to be further substantiated by high school students' higher scores across all scales and subscales of the *Student Adaptation to College* questionnaire and the fact that 97% of the Clipper high school students who matriculated completed their first year and returned the following fall, as compared to 93-94% sophomore-year return rates for the general University population. A 3-4% increase in retention has huge implications not only for the financial health of an institution but also for its rankings in media outlets such as *US News and World Report*. In addition, at the time of this report the Clipper students' 6-year graduate rate of 96% is projected to be as much as 10-13% points higher than their Lehigh peers'. This result clearly shows that early exposure to college level work can help move students through the undergraduate experience at a reasonable rate. Similar to retention rates, Clipper students' higher graduation rates have important implications for all colleges and universities as they struggle to remedy the increasing numbers of students who start college, but never finish.

b) The high school senior year may not be the best time to engage incoming students.

Our analyses of the Clipper data also revealed that a significantly larger percentage of the online students withdrew from the online sections (41.5%) than the F2F sections (2.7%) --fueled almost entirely by the high school students who withdrew from their online courses in substantially higher numbers (98%) than their on-campus online college classmates (2%). Significant differences in the characteristics of completers and non-completers appear to be best explained by the extent to which the course taken aligned with students' intended major and/or interests. For example, with the highest and second highest online course completion rates respectively, Engineering I (75.9% completed) and Chemistry I (71.1% completed) are both requirements for engineering majors and both courses were filled primarily by students enrolled in the College of Engineering (78.4% in Engineering I and 64.4% in Chemistry I).

According to the non-completing high school students who responded to the *Drop Survey*, the primary factor leading to their decision to withdraw was the challenge of finding time to participate in a college-level course while also completing high school requirements and engaging in spring-semester senior year extra-curricular activities. A majority of the respondents reported that they had great difficulty completing their online course because of a lack of time given all their activities (40%). Time constraints and excessive load were also the chief complaints among those who responded to the end-of-course *Survey of Course and Teaching Effectiveness*. Generally, students reported putting in between 5-10 hours per week on their course with moderate to high effort.

Data gathered from high school group students in post-matriculation focus group meetings confirmed these findings:

> *[I] had very little time to do the work in the clipper project due to my commitment in varsity lacrosse at Ridgewood High School.*
>
> *I expected it to require less time and/or work than it did…*
>
> *I was unaware of just how much time was going to be needed in order to do well in the class. Considering the fact that I was trying to complete my regular school work, babysit, and play on club sports teams there was just not enough time in my schedule for an additional class…*
>
> *There wasn't much that I didn't like about the course. My reasons for dropping the course are purely that I did not have the time required for taking a college course in addition to my regular schedule.*

Similarly, faculty observed:

> *There is definitely a higher dropout rate in online. A few can't handle the technology. Some don't have the time. They did not realize how much time this takes, and they found that this course conflicts with all the extra-curricular activities they have.*

It appears that those online students who persisted despite their time limitations may have done so at the peril of their final course grade. Out of the five Clipper courses offered, engineering had significantly fewer online students drop. At the same time, however, engineering was the only Clipper course that had significantly lower online final grades than F2F final grades.

Thus, the undergraduate online courses we developed for early-decision high school students under the Andrew W. Mellon Foundation's support of the Clipper Project appear to have been highly effective in helping high school students begin making their critical transition to college. However, the data collected also suggested that the best time to engage incoming students may not be the same time they are struggling to meet the academic and extra-curricular demands of their senior year, but rather in the summer between high school and college (see Bishop & White, 2004, 2005). Out of the myriad student outcomes findings from the Clipper data that are reported in the sections that follow, we believe these two are likely to have the greatest impact on the way colleges and universities strategize over how to create environments that might ease the high-school to college transition and foster academic success.

Faculty Outcomes

Driven by advances in instructional technologies, the processes of teaching and learning have come under new scrutiny in recent years, leading some to call for renewed interest among faculty in the "scholarship of teaching" –whereby a portion of their time is devoted to assessing their pedagogical styles and seeking technology-enhanced alternatives to "chalk and talk" methodologies (Boyer, 1990; Shulman, 2003). However, as Bender and Gray (2005) observed, faculty often view teaching and research as two separate and competing forces contending for their time. Overburdened schedules limit the additional time faculty have to spend familiarizing themselves with labor-intensive technology-based instructional materials; much less prepare and teach an online course that can require at least twice as much time as its traditional face-to-face counterpart (Cornell, 1999). And, while technology-based instruction may help to make teaching and learning more accessible and expedient, the mere hasty addition of instructional technologies rarely have the intended positive effect and can often leave students and instructors feeling "disconnected" and out of touch with each other (Fulford & Zhang, 1993; Haefner, 2000; Willis & Dickinson, 1997).

Thus, one of the goals of the Clipper Project was to provide participating faculty with a "test bed" for *longitudinally* exploring their scholarship through the design and development of online instruction. We were interested to know how faculty would transform their "traditional" on-campus course for online delivery and whether the experience of having done so would have any influence on their pedagogical styles overall. What we found was that, while there was a) there is a strong initial temptation for faculty simply to replicate their traditional course online, b) faculty did take advantage of the opportunity to explore the innovative pedagogical approaches that new instructional technologies offer and incorporate those methods into their on-campus classes as well.

a. Faculty are often initially tempted simply to replicate their traditional course online.

In his November 2002 external evaluation report on the Clipper Project, Dr. Thomas C. Reeves, professor of instructional technology and assessment expert from the University of Georgia, observed that the online Clipper courses had been designed to replicate most of the components of traditional classroom instruction. Several factors likely contributed to the initial "high fidelity" between the Clipper courses and their F2F counterparts. First, in the absence of guidelines, educators—like everyone else—have tended to adopt newer technologies as a substitute for the older technologies (Saettler, 1990). Second, some Web-based course management technologies (like Blackboard) primarily support traditional instructional activities, with little support for helping instructors think differently about online teaching and learning methodologies. Third, it appears some content areas and topics may lend themselves more naturally to alternative pedagogical approaches. For example, one particularly successful online pedagogical model has emerged from Clipper English, a course focused on personal expression. There, students are encouraged to engage in writing and collaborative critique through a simulated "history-on-trial" approach. Interestingly, more so than any of the other four Clipper courses, the Clipper English students have exhibited signs of having established strong social bonds and formed a "community" of learners.

Lehigh faculty are not alone in the evolution of their thinking about Web-based instruction. It appears the conservative, "replication" approach to the design of online courses has been a necessary first step for many institutions as they have explored this new teaching and learning delivery system (Kearsley, 2000). What becomes problematic, however, is when we fail to build upon this initial foray by exploring ways we might capitalize on the things we find that the new instructional technologies have to offer education and use the opportunity, where appropriate, to test innovative pedagogical approaches (Jonassen & Reeves, 1996).

b) Faculty did explore innovative, technology-enhanced pedagogical approaches and incorporated those methods into their on-campus classes as well.

Qualitative data from interviews and open-ended questionnaires indicated that, while the faculty found teaching online to be more demanding initially than teaching face-to-face courses, the pay-offs were high in terms of their overall satisfaction and professional development. As a group the Clipper faculty reported that the technology-enhanced communications and smaller sections allowed them to get to know the Clipper students better than their face-to-face students:

> *In Clipper, I feel that I do know the [online] students a lot better than I do in the regular class. Of course, in the regular class there are 60 students and it is hard to get to know many of them anyway.*
>
> *I enjoyed the [online] section more and felt I had more contact with the students even though I wouldn't be able to recognize any of them on the street.*
>
> *I know the students so much more in the online discussion groups.*

The faculty also observed that the online technologies employed in their Clipper courses challenged them to think differently about teaching and learning in all contexts:

> *I think the online course highlights the importance of peer learning. In most course that is informal but I think I will try to make that a more formal part of my on campus classes in the future.*
>
> *I like the fact that everyone's work is public. It enables peer feedback. The old model was students would write a paper and only the professor would read it. This is better.*
>
> *…the online course shifts the burden to the student to learn rather than from the faculty to teach. In the regular course, students show up expecting you to interpret the material for them, and then they will learn the interpretation you give them.*

Most importantly, however, the faculty found they were able to transfer strategies and methodologies that they used online into their regular F2F courses. As one Clipper faculty member reported:

> *I don't feel much difference between my online and face-to-face courses anymore. They have blended.*

Through the Clipper project the participating faculty discovered that, rather than simply "digitize" what they had always done, they could use technology to support students' knowledge construction, explorations, learning by doing, discourse with others, and reflections. Thus, even though Clipper only directly impacted 451 students over its tenure, one of the project's legacies is the influence it also had on the 5 faculty members involved and the impact that their pedagogical shift will continue to have on cohorts of Lehigh students to come.

Institutional Outcomes

The development and delivery of the Clipper courses had implications throughout the University –from Library and Technology Services to the Registrar's Office, to Admissions and Financial Aid, to the Dean of Students Office, to Academic Affairs and the Educational Policy Committee. Among the many positive influences that the Clipper Project had on the larger institution, however, was to help increase recognition on campus that large scale course redesign using information technology would involve a partnership among faculty, Library and Technology Services staff, and administrators in both planning and execution. The faculty/LTS staff collaborative model piloted as part of the Clipper Project became a partial impetus for extensive reorganizations during the late 1990s and early 2000s that united academic computing, media services, administrative computing, distance education, digital initiatives, library services, and faculty development into a single organization, with the goal of advancing a vision of systemic change in the classroom.

One of the initiatives to come out of that reorganization was Lehigh Lab, for which the University received an EDUCAUSE "Systemic Progress in Teaching and Learning Award" in November 2004. Like Clipper, Lehigh Lab was founded on the idea that the University as a whole is a laboratory, in which faculty, staff, and students work and experiment together, across departments and disciplines, to advance learning. The Lab's primary objective is to facilitate innovative undergraduate and graduate teaching that utilizes information and technology to its fullest in a learner-centered environment, enables faculty to achieve their core teaching goals, and provides students with the capability to tap into the world-wide reservoir of social, economic, scientific, and political knowledge.

In this way, the Clipper Project has helped to clarify Lehigh's vision of online learning and to crystallize its role within the University. One member of the Library and Technology Services staff assigned to Clipper noted:

> *It's given us a vision of the possibilities for online learning. It's changed our distance education model from video delivery to learning objects. There is a much better atmosphere for innovation, thanks to Clipper.*

Conclusions

In conclusion, we believe that the undergraduate online Clipper courses developed for high school students under the Andrew W. Mellon Foundation's support have been highly effective for Lehigh University by

1) easing early-decision high school students' transition to college,
2) advancing the pedagogical methods of the faculty involved, and
3) helping the institution begin to think differently about how to support alternative models for teaching and learning.

As anticipated, we discovered that the gains to be realized in moving courses to an online delivery format are more likely to be found in the ways that the Web "democratizes" instruction and, in the case of the Clipper Project format, the extent to which offering college-level courses online helped prepare entering first-year students for college. Through Clipper, we have learned a great deal about this phase of the student's overall life-long learning cycle and how rapid academic and social adaptation to college leads to long-term success (see Bishop & White, 2004, 2005). In addition, Clipper provided participating faculty with an opportunity to learn how to design and develop instruction for online delivery –an approach that hadn't been explored systematically at Lehigh prior to the project's inception in 1999. More than that, however, Clipper became an opportunity to explore best practices for instructing in *any* medium.

We are in the final stages of dissemination and are exploring how to leverage what we have learned from Clipper into the regular offerings of the undergraduate curriculum. In essence, thanks to the support of the Andrew Mellon Foundation, we are now hard at work translating our research into best practices for Lehigh University.

Let's suppose for a moment that it's the 1930s. You're the captain of the luxury liner, the Queen Mary, steaming across the Atlantic to New York. Suddenly, you hear a low drone. You look up and see a Pan Am Clipper, winging its way from London to New York. Would you realize that the age of steamships is about to end? Would the steamship company understand that its business actually is transportation, not ships? Would the passengers guess that seats at the captain's table, strolls on the deck, steamship trunks, and days at sea are about to become a six hour-flight in row 17 – a window or aisle please, but not the middle?

-- April 9, 1999, President Gregory C. Farrington's inaugural address, Lehigh University

As the *Pan Am Clipper* helped to change the future of transportation, so too has Lehigh University's Clipper Project helped to change the future of teaching and learning –by exploring ways that Web-based courses can help higher education achieve its core teaching and learning goals. Specifically, this five-year research and development project explored the short- and long-term outcomes for *students*, *faculty*, and the *institution* offering Web-based, college-level courses to high school students who were selected for admission to the University under the early decision program.

The Need

The degree completion rate for those who enter college today is projected to be only 58%, with retention and graduation rates consistently lower for underrepresented minorities (Consortium for Student Retention Data Exchange, 2001; National Center for Education Statistics, 2000b; , 1995). So, even as increasing numbers of 18 to 22 year-olds enter higher education immediately after high school, it seems they encounter numerous academic, financial, and social barriers that are likely to prevent them from graduating within six years.

Barriers to Retention

An overwhelming barrier to retention appears to be insufficient academic preparation. A growing number of high school graduates are not prepared for the more rigorous academic workload of college and require remediation courses and programs. By 1995, virtually all public two-year institutions, 81 percent of public four-year institutions, and 63 percent of private four-year institutions offered remedial courses in reading, writing, or mathematics (National Center for Education Statistics, 2000c).

The financial cost of a college education is yet another barrier to completing a college degree. This problem will be compounded by the fact that colleges and universities will need classroom space for 1.6 million more students in just 10 years (National Center for Education Statistics, 2000b; Symonds, 2001). Tuition in both public and private institutions continues to rise faster than inflation –making the cost of obtaining a college education prohibitive for an increasing number of students (National Center for Education Statistics, 2000a, 2001). At the very least, rising tuition and a faltering economy forces many students to work longer hours at jobs and take fewer classes each semester, leading to an increase in the average time it takes students to complete their college degrees (ACT, 2001).

It appears that those who *are* able to overcome academic and financial barriers may still decide to leave college for social reasons. Treisman (1990) suggested that, to a large extent, retention is a function of the way students interact with each other and with the institution and the extent to which they feel "connected" to life on campus. Research shows that students who are not involved in campus organizations and activities are unlikely to be retained through graduation (Reisberg, 1999). In fact, a 2001 Consortium for Student Retention Data Exchange Report that examined drop-out rates over a six-year period made clear that it is the first several months of a student's collegiate experience that are the most critical for retention –more than half of those who left college before graduation did so in their freshman year, most during the holiday break between the fall and spring semesters (Consortium for Student Retention Data Exchange, 2001).

Richard Ferguson, President of ACT, contended that these trends indicate that it is not "business as usual" for college students (ACT, 2001). Robert T. Jones, CEO of the National Alliance of Business agreed and warned that the supply of students coming out of higher education will not meet the economy's demands over the next 10 years. According to the Advisory Committee on Student Financial Aid Assistance (2002), failure to act on the problems in higher education will rob the economy of high-skilled workers necessary to sustain economic growth and prosperity. A draft of the first Bush administration's strategic plan for improving accountability in higher education stated that "the public and many policy makers are especially concerned about the effectiveness of postsecondary institutions" in retaining students and graduating them "in a timely fashion." Plans called for states to begin using college graduation and retention rates as measures of performance and to require these rates be broken out by race, gender, and ethnicity, and whether the student received federal financial aid (Burd, 2001).

Web-based Technologies and the Productivity of Learning

Web-based instruction is viewed by many leaders as a potential solution to higher education's productivity problems; It has the dual potential to reduce faculty "costs" through archived, Web-based lectures while increasing enrollment "profits" by reaching a much larger audience of potential students. While this approach may make the institution more profitable for a time, it appears that the increased workload on faculty and staff may bring more than commensurate losses in higher education's real outputs –learning, research, and public service. Cost-cutting measures that have reduced salaries and/or the number of teaching professors have left many undergraduates in courses taught or "moderated" by inexperienced teaching assistants or substandard instructors. Consequently, those undergraduates who do finish their degrees appear to be increasingly ill equipped for information-economy jobs.

Instead, Johnstone (1992) argued, the productivity problems in higher education may stem not so much from excessive costs, but from insufficient and inefficient learning. He suggested that the imperative for higher education is to pay less attention to input-side productivity issues such as costs and enrollments and, instead, pay more attention to the output side –or the *productivity of learning*.

Learning is more productive when one masters a given body of knowledge or skills in less time and/or with less costly inputs. Thus, according to Johnstone (1992), academic productivity enhancements will come through methods that increase "throughput" (number and rate of students completing their education) while simultaneously maintaining or increasing educational quality. *This is where Web-based technologies may make the greatest impact in helping higher education achieve its core teaching and learning goals.* The challenge, argued Farrington and Yoshida, "is to separate the real progress from the razzle dazzle" (2000, p. 14).

Clipper I

Initially funded by The Andrew W. Mellon Foundation in 1999 as a two-year development project, Clipper I set out to explore the future of teaching and learning technologies by evaluating the costs and benefits associated with offering Web-based courses free of charge to high school seniors who had been admitted early to a medium-sized private residential university. Clipper I resulted in the development of five new, Web-based courses (Calculus I, Economics I, Chemistry I, English I, and Engineering I) and yielded preliminary data about student outcomes, faculty reactions, and the institutional issues that arise when traditional instruction is replaced with Web-based learning.

Results from the data analysis for the Clipper I courses revealed that students achieved at a level commensurate with those students who participated in on-campus sections of the course. Feedback from Clipper I students indicated that the overall experience was positive and that participation in the course favorably affected their academic skills. Although a higher percentage of students withdrew from the Web-based sections than from on-campus sections, the primary factor contributing to attrition appeared to be the challenge of finding time to participate in a college-level course while completing high school requirements and extra-curricular activities. (For a more detailed description of Clipper I results, please refer to the Interim Report submitted to The Andrew W. Mellon Foundation, October 2001.)

Clipper I produced new information on the effects of technology on early decision students, on faculty, and on academic institutions. However, while Clipper accomplished a great deal in two short years, it had only just begun to scratch the surface of discovering the effects of Web-based technologies on teaching and learning. With the course development phase completed and all the pieces in place for more in-depth and long-term analyses, The Clipper Project was well situated to continue its research into how Web-based technologies can help higher education achieve its core teaching and learning goals — goals, it seems, that are becoming increasingly difficult to meet.

Clipper II

With a second grant from the Andrew W. Mellon Foundation, Clipper II carried the study through an additional two and a half years. This additional funding allowed Lehigh University to complete three cycles for each of the five courses and increased the project's participant pool to a total of 451. In addition, we explored the reliability of Clipper I results and observed the long-term effects that these courses had on students, instructors, and the institution.

Thus, Clipper II built upon Clipper I by longitudinally exploring the educational, pedagogical, and logistical issues of Web-based learning through the extended study of offering online courses to early decision high school seniors. Therefore, in this final document we report the findings over the *entire* tenure of the Clipper Project, from 2000-2005.

Research Questions

The Clipper Project collected a great deal of data and identified many questions to examine. These questions fell into three broad categories: What are the short- and long-term outcomes of offering Web-based, college-level introductory courses to early decision, non-matriculated high school seniors 1) for the *students* who participate; 2) for *faculty* who develop the courses and teach them online; and 3) for the *institution* that offers Web-based courses to incoming high school seniors? Specifically we set out to determine the following:

Student Outcomes

Course results: as measured by course completion rates, final Clipper course grades, and grades for subsequent courses in content area.

1. Do online students generally do as well as their face-to-face counterparts? [F2F vs. all online (HSOnlyOnline and MixedOnline)]
2. Do high-school seniors generally do as well in college-level courses taken online as matriculated students do in the same course taken face-to-face? [F2F vs. all HS online (HSOnlyOnline and high school students in MixedOnline)]
3. Do high-school seniors taking college courses online do as well as their on-campus colleagues enrolled in the same online course? [All HS online (HSOnlyOnline and high school students in MixedOnline) vs. college students in MixedOnline]
4. Do high school students do better in online courses by themselves or mixed with college students? [HSOnlyOnline vs. high school students in MixedOnline]
5. Are some content areas easier to learn online than others? [F2F vs. all online (HSOnlyOnline and MixedOnline) among courses]
6. Do some students learn course content better from online courses than others? [All online (HSOnlyOnline and MixedOnline) across participant characteristics]
   i. Gender
   ii. Race
   iii. College of enrollment
   iv. Technical competence
   v. Task/ego orientation
   vi. Academic skills/enablers

Preparation for College Outcomes: as measured by 1st-semester GPA, SACQ subscales, and 4th-year follow-up survey where appropriate.

7. Are students who have taken a college-level course online prior to matriculation more prepared for college than those who have not? [All college students (F2F and college students in MixedOnline) vs. all HS and All HS vs. 1st-year F2F]
8. Are high school students who have taken a college-level course online with college students more prepared for college than those who took the same course by themselves? (HSOnlyOnline vs. high school students in MixedOnline)
9. Do some content areas taught online better prepare students for college than others? (HSOnlyOnline and high school students in MixedOnline among courses)

10. Do online courses better prepare some students than others? (HSOnlyOnline and high school students in MixedOnline across participant characteristics)
    i. Gender
    ii. Race
    iii. College of enrollment
    iv. Technical competence
    v. Task/ego orientation
    vi. Academic skills/enablers

Students' Assessment of Experience: as measured by the Survey of Course and Teaching Effectiveness.

11. How did Clipper students evaluate their online course?
12. How much time/effort did Clipper students report was required for their online course?
13. To what extent did Clipper students believe their academic and technology skills improved as a result of taking their online course?
14. Why did Clipper students drop their online course?

Faculty Outcomes

15. How did participating instructors compare their Clipper and face-to-face courses in terms of workload? social connectedness? outcomes?
16. What, if anything, did participating faculty take away from their Clipper course and adopt as part of their regular pedagogical style?

Institutional Outcomes

17. To what extent did Clipper courses increase the number of students who ultimately completed their Lehigh University degree?
18. In what ways did Lehigh have to adjust its standard procedures, policies, and cultures in order to accommodate the Clipper courses/students?

Research Design

The Clipper Project was designed to allow within- and between-group comparisons across time. In addition, the project used replication to test for cohort effects. As such, three instructional conditions were implemented across each of the five academic courses (English I, Calculus1, Engineering I, Chemistry I, and Economics I).

The first instructional condition reflected a "traditional" model of instructional delivery: on-campus, face-to-face instruction. The second instructional condition was a high school-only section of the same Web-based course. The third instructional condition was Web-based instruction for a "class" comprised of both early decision high school seniors and on-campus students. This latter condition provided an opportunity to assess Web-based instruction for students on campus, as well as to evaluate an instructional delivery model likely to be implemented in practice. This instructional condition also allowed for the exploration of possible non-academic outcomes, such as adjustment to college, which may result from high school seniors having the opportunity to interact with college students.

These instructional conditions provided the opportunity for between-group comparisons of student achievement, satisfaction, learning behavior, and long-term outcomes (such as course of study, cumulative GPA, and the like). Also, because the same instructors taught all three conditions within each content area (with the exception of the Engineering I course), the design allowed us to assess the impact of Web-based course development on instruction provided via the "traditional" method of face-to-face contact.

Instrumentation/Data Collected

Baseline Data

Prior to their participation in the Clipper courses, high school and on-campus student volunteers were asked to provide general background and demographic information as well as information about their academic and technical competence. This information included commonly reported academic competence/aptitude indicators such as high school GPA and SAT/ACT scores. Additionally, students provided a self-assessment of their skill, proficiency, and level of comfort with the use of specific technologies (such as email, discussion boards, word processing, and the like) via a standardized instrument created for the project. (See Appendix A1: *Background Information Survey*, below).

In addition to the demographic data survey, additional baseline data for this study were collected using the two instruments described in detail, below:

> *Academic Competence Evaluation Scales* (ACES) (DiPerna & Elliott, 2001; r =.94-.99). ACES is a 66-item instrument (α = .94) that asked participants to self-assess their academic skills (10 reading/writing items, α = .87; 10 mathematics/science items, α = .88; and 10 critical thinking items, α = .88) and academic enablers (8 interpersonal skills items, α = .75; 8 engagement items α = .83; 10 motivation items α = .85, and 10 study skills items, α = .84). Participants considered their academic skills like "reading comprehension," "mental math," and "critical thinking" and rated them in comparison to their peers' along a 5-point Likert scale (1 = "far below" to 5 = "far above"). Participants then rated academic enablers along a different 5-point scale according to how often they believed statements like "I critically evaluate my own work," "I take notes in class," and "I am relaxed during exams" described them (1= "never" to 5 = "almost always"). (See Appendix A3: *Academic Competence Evaluation Scales*, below).

Perceptions of Learning Success Questionnaire (PLSQ). Adapted from Duda and Nicholls' (1992) Task and Ego Orientation in Sport Questionnaire, this 13-item instrument (α = .74) was employed to measure individual differences in achievement motivation. The PLSQ consisted of two subscales: Task Orientation (7 items; α = .81) and Ego Orientation (6 items; α = .75). Participants responded to the stem "I feel most successful as a student when…" Responses on the PLSQ were recorded on a 5-point Likert scale (5 = "strongly agree" to 1 = "strongly disagree"). Examples of task orientation items included "I learn something new and it makes me want to work harder in class" and "I learn something in class that is enjoyable and this makes me try harder." Examples of ego orientation items included "I'm the only one who can learn the material presented in class" and "I do better than the other students in the class." (See Appendix A2: *Perceptions of Learning Success Questionnaire*, below).

Course results Data

In addition to collecting students' final course grades and tracking withdrawal rates, all students who participated in the online sections were asked to evaluate the course and their experiences using one of the two instruments described below:

Survey of Course and Teaching Effectiveness (SCTE). This 98-item, Web-based survey (α = .96) asked the online students to rate the frequency of instructional strategies used, the support they received, the extent to which their academic and technical skills changed, the amount of time and effort necessary to succeed in the course, and the course overall. The survey began by asking students to rate on a 5-point Likert scale (1=never, 2=seldom, 3=sometimes, 4=often, 5=almost always) how often the instructor used various instructional delivery strategies (19 items, α = .91), assessment/feedback strategies (11 items, α = .91), and teacher/student interaction strategies (7 items, α = .89). Students also rated the extent to which they believed their academic skills had changed as a result of taking the course (8 items, α = .85, 1=significantly decreased, 2=decreased, 3=remained the same, 4=improved, 5=significantly improved) and, using the same items and scale as the one used prior to taking the Clipper course (1=very low, 2=low, 3=moderate, 4=high, 5=very high), reassessed their proficiency with technology and comfort level with technology (16 items, α = .93). As part of the end-of-course survey we also asked students to assess the helpfulness (1=very unhelpful, 2=unhelpful, 3=somewhat helpful, 4=very helpful) and ease of use (1=very difficult, 2= difficult, 3=somewhat easy, 4=very easy) of supportive services (10 items, α = .85) and supportive technologies (12 items, α = .87). The survey asked students to report the amount of time they spent per week on the course (2 items, α = .87, 1=Less than 5 hours, 2=Five to 10 hours, 3=Eleven to 15 hours, 4=Sixteen to 20 hours, 5=More than 20 hours) and the amount of effort they put into the course (2 items, α = .80, 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high) and supply an overall evaluation of the course (6 items, α =.83). (See Appendix A4: *Survey of Course and Teaching Effectiveness*, below).

Drop Survey. All students who withdrew from an online section of a Clipper course were emailed a 7-item, open-ended survey that asked qualitative questions about their decisions to enroll and withdraw such as "Why were you originally interested in the Clipper course?" and "What factors led to your decision to drop the course?" (See Appendix A5: *Drop Survey*, below).

Student Adaptation to College Data

To assess the effect Clipper courses might have on high school students' subsequent academic and social adjustment to college, the researchers collected first-semester GPAs and administered the *Student Adaptation to College Questionnaire* in the 6th week of participants' first semester, described below:

> *Student Adaptation to College Questionnaire* (SACQ) (Baker & Siryk, 1999; r=.92-.95). Designed to measure students' multifaceted adjustment to college, this 67-item Likert-style questionnaire (α = .94) measured four subscales: Academic Adjustment (24 items; α = .87), Social Adjustment (20 items; α = .90), Personal-emotional Adjustment (15 items; α = .83), and Institutional Attachment (15 items; α = .88). Participants responded to statements such as "I feel that I fit in well as part of the college environment," "I am very involved with social activities in college," and "My appetite has been good lately" by rating the extent to which they believed each applied to them along a 9-point Likert scale (9 = "applies very closely to me" to 1 = "doesn't apply to me at all"). (See Appendix A6: *Student Adaptation to College Questionnaire*, below).

Long-term Student Outcomes Data

Long-term student outcomes data collected included grades for the subsequent course in the content area of the Clipper course in which the student participated. The researchers also collected data on students who dropped out of college prior to degree completion. In addition, senior-year follow-up questionnaires are being distributed to participants in order to assess their own perceptions of the long-term impact of participation in the Web-based courses. (See Appendix A7: *Senior Year Follow-up Survey*, below).

Faculty and Institutional Outcomes Data

The same five faculty served as instructors for the project. Faculty incentives included honoraria for time spent initially developing and maintaining the courses and increased opportunities for research and scholarship. To assess faculty outcomes –such as increased competence in the use of instructional technology, incorporation of technology-based instructional methods in other courses, and changes in pedagogical styles– the researchers conducted interviews and distributed questionnaires at end of each academic year that asked faculty to reflect on their experiences and compare the online course they designed to their traditional courses. (See Appendix A8: *End-of-Semester Clipper Faculty Questionnaire*, below).

To preserve data on procedure, policy, and cultural changes that have occurred within the institution as a result of the Clipper Project, all meetings over the four years of the project were recorded and transcribed. In addition, the Co-PIs maintained a detailed log of various interactions and correspondences that occurred over the course of the project.

Project Timeline

As discussed, the Clipper Project research design involved two instructional situations: 1) a traditional, face-to-face equivalent of the Web-based section that was offered in the Fall semester and available only to on-campus students and 2) a Web-based section of each course that was offered in the Spring semester and, depending upon the instructor's preference, either available to both on-campus and high-school students or available only to high school students. Table 2 illustrates the schedule for each of the instructional conditions for each course.

Table 2: Course schedule for each academic year during the Clipper Project.

Instructional Condition	Year 1 2000-2001		Year 2 2001-2002		Year 3 2002-2003		Year 4 2003-2004		2004-2005
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
F2F	Economics Calculus		Economics Calculus English Chemistry Engineering		Economics Calculus English Chemistry Engineering		English Chemistry Engineering		FINAL FOLLOW-UP
HSOnlyOnline		Economics Calculus		English		English Calculus		English	
MixedOnline		Economics Calculus		Economics Calculus Chemistry Engineering		Economics Chemistry Engineering		Chemistry Engineering	

The online courses envisioned at the beginning of the Clipper project did not exist and had to be developed as part of the grant. To accomplish this, each faculty member was assigned an instructional technology consultant from within the university's Library and Technology Services department. This consultant served as the "point-of-contact" between the instructor and the technical and support personnel to form a course development team. During each course's three-year cycle over the 4 years of the project, this team worked together to develop the online course from its initial conception to the final version. As can be seen in Table 1, the first two online courses to be developed and offered in Year 1 were Economics and Calculus. Those courses ran through Year 3 of the project. English, Chemistry, and Engineering were developed and offered for the first time in Year 2 and ran through Year 4.

Student Participants

In all, 451 students participated in Clipper over the four years of the project. High school participants (*n* = 293) were solicited through informational brochures sent to seniors who were admitted to the University in December under the early decision program. Information describing the project also was disseminated via the project Website (http://clipper.lehigh.edu). College student participants (*n* = 158) were solicited through a variety of means, including information shared with faculty advisors and emails distributed to all students registered in the traditional versions of the Clipper courses offered. Student incentives for continued participation in the project included gift certificates to the University bookstore and lotteries for larger items. Tables 3 and 4 summarize the number of participants by course and by year.

Table 3: Number of Clipper participants for each course organized by instructional condition and participant type.

			Participant type		
			College student	High school student	Total
Calculus	Instructional condition	F2F	19	--	19
		HSOnlyOnline	--	72	72
		MixedOnline	3	16	19
	Subtotal		**22**	**88**	**110**
Chemistry	Instructional condition	F2F	22	--	22
		HSOnlyOnline	--	--	--
		MixedOnline	15	30	45
	Subtotal		**37**	**30**	**67**
Economics	Instructional condition	F2F	34	--	34
		HSOnlyOnline	--	64	64
		MixedOnline	3	19	22
	Subtotal		**37**	**83**	**120**
English	Instructional condition	F2F	19	--	19
		HSOnlyOnline	--	64	64
		MixedOnline	--	--	--
	Subtotal		**19**	**64**	**83**
Engineering	Instructional condition	F2F	17	--	17
		HSOnlyOnline	--	--	--
		MixedOnline	26	28	54
	Subtotal		**43**	**28**	**71**
	TOTAL		**158**	**293**	**451**

Table 4: Number of Clipper participants for each year organized by instructional condition and participant type.

			Participant type		
			College student	High school student	Total
2000-2001	Instructional condition	F2F	15	--	15
		HSOnlyOnline	--	48	48
		MixedOnline	6	35	41
	Subtotal		**21**	**83**	**104**
2001-2002	Instructional condition	F2F	31	--	31
		HSOnlyOnline	--	64	64
		MixedOnline	15	12	27
	Subtotal		**46**	**76**	**122**
2002-2003	Instructional condition	F2F	38	--	38
		HSOnlyOnline	--	61	61
		MixedOnline	16	18	64
	Subtotal		**54**	**79**	**133**
2003-2004	Instructional condition	F2F	27	--	27
		HSOnlyOnline	--	28	28
		MixedOnline	10	27	37
	Subtotal		**37**	**55**	**92**
	TOTAL		**158**	**293**	**451**

Table 5: Background information on Clipper participants as compared to the entering first-year classes (for the same 4-year period, Fall 2000-Fall 2003).

		F2F		All Online		Total		Entering 1st year students
		n	%	*n*	%	*n*	%	%
Gender	Male	66	59	204	60	270	60	60
	Female	45	41	136	40	181	40	40
	Total	111	100	340	100	451	100	100
Race	Non-white and Hispanic	11	10	52	15	63	14	24
	White, non-Hispanic	53	48	256	75	309	69	76
	No response to item	47	42	32	9	76	17	--
	Total	111	100	340	100	451	100	100
College of enrollment	Arts and Sciences	33	30	118	35	151	33	42
	Business & Economics	20	18	82	24	102	23	22
	Engineering	57	51	131	39	188	42	33
	No response to item	1	1	9	2	10	2	3*
	Total	111	100	340	100	451	100	100
High school location	Urban	15	13	39	11	54	12	--
	Suburban	73	66	241	71	314	70	--
	Rural	22	20	47	14	69	15	--
	No response to item	1	1	13	4	14	3	
		111	100	340	100	451	100	--
AP Courses	Took none	13	12	47	14	60	13	--
	Took at least 1	98	88	284	84	382	85	--
	No response to item	0	0	9	2	9	2	
		111	100	340	100	451	100	--

*Three percent of the entering 1st-year students overall enrolled in cross-disciplinary programs unaccounted for in the Clipper instrument.

We collected background demographic data on all participants to ensure differences found later were not due to errors in sampling. Table 5 summarizes the background data collected from F2F and all online students (HSOnlyOnline and MixedOnline) prior to their participation in Clipper as compared to the entering first-year classes for the same 4-year period. Clipper students were fairly evenly divided between male (60%) and female (40%) and, not surprisingly given the university's history, the largest college of enrollment was engineering (42%). And, consistent with the general university population, a majority of the participating students who responded to the item on race reported that they were white, non-Hispanic (69%). Chi-square tests on gender [$X^2(1, N = 451) = .00, p = 1.00$)], race [$X^2(1, N = 372) = .00\ p = 1.00$)], college of enrollment [$X^2(2, N = 441) = 5.22, p = .073$)], location of high school [$X^2(2, N = 437) = 2.46, p = .29$)], and AP courses taken [$X^2(2, N = 442) = .252, p = .62$)], indicated there was no significant difference between the online and F2F student groups on these demographic variables.

However, as shown in Table 6, F2F students had higher SAT mean scores. Independent-samples t-tests revealed that the F2F students' verbal SAT [$t(440) = 6.50, p < .0005$ (2-tailed)], math SAT [$t(440) = 6.85, p < .0005$ (2-tailed)] and total SAT scores [$t(440) = 8.44, p < .0005$ (2-tailed)] were significantly higher than the online students' scores and the magnitude of the eta squared differences in the means were moderate to large (verbal = .09; math = .10; total = .14).

Table 6: Clipper participants' verbal and math SAT scores.

	F2F or All Online					
	F2F			All Online		
	M	*SD*	*n*	*M*	*SD*	*n*
SAT Verbal	644	57	109	601	61	333
SAT Math	698	59	109	653	59	333
SAT Total	1342	94	109	1254	94	333

These data are not particularly surprising given that the F2F students were recruited volunteers and there is a good deal of accumulated research indicating that, as a group, volunteers for human subject research tend to be more intelligent than the general population as measured by standardized tests like the SAT (Rosenthal & Rosnow, 1975). The possibility that this was the case with our F2F volunteers appears to be corroborated by comparisons in Table 7 of the 25th and 75th percentile SAT data among the Clipper participants and the corresponding entering class for that year. Nonetheless, the fact that the F2F students did so much better on a reliable measure of scholastic aptitude means that comparisons between the F2F and online groups will need to be interpreted with some caution.

Table 7: SAT 25th and 75th percentiles by year for entering first-year students compared to Clipper participants.

				Clipper participants			
		Entering 1st-year Students		F2F		All Online	
		25th Percentile	75th Percentile	25th Percentile	75th Percentile	25th Percentile	75th Percentile
2000-2001	Verbal	569	662	628	690	570	640
	Math	614	703	645	733	610	680
2001-2002	Verbal	590	660	610	700	540	640
	Math	620	710	660	740	620	700
2002-2003	Verbal	580	660	640	730	570	640
	Math	630	710	640	740	610	690
2003-2004	Verbal	590	670	590	690	570	660
	Math	630	710	670	770	593	720

Table 8 supplies data on participants' total SAT scores by the Clipper course taken and delivery type (F2F versus online). A two-way between-groups analysis of variance (2-way ANOVA) was conducted to explore the possibility of significant differences in SAT scores between Clipper course taken and delivery type. There was a statistically significant main effect for course taken [$F(4, 432) = 5.99, p = .000$, eta squared = .05] and for delivery type [$F(1, 432) = 64.45, p = .000$, eta squared = .13], however the interaction effect [$F(4,432) = 1.74, p = .14$] did not reach statistical significance. Post-hoc comparisons using the Tukey HSD test indicated that the mean total SAT score for Engineering ($M = 1391$, $SD = 84$) was significantly higher than all three other courses and that Chemistry ($M = 1333$, $SD = 95$) was significantly higher than English ($M = 1290$, $SD = 103$).

Table 8: Participants' total SAT scores by Clipper course taken.

	F2F or All Online					
	F2F			All Online		
	M	*SD*	*n*	*M*	*SD*	*n*
Calculus	1335	74	19	1257	83	90
Chemistry	1333	95	22	1278	104	44
Economics	1356	91	32	1232	83	85
Engineering	1391	84	17	1295	104	53
English	1290	103	19	1227	93	61

As a second measure of scholastic aptitude, students in this study also self-assessed their academic skills (reading/writing $\alpha = .87$; mathematics/science $\alpha = .88$; and critical thinking $\alpha = .88$) and academic enablers (interpersonal $\alpha = .75$; engagement $\alpha = .83$; motivation $\alpha = .85$, and study skills $\alpha = .84$) using the Academic Competence Evaluation Scales, a nationally-normed, standardized self-report instrument for college students (r =.94-.99; DiPerna & Elliott, 2001; $\alpha = .94$). As shown in Table 9, all group mean scores fell in the mid- to high- "competent" range, indicating that these students' reported performance as a group on each indicator was at or slightly above grade-level expectations. In addition, *t*-tests indicated there was no significant difference between the two groups on any of the indicators.

Table 9. Academic Competence Evaluation Scale (ACES) scores for Clipper participants.

	F2F		All Online									
	M	*SD*	*M*	*SD*	90% CI	Developing	Competent	Advanced	Decile	*t*	*df*	*p**
Academic Skills												
Total Scale	114	14.1	115	14.5	±5	30-90	90-120	120+	6	-.108	364	.914
Reading/Writing	38	5.7	38	5.3	±3	10-30	30-40	40+	6	-.018	363	.985
Mathematics/Science	39	6.0	39	5.4	±3	10-30	30-40	40+	7	-.258	360	.796
Critical Thinking	38	5.0	39	5.2	±3	10-30	30-40	40+	6	-.758	363	.449
	M	*SD*	*M*	*SD*	90% CI	Developing	Competent	Advanced	Decile	*t*	*df*	*p**
Academic Enablers												
Total Scale	149	14.9	152	14.7	±7	36-130	130-167	167+	5	-1.584	365	.114
Interpersonal	33	3.7	34	3.5	±3	8-28	28-38	38+	5	-1.727	365	.085
Engagement	31	4.9	32	5.0	±4	8-24	24-37	37+	5	-1.709	365	.088
Motivation	42	5.3	43	4.9	±3	10-36	36-48	48+	5	-1.127	365	.260
Study Skills	43	5.2	43	5.1	±3	10-35	35-49	49+	5	-.594	365	.553

*2-tailed

Prior to their participation in the Clipper course, students also were asked to self-assess their technology skills. Students filled-out a 16-item questionnaire ($\alpha = .92$) with 8 items on their proficiency with technology ($\alpha = .86$) and 8 items on their comfort level with technology ($\alpha = .84$). Table 10 illustrates that participants in each group reported moderate to high technology skills (proficiency and comfort). Although the online students did report being somewhat more comfortable with technology, there were no statistically significant differences between the online and F2F groups in the mean proficiency with technology score [$t(440) = -.194$, $p = .846$ (2-tailed)] or the mean comfort-level with technology score [$t(438) = -1.96$, $p = .051$ (2-tailed)].

Table 10: Clipper participants' reported technology skills.

	F2F or All Online					
	F2F			All Online		
	M	*SD*	*n*	*M*	*SD*	*n*
Beginning proficiency with technology*	3.70	.64	111	3.71	.63	331
Beginning comfort with technology*	3.70	.70	110	3.84	.64	330

*1=very low, 2=low, 3=mod, 4=high, 5=very high

Table 11. Online Clipper course taken by college of enrollment.

	College of Enrollment						
	Arts and Sciences		Business & Economics		Engineering		
Clipper course taken	*n*	%	*n*	%	*n*	%	Total
Calculus	37	41.1	26	28.9	27	30.0	90
Chemistry	14	31.1	2	4.4	29	64.4	45
Economics	26	31.0	38	45.2	20	23.8	84
Engineering	11	21.6	0	0.0	40	78.4	51
English	30	49.2	16	26.2	15	24.6	61
Total	118	35.6	82	24.8	131	39.6	331*

* College of enrollment data were not available for 9 of the 340 students who took online Clipper course sections.

Table 11 provides data on Clipper online students' college of enrollment choices. (While entering students must declare a college of enrollment, Lehigh does not require them to select a major until after their first year.) The majority of Clipper students were enrolled in the College of Engineering and the highest overlap between Clipper course taken and college of enrollment was engineering at 78.4%. At 64.4%, College of Engineering students also made up a majority of the students enrolled in the Clipper Chemistry course. Beyond that, students generally chose a Clipper course that fell within their college of enrollment --with the exception of the engineering students who were somewhat more widely distributed, likely due to the fact that all 5 courses are requirements for engineering majors.

Data Analyses

The researchers used both quantitative and qualitative methods to analyze the data gathered. Quantitative analyses included chi-square tests, within and between-subjects *t*-tests and one- and two-way analyses of variance with and without covariates (ANOVA and ANCOVA), and repeated measures multivariate analysis of variance (MANOVA) using student's background characteristics, academic skills and enablers, goal orientation, course grades, first-semester GPAs, questionnaire responses, reported learning behaviors, and course evaluations as dependent variables. Qualitative methods that were used to analyze data collected via faculty journals, logs, classroom observations and transcripts from meetings. Grounded theory was used to identify themes from the qualitative data, produce rich descriptions, and categorize concepts that emerged from the data. In addition, a case study methodology was used to explore emerging concepts and processes relevant to the study, and to assess the overall costs and benefits of each course individually and the Clipper Project as a whole.

The findings reported here are organized according to the questions identified in the "Research Questions" section of this document, above. In each section we first report the data, then supply a summary discussion of those findings.

Student Outcomes

Course Results: Completion Rates

Table 12 provides general summary data on course completion rates for all online and F2F students by participant type and instructional condition.

Table 12: Course completion rates by participant type and instructional condition.

			Completed		Dropped		
Participant type	Instructional condition		*n*	%	*n*	%	Total
College student	F2F		108	97	3	3	111
	HSOnlyOnline		--	--	--	--	--
	MixedOnline		44	94	3	6	47
		Total	152	96	6	4	158
High school student	F2F		--	--	--	--	--
	HSOnlyOnline		99	49	102	51	201
	MixedOnline		56	61	36	39	92
		Total	155	53	138	47	293

1. F2F vs. all online (HSOnlyOnline and MixedOnline): A chi-square test comparing F2F and all online student course completion rates revealed that the overall percentage of high school and college students who dropped online sections of the courses (41.5%) was significantly higher than the percentage of those who dropped the traditional, F2F sections of the courses (2.7%) [$X^2(1, 307) = 56.1$, $p < .001$)].

2. F2F vs. all HS online (HSOnlyOnline and high school students in MixedOnline): Comparing only all high-school seniors' online course completion rates (53%) to their traditional F2F course counterparts (97%) revealed that the high-school students (both HSOnlyOnline and high school students in MixedOnline conditions) withdrew from their online courses in significantly higher numbers [$X^2(1, 404) = 67.90$, $p = .000$)].

3. All HS online (HSOnlyOnline and high school students in MixedOnline) vs. College online (college students in MixedOnline): We also compared course retention rates for all high-school seniors (HSOnlyOnline and high school students in MixedOnline) to on-campus students enrolled in the same online course and found that the high-school students withdrew in significantly higher numbers (98%) than their on-campus classmates (2%) [$X^2(1, 340) = 26.01$, $p = .000$)].

4. HSOnlyOnline vs. high school students in MixedOnline: While there was a larger percentage of drops among the high school students enrolled in "high-school only" sections (51%) as compared to the high school students enrolled in the "mixed" sections (39%), the difference was not significant at the $p < .05$ level [$X^2(1, 293) = 2.97$, $p = .085$ (2-sided)].

5. F2F vs. all online (HSOnlyOnline and MixedOnline) among courses: Table 13 provides completion rates for F2F and all online students organized by course. There was a significant difference among courses in online students' course completion rates [$X^2(4, 340) = 23.67$, $p = .000$ (2-sided)], with the highest percentage of withdrawals occurring in the Calculus course and the lowest percentage of withdrawals occurring in the Engineering course. Chi-square comparisons with Yates Correction for

Continuity (for 2 by 2 table) of F2F and online students' completion rates by course revealed significant differences in course dropout rates for calculus [$X^2(1, 110) = 12.47$, $p = .000$ (2-sided)], chemistry [$X^2(1, 67) = 6.15$, $p = .013$ (2-sided)], economics [$X^2(1, 120) = 11.36$, $p = .001$ (2-sided)], and English, [$X^2(1, 83) = 13.42$, $p = .000$ (2-sided)], but not engineering [$X^2(1, 71) = 3.53$, $p = .060$ (2-sided)].

Table 13: F2F and all online student completion rates by course.

	F2F				All Online			
	Completed		Dropped		Completed		Dropped	
Clipper course taken	*n*	%	*n*	%	*N*	%	*n*	%
Calculus	17	89.5	2	10.5	38	41.8	53	58.2
Chemistry	22	100.0	0	0	32	71.1	13	28.9
Economics	33	97.1	1	2.9	56	65.1	30	34.9
Engineering	17	100.0	0	0	41	75.9	13	24.1
English	19	100.0	0	0	32	50.0	32	50.0
Total	108	97.3	3	2.7	199	58.5	141	41.5

Table 14: Online student completion rates by categorical participant characteristics.

		Completed		Dropped		
Participant characteristic		*n*	%	*n*	%	Total
Gender	Male	141	69.1	63	30.9	204
	Female	58	42.6	78	57.4	136
Race	White, non-Hispanic	157	61.3	99	38.7	256
	Non-white, Hispanic	33	63.5	19	36.5	52
College of Enrollment	Arts and Sciences	53	44.9	65	55.1	118
	Business and Economics	46	56.1	36	43.9	82
	Engineering	98	74.8	33	25.2	131

6. All online (HSOnlyOnline and MixedOnline) across participant characteristics: Table 14 breaks down course completion rates by categorical participant characteristics such as gender, race, and college of enrollment.

i. *Gender*: The percentage of female students who dropped their online course ($n = 78$ or 57.4%) was significantly higher than the percentage of male students who dropped ($n = 63$ or 30.9%) [$X^2(1, 340) = 22.48$, $p = .000$)].

ii. *Race*: Completion rates by race differences were not significant [$X^2(1, 308) = .017$, $p = .895$)].

iii. *College of Enrollment:* There was also a significant difference in course completion rates among students' college of enrollment [$X^2(2, 331) = 23.55$, $p = .000$)].

Table 15: Online student completion rates by continuous participant characteristics.

		Completed			Dropped		
Participant Characteristic		*n*	*M*	*SD*	*n*	*M*	*SD*
Technology Skills	Beginning proficiency with technology	197	3.78	.66	134	3.61	.58
	Beginning comfort with technology	196	3.91	.65	134	3.75	.62
Goal Orientation	Ego subscale	90	3.13	.65	62	3.05	.69
	Task subscale	90	4.12	.57	62	4.18	.50
Academic Skills	Reading/Writing Skills	194	37.19	5.21	94	38.29	5.51
	Mathematics/Science Skills	192	39.12	5.36	93	38.63	5.34
	Critical Thinking Skills	194	38.24	5.26	94	39.32	4.96
	Interpersonal Skills	194	33.72	3.66	96	34.11	3.23
	Academic Skills Subtotal	194	114.38	13.60	95	115.05	16.25
Academic Enablers	Engagement	194	31.55	4.96	96	33.34	4.91
	Motivation	194	42.51	5.09	96	42.75	4.50
	Study Skills	194	42.92	5.23	96	44.41	4.58
	Academic Enablers Subtotal	194	150.71	14.91	96	154.61	13.85

Table 15 provides online course completion data organized by continuous student characteristics such as beginning technology skills, goal orientation, academic skills, and academic enablers as measured by the self-assessment instruments discussed above.

i. *Technical competence*: Independent samples *t*-tests revealed that completers had significantly higher beginning proficiency with technology scores [$t(329) = 2.41$, $p = .017$ (2-tailed)] and beginning comfort with technology scores [$t(328) = 2.26$, $p = .024$ (2-tailed)] than non-completers.

ii. *Task/ego orientation*: While completers did score slightly higher on the ego subscale and slightly lower on the task subscale than non-completers, differences in goal orientations did not reach statistical significance.

iii. *Academic skills/enablers*: Contrary to what one might expect, non-completers scored significantly higher on engagement [$t(288) = -2.91$, $p = .004$ (2-tailed), eta squared = .03], study skills [$t(288) = -2.37$, $p = .019$ (2-tailed) , eta squared = .02], and academic enablers overall [$t(288) = -2.15$, $p = .032$ (2-tailed), eta squared = .02]. As can be seen in the eta squared scores, however, the magnitude of the differences in the means was relatively small for each. Differences in academic skills did not reach statistical significance.

Completion Rates Discussion

Online course withdrawal rates reported in the literature over the last 10 years vary considerably –ranging anywhere from 15%-80%. However, from anecdotal evidence and studies by individual institutions it does appear that more online students withdraw than do their F2F counterparts (Carr, 2000; Phipps & Merisotis, 1999) and that those dropout rates seem to be close to around 30% (Hill, Han, & Raven, 2001; O'Connor, Sceiford, Wang, Foucar-Szocki, & Griffin, 2003). Thus, while online Clipper students did drop their course in significantly higher numbers than the F2F group, the project's overall 41.5% withdrawal rate was only somewhat higher than typical among other institutions offering Web-based courses.

Further, it should be noted that Clipper's online course withdrawal rate was fueled almost entirely by the high school students, who dropped in substantially higher numbers (98%) than their college student classmates (2%). There are two likely explanations for this attrition. First, according to the 61 non-completing high school students who responded to the *Drop Survey*, the primary factor leading to their decision to withdraw was the challenge of finding time to participate in a college-level course while also completing high school requirements and engaging in spring-semester senior year extra-curricular activities (Table 56, below). Second, the fact that the Clipper courses were offered to the high school students free of charge meant that, unlike their college student colleagues, there was no financial commitment that might have made them feel more obligated to finish.

Variations in online completion rates among the courses and among the colleges of enrollment is likely to have been influenced to some extent by whether the course was a requirement for the student's intended major. With the highest and second highest online course completion rates respectively, Engineering I (75.9% completed) and Chemistry I (71.1% completed) are both requirements for engineering majors and, as illustrated above in Table 11, both courses were filled primarily by students enrolled in the College of Engineering (78.4% in Engineering I and 64.4% in Chemistry I). While Calculus I is also an engineering requirement, far fewer engineering students enrolled in this Clipper course (30.0%), probably because so many who enroll in the College of Engineering have already taken Calculus I as an Advanced Placement course. Economics I is a requirement of majors in both the

College of Engineering (23.8% of the online economics students) and the College of Business and Economics (45.2% of the online economics students), which likely explains its third highest online completion rate of 65.1%.

The "required course/higher persistence" hypothesis begins to break down, however, as we consider the relatively low online course completion rates (50%) for English I --a Lehigh University general requirement for all students. It may be that one factor in online course persistence was not that the course was required, but rather that students taking a course in their major were more likely to be comfortable with and interested in the course content. While plausible, this is a hypothesis that needs further research.

Female Clipper students dropped their online course in significantly higher numbers than their male classmates. One possible explanation is that female students were less comfortable than male students with the technology and/or the lack of social connectedness in the online learning environment. Further analyses of the qualitative data collected in this study may support that hypothesis. However, when we consider the gender distribution of online students across the courses (Table 16), another possible explanation emerges. The three courses with the highest percentages of male students were, once again, Engineering (85.2%), Chemistry (68.9%), and Economics (57.0%). Thus, if our earlier hypothesis about persistence and course interest holds true, the significantly higher completion rate among male students may also be explained, at least in part, by the fact that more of the male students were taking requirements in their major.

Table 16: Online students' gender breakdown by course.

		Male		Female		
		#	%	#	%	Total
Clipper course taken	Calculus	47	51.6	44	48.4	91
	Chemistry	31	68.9	14	31.1	45
	Economics	49	57.0	37	43.0	86
	Engineering	46	85.2	8	14.8	54
	English	31	48.4	33	51.6	64
Total		204	60.0	136	40.0	340

As might be expected, online course completers reported significantly higher levels of proficiency and comfort with technology than non-completers and there is evidence to suggest that some Clipper students dropped their course due to technical difficulties they had (see Table 56, below). Here again, however, there is some question about whether persistence can be predicted only by beginning technology skills. While male online students' technology proficiency [$t(329) = 4.12$, $p = .000$ (2-tailed), eta squared = .05] and comfort [$t(328) = 4.62$, $p = .000$ (2-tailed), eta squared = .06] were significantly higher than females' (Table 17), a one-way ANOVA to explore differences in online students' reported technology skills among Clipper course taken yielded no significant differences (Table 18). Given that significantly more engineering students completed their online course, if beginning technology skills had a substantial bearing on online students' persistence we might have expected to see significant differences in technical proficiency/comfort for course taken as well as for gender. Instead, it appears that the significant difference in completers and non-completers' technology skills can most likely be explained by the gender covariate.

Table 17: Online students' technology proficiency/comfort scores by gender.

	Male			Female		
	n	*M*	*SD*	*n*	*M*	*SD*
Beginning proficiency with technology	199	3.83	.629	132	3.54	.603
Beginning comfort with technology	198	3.97	.614	132	3.65	.633

Table 18: Online students' technology proficiency/comfort scores by course taken.

	Beginning proficiency with technology			Beginning comfort with technology		
	n	*M*	*SD*	*n*	*M*	*SD*
Calculus	90	3.649	.624	90	3.74	.647
Chemistry	45	3.81	.621	45	3.93	.679
Economics	84	3.66	.641	83	3.85	.630
Engineering	51	3.93	.711	51	4.04	.636
English	61	3.63	.541	61	3.74	.588

Thus, while Clipper students withdrew from their online course in high numbers, the project's overall 41.5% drop rate was only somewhat higher than typical for online courses –and likely caused by the timing and administrative structure of the project rather than students' dissatisfaction with the course. Additionally, significant differences in the characteristics of completers and non-completers appear to be best explained by the extent to which the course taken aligned with students' intended major and/or interests. Further analyses and discussion of these course completion data are needed and will be addressed in manuscript #11, tentatively titled "Characteristics of the 'successful' online student" (see Table 58: Clipper Project Research dissemination plan, below).

Course Results: Final Grades

Table 19 provides general summary data on final grade mean scores for all online and F2F students by participant type and instructional condition.

Table 19: Final grade mean scores by participant type and instructional condition.

Participant type	Instructional condition		*n*	*M*	*SD*
College student	F2F		108	3.23	.76
	HSOnlyOnline		--	--	--
	MixedOnline		44	2.92	1.11
		Total	152	3.15	.88
High school student	F2F		--	--	--
	HSOnlyOnline		99	3.25	.80
	MixedOnline		56	2.95	1.13
		Total	155	3.14	.94

1. F2F vs. all online (HSOnlyOnline and MixedOnline): Overall, mean course scores were higher for F2F students (n = 108, M = 3.23, SD = .76) than for online students (n = 199, M = 3.09, SD = .98). While the variances between the F2F and online students' final course grades were not equivalent according to Levene's test [$F(305) = 6.42$, $p = .012$], an independent-samples t-test for equality of means (equal variances not assumed) indicated that the difference between mean scores for students who completed the Web-based sections of the courses and those students who participated in on-campus sections of the same courses was not significant [$t(270) = 1.44$, $p = .15$ (2-tailed)].

2. F2F vs. all HS online (HSOnlyOnline and high school students in MixedOnline): F2F students' mean course scores (n = 108, M = 3.23, SD = .76) were also higher than online high school students (n = 155, M = 3.14, SD = .94). An independent-samples t-test revealed the difference was not significant, however [$t(261) = .895$, $p = .372$ (2-tailed)].

3. All HS online (HSOnlyOnline and high school students in MixedOnline) vs. college online (college students in MixedOnline): When compared to their on-campus online course classmates (n = 44, M = 2.93, SD = 1.11), high school online students' mean course scores were higher (n = 155, M = 3.14, SD = .94). This difference did not reach statistical significance, however [$t(61.64) = -1.16$, p = .250 (2-tailed)].

4. HSOnlyOnline vs. high school students in MixedOnline: With equal variances not assumed [$F(155) = 7.89$, $p = .006$], a *t*-test conducted to compare mean course grades between students in a "high school only" section ($n = 99$, $M = 3.25$, $SD = .80$) versus high school in a "mixed" section ($n = 56$, $M = 2.95$, $SD = 1.13$) found no statistically significant difference between the two groups.

5. F2F vs. all online (HSOnlyOnline and MixedOnline) vs. among courses: Table 20 compares mean scores for F2F and all online students across courses. Separate independent samples *t*-tests by course revealed that mean course grades differed significantly only between F2F ($M = 3.73$, $SD = .39$) and online [$M = 3.33$, $SD = .94$; $t(56) = 2.24$, $p = .03$] engineering students. The magnitude of the difference in the engineering students' means was moderately large (eta squared = .082).

Table 20: F2F and online student final grade mean scores by course.

	F2F			All Online			Total					
Clipper course taken	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p* **
Calculus	17	3.22	.81	38	3.09	.98	55	3.13	.93	53	.47	.64
Chemistry	22	3.15	.89	32	2.73	1.31	54	2.90	1.17	52	1.41*	.17
Economics	33	3.04	.74	56	2.95	.75	89	2.98	.74	87	.54	.59
Engineering	17	3.73	.39	41	3.33	.94	58	3.45	.84	56	2.24*	.03
English	19	3.25	.67	32	3.39	.88	51	3.33	.81	49	-.59	.55
Total	108	3.23	.76	199	3.09	.98	307	3.14	.91	270	1.44	.15

*equal variances not assumed
**2-tailed

6. All online (HSOnlyOnline and MixedOnline) across participant characteristics: Table 21 breaks out course mean grades by categorical participant characteristics (gender, race, college of enrollment).

Table 21: Clipper course mean grades for all online students by categorical participant characteristics.

Participant characteristic		*n*	*M*	*SD*
Gender	Male	205	3.08	.94
	Female	102	3.26	.82
Race	White, non-Hispanic	210	3.13	.92
	Non-white, Hispanic	44	3.19	.94
College of Enrollment	Arts and Sciences	53	3.19	.92
	Business and Economics	46	3.12	.77
	Engineering	98	3.01	1.10

i. *Gender*: An independent samples *t*-test was conducted to compare final Clipper online course grades for males ($n = 141$, $M = 2.98$, $SD = 1.01$) and females ($n = 58$, $M = 3.35$, $SD = .86$). Females had significantly higher final grades than their male counterparts [$t(197) = -2.44$, $p = .016$ (2-tailed)], but the effect size was relatively small (eta squared = .03).

ii. *Race*: A *t*-test comparing non-white's and Hispanic's final Clipper online course grades ($n = 33$, $M = 3.13$, $SD = 1.00$) and white, non-Hispanic's grades ($n = 157$, $M = 3.13$, $SD = .96$) revealed no significant difference between the two group's scores [$t(188) = .013$, $p = .989$ (2-tailed)].

iii. *College of enrollment*: A one-way, between-groups ANOVA revealed no significant differences in mean scores between these three groups.

Table 22: Clipper course mean grades for all online students compared to continuous participant characteristics.

Participant characteristic		Pearson Correlation	Sig. (2-tailed)	*n*
Technology skills	Beginning proficiency with technology	-.059	.406	197
	Beginning comfort with technology	-.099	.168	196
Goal Orientation	Ego subscale	.115	.282	90
	Task subscale	-.036	.735	90
Academic Skills	Reading/Writing Skills	.081	.260	194
	Mathematics/Science Skills	.066	.360	192
	Critical Thinking Skills	.086	.235	194
	Academic Skills Subtotal	.091	.207	194
Academic Enablers	Interpersonal Skills	-.114	.115	194
	Engagement	-.059	.418	194
	Motivation	.023	.749	194
	Study Skills	.103	.152	194
	Academic Enablers Subtotal	-.003	.964	194

Table 22 supplies comparisons of course mean grades by continuous participant characteristics (technology skills, goal orientation, academic skills/enablers).

i. *Technical competence*: The potential relationships between beginning technical skills (comfort and proficiency) and final online course grades were explored using Pearson product-moment correlation coefficient. There were no significant correlations among these variables.

ii. *Task/ego orientation*: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and final online course grades. While there was a small amount of correlation between an ego-orientation and final online course grade [$r = .115$, $n = 90$] according to the Cohen (1988) guidelines, the relationship was not statistically significant ($p = .282$) and the coefficient of determination (amount of overlap in the variances) indicated only 1.3% shared variance. Task orientation was not at all correlated with final online course grade.

iii. *Academic skills/enablers*: We also explored the potential relationships among academic skills/enablers and final online Clipper course grades. There was a small negative correlation between interpersonal skills and final course grade [$r = -.114$, $n = 194$], but, like above, the relationship was not statistically significant ($p = .115$) and it explained only 1.3% of the shared variance.

Final Grades Discussion

In order to provide early decision students with a high-fidelity introduction to what instruction would be like for them at Lehigh, the Clipper courses deliberately adopted the "conservative" design approach of replicating traditional university classroom instruction online:

> *Each course will be designed as an online version of the on-campus course offered at Lehigh. This means the same content will be presented with the same expectations for success. This also means the faculty involved will not simply design materials to be placed on a Web site for students to pass through on their own. Instead, the same faculty member who designs the course will also be responsible for interacting with students enrolled in the Web-based versions. This interaction is an imperative component of these courses, and will be facilitated via a combination of discussion groups, chat rooms, email, video conferencing (if applicable), and other media.* (see the initial funding proposal, "The Clipper Project: A Web-based Curriculum Research and Development Initiative," 1999).

While this "replication" approach is a very common one in higher education today (Kearsley, 2000), Clark (1994) and others have argued that we cannot expect the medium used to deliver instruction to influence learning unless pedagogical shifts accompany the change (see also Reeves, 2003). This contention is supported by the myriad "media comparison studies" that, all other things being equal except the instructional delivery medium used, find no significant difference between the variables compared (Russell, 1999). Thus, it is not at all surprising to find no significant differences generally between F2F and online Clipper students' final grades.

That said, given that the F2F students' total SAT scores were significantly higher than the online students', we investigated the potential relationship between SAT scores and Clipper final grades using Pearson product-moment correlation coefficient. There was only a small positive correlation between the two variables [$r = .26$, $n = 305$, $p < .0005$] accounting for only 7% of the shared variance. In other words, there is only a very weak relationship between final grade and total SAT score and, therefore, total SAT score is not a potential covariate for which we need to control.

On the other hand, online drop rates undoubtedly had some bearing on the course grade results as online students who were doing badly often chose to withdraw from the course rather than receive a low grade. This hypothesis appears to be supported by analyses comparing final course grades and withdrawal rates for online versus F2F students among all courses. Out of the five Clipper courses offered, only the online engineering students had significantly lower final grades than their F2F counterparts (Table 20). At the same time, however, engineering also was the only Clipper course that had significantly fewer online students drop (Table 13). Stated simply, lower final mean grades for the online engineering students may be due to the fact that more of them persisted despite knowing they might receive less than an "A" for the course.

Withdrawal rates may also account for the fact that females had significantly higher online final course grades than males (recall that significantly more females withdrew from their online Clipper course than males; see Table 14, above). However, even if this is the case, the fact that some female students can be more successful in online courses than F2F is promising --particularly in the case of courses from science/math-oriented majors, like Chemistry and Calculus, that historically have been more difficult for female students (Table 24). Being successful in science/math-related courses in the first year encourage more women to choose majors in these areas. While a two-way ANOVA comparing the impact of delivery method and course taken on females' final grade yielded no significant differences [$F(4, 90) = .523$, $p = .719$], more research in this area with a larger participant pool is worth pursuing --particularly with regard to the extent that the "anonymity" of online courses may help female students' overcome their inhibitions about science/math topics.

Table 24: Female students' final grades by course and instructional condition.

	Online or F2F					
	F2F			Online		
Clipper course taken	*M*	*SD*	*n*	*M*	*SD*	*n*
Calculus	3.25	.556	8	3.40	.693	15
Chemistry	2.63	.916	8	3.33	1.036	7
Economics	3.03	.731	12	3.04	.758	18
Engineering	3.67	.576	5	3.67	.665	4
English	3.22	.799	9	3.52	1.076	14
Total	3.11	.767	42	3.33	.857	58

The low correlations we found between final online course grades and goal orientation and academic skills/enablers are somewhat surprising given the wealth of prior research supporting these constructs as predictors of academic success. It should be noted that the sample sizes for these groups was relatively low and that a larger participant pool might have yielded higher levels of significance. As above, our recommendation would be to explore the relationship further with a larger sample size.

Thus, analyses of final course grades indicate that the high school and college students who completed the online sections of the courses achieved at levels commensurate with those students who participated in F2F sections of the same courses. While it would have been nice to discover that the online course delivery medium improved final grade outcomes in-and-of-itself, prior research in this area did not lead us to expect this result. Instead, as anticipated, the gains to be realized in moving courses to an online delivery format are more likely to be found in the ways that the Web "democratizes" instruction and, in the case of the Clipper Project format, the extent to which offering college-level courses online helped prepare entering first-year students for college. These findings will be discussed further below and in manuscript #12, tentatively titled "How early engagement with a university affects student in the short- and long-term" (see Table 58: Clipper Project Research dissemination plan, below).

Course results: Grades for Subsequent Course in Content Area

Table 25 provides general summary data on subsequent course grade mean scores for all online and F2F students who took a subsequent course in the content area by participant type and instructional condition.

Table 25: Subsequent course grade mean scores by participant type and instructional condition.

Participant type	Instructional condition		*n*	*M*	*SD*
College student	F2F		74	3.34	.74
	HSOnlyOnline		--	--	--
	MixedOnline		21	2.54	1.34
		Total	95	3.16	.96
High school student	F2F		--	--	--
	HSOnlyOnline		67	2.85	.84
	MixedOnline		33	3.35	.93
		Total	100	3.01	.90

1. F2F vs. all online (HSOnlyOnline and MixedOnline): F2F students did better in their subsequent course in the same content area (n = 74, M = 3.34, SD = .74) than did the online students (n = 121, M = 2.93, SD = 1.00). While the variances between the F2F and online students' final course grades were not equivalent according to Levene's test [$F(195) = 6.67$, $p = .011$], an independent-samples t-test for equality of means (equal variances not assumed) indicated that the differences between the F2F and online students was statistically significant but with only a small-to-moderate effect size [$t(185.59) = 3.24$, $p = .001$ (2-tailed), eta squared = .05].

2. F2F vs. all HS online (HSOnlyOnline and high school students in MixedOnline): Similarly, F2F students also did better in their subsequent course (n = 74, M = 3.34, SD = .74) than the online high school students alone (n = 100, M = 3.01, SD = .90). With equal variances assumed, a t-test indicated this difference was significant [$t(172) = 2.52$, $p = .013$ (2-tailed)]. Once again, however, the magnitude of that difference in the means was small (eta squared = .04).

3. All HS online (HSOnlyOnline and high school students in MixedOnline) vs. college online (college students in MixedOnline): Among online students, however, the high school students did better in their subsequent course (n = 100, M = 3.01, SD = .90) than their on-campus classmates (n = 21, M= 2.54, SD = 1.34). This difference did not reach significance, however [with equal variances not assumed, $t(23.95) = -1.56$, $p = .133$ (2-tailed)].

4. HSOnlyOnline vs. high school students in MixedOnline: Among the high school students, those were enrolled in “mixed” sections of Clipper did better in their subsequent course (n = 33, M = 3.35, SD = .93) than those who were enrolled in “high school only” sections (n = 67, M = 2.85, SD = .84). This difference was statistically significant [$t(98) = -2.74$, p = .007 (2-tailed)] with a moderate effect size (eta squared = .07).

Table 26: F2F and all online student subsequent course grade mean scores by course.

	F2F			All Online			Total					
Clipper course taken	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p***
Calculus	13	3.26	.90	23	3.41	.99	36	3.35	.95	34	-.450	.66
Chemistry	9	2.96	.95	12	2.75	1.23	21	2.84	1.10	19	.431	.67
Economics	19	3.18	.77	32	2.40	.83	51	2.69	.88	49	3.34	.002
Engineering	17	3.73	.58	29	3.00	1.19	46	3.27	1.06	42.99	2.78*	.008
English	16	3.40	.44	25	3.19	.42	41	3.27	.44	39	1.52	.14
Total	74	3.34	.74	121	2.93	1.00	195	3.09	.93	185.59	3.24*	.001

*equal variances not assumed
**2-tailed

5. F2F vs. all online (HSOnlyOnline and MixedOnline) among courses: Table 26 provides mean subsequent course scores for all online students organized by Clipper course taken. Separate independent samples t-tests by course revealed that mean subsequent course grades differed significantly between F2F and online students in both the economics [$t(49) = 3.34$, p = .002 (2-tailed), eta squared = .19] and engineering courses [$t(42.99) = 2.78$, p = .008 (2-tailed), eta squared = .15] with large effect sizes.

6. All online across participant characteristics: Table 27 breaks out course mean grades by categorical participant characteristics (gender, race, college of enrollment).

Table 27: Subsequent course mean grades for all online students by categorical participant characteristics.

Participant characteristic		*n*	*M*	*SD*
Gender	Male	87	2.83	1.01
	Female	34	3.20	.76
Race	White, non-Hispanic	101	2.95	.99
	Non-white, Hispanic	16	3.19	.71
College of Enrollment	Arts and Sciences	25	3.09	.77
	Business and Economics	32	2.54	1.03
	Engineering	63	3.05	1.03

ii. *Gender*: Females generally did better (n = 34, M = 3.20, SD = .76) than their male counterparts (n = 87, M = 2.83, SD = 1.01) in their subsequent course, as measured by final course grade. This difference was not significant, however [$t(119) = -1.84$, p = .068].

iii. *Race*: Non-whites and Hispanics did better (n = 16, M = 3.19, SD = .71) than their white, non-Hispanic colleagues (n = 101, M = 2.95, SD = .99) in their subsequent course. This difference was not significant, however [$t(115) = .916$, p = .361].

iv. *College of enrollment*: A one-way analysis of variance revealed that there was a significant among the groups [$F(2, 117) = 3.31$, p = .04]. Post-hoc comparisons using the Tukey HSD test indicated that the difference between the business and economics mean (M = 2.54, SD = 1.03) and the engineering mean (M = 3.05, SD = 1.03) was statistically significant. Arts and sciences students (M = 3.09, SD = .77) did not differ significantly from either business and economics or engineering students.

Table 28 supplies comparisons of course mean grade by continuous participant characteristic (technology skills, goal orientation, academic skills/enablers).

iv. *Technical competence*: The potential relationships between beginning technical skills (comfort and proficiency) and subsequent course grades was explored using Pearson product-moment correlation coefficient. While not significant, according to the Cohen (1988) guidelines there was a small, negative correlation between subsequent course grades and both proficiency with technology [r = -.169, n = 120, p = .066 (2-tailed)] and comfort with technology [r = -.161, n = 119, p = .079 (2-tailed)]. In which direction was the difference?

Table 28: Subsequent course mean grades for <u>all</u> online students compared to continuous participant characteristics.

		Pearson Correlation	Sig. (2-tailed)	*n*
Technology Skills	Beginning proficiency with technology	-.169	.07	120
	Beginning comfort with technology	-.161	.08	119
Goal orientation	Ego subscale	.094	.49	56
	Task subscale	.151	.27	56
Academic Skills	Reading/Writing Skills	.183	.05	119
	Mathematics/Science Skills	.199	.03	117
	Critical Thinking Skills	.140	.13	119
	Academic Skills Subtotal	.223	.02	119
Academic Enablers	Interpersonal Skills	-.026	.78	119
	Engagement	.012	.90	119
	Motivation	.228	.01	119
	Study Skills	.075	.42	119
	Academic Enablers Subtotal	.098	.29	119

v. *Task/Ego orientation*: A Pearson product-moment correlation coefficient was used to explore the potential relationship between goal orientation (task/ego) and subsequent course grades. While there was a small amount of correlation between task-orientation and subsequent course grade [r = .151, n = 56] (see Cohen, 1988), the relationship was not statistically significant (p = .267) and the coefficient of determination (amount of overlap in the variances) indicated only 2.3% shared variance. Ego orientation was not at all correlated with subsequent course grade.

vi. *Academic skills/enablers*: We also explored the potential relationships among academic skills/enablers and final online Clipper course grades. There were small, but significant correlations between subsequent course grade and reading/writing skills [r = .183, n = 119, p = .05 (2-tailed)], mathematics/science skills [r = .199, n = 111, p = .03 (2-tailed)], academic skills generally [r = .223, n = 119, p = .02 (2-tailed)], and motivation [r = .228, n = 119, p = .01 (2-tailed)]. There was also a small, but non-significant correlation between subsequent course grade and critical thinking skills [r = .140, n = 119, p = .13]. None of these small correlations explain more than 5% of the shared variance, however.

<u>Grade for Subsequent Course Discussion</u>

The fact that the raw data indicates the F2F students did better in their subsequent course than the online students raises concerns over long-term retention and transfer of knowledge, even if the magnitude of the differences in the means was relatively small (instructional condition accounted for only between 4-5% of the variance in subsequent course grade). Even after adjusting for Clipper course final grades using a one-way ANCOVA, there was still a significant difference between the online and F2F students' subsequent course grades [$F(1, 193) = 9.02$, p = .003, eta squared = .05]. The adjusted means were 3.31 for the F2F students (n = 74) and 2.95 for the online students (n = 121).

A finding of interest that is worthy of future research is the apparent positive influence that mixing high school and college students in an online course might have had the high school students' knowledge retention, even though the "mixed" high school students' mean Clipper course grade was lower than the "high school only" section (M = 2.95 and M = 3.25 respectively, see Table 19, above). This line of research might also study further our finding that the high school students enrolled in "high-school only" sections dropped their Clipper course in higher numbers than the high school students enrolled in the "mixed" sections (51% and 39% respectively, see Table 12, above).

The fact that students enrolled in the College of Business and Economics fared least well on their subsequent course in the content area may be due to the fact that, while all the other Clipper courses very clearly have a second course in the sequence (Calculus II, Chemistry II, Engineering II, and English II), the Economics course does not (recall from Table 11, above, that the majority of Business and Economics Clipper students took the Economics course). This may mean that the transfer of knowledge for the Economics students was less direct than for the others, causing them to do less well in their subsequent course. This hypothesis seems also to be supported by the *t*-test comparisons between the F2F and online Economics students' subsequent course mean score.

Once again, the low correlations we found between subsequent course grades and goal orientation and academic skills/enablers may be due to the small sample sizes we had for these groups. As above, our recommendation would be to explore the relationship further with a larger participant pool.

It appears that researchers have become increasingly interested in the merits of measuring knowledge retention as a construct for evaluating online instruction (Wisher, Curnow, & Seidel, 2001); however, we could find no other studies to date that actually compared F2F and online students' performance in a subsequent course. Our data appear to indicate that online students' have more trouble with subsequent courses in the content area, particularly with regard to economics and engineering topics. This seems to be an area that warrants further research with a larger participant pool.

Preparation for College Outcomes: First-semester GPA

Table 29 provides general summary data on mean first-semester GPAs for all students by participant type and instructional condition.

Table 29: First-semester mean GPAs by participant type and instructional condition.

Participant type	Instructional condition		*n*	*M*	*SD*
College student	F2F		111	3.30	.55
	HSOnlyOnline		--	--	--
	MixedOnline		46	3.08	.56
		Total	157	3.23	.56
High school student	F2F		--	--	--
	HSOnlyOnline		197	2.86	.57
	MixedOnline		90	3.00	.59
		Total	287	2.91	.58

7. <u>All College (F2F and online) vs. all HS</u>: College students' mean first-semester GPA (n = 157, M = 3.23, SD = .56) was higher than the high school students' (n = 287, M = 2.91, SD = .58). An independent-samples *t*-test revealed the difference was significant [$t(442)$ = 5.775, p = .000 (2-tailed)] with a moderate effect size (eta squared = .07).

8. <u>HS only vs. HS mixed</u>: High school students enrolled in "mixed" sections of their online course had a higher mean first-semester GPA (n = 90, M = 3.00, SD = .59) than their counterparts in the

"HS only" sections (n = 197, M = 2.86, SD = .57). The difference in means was not significant, however [t(285) = -1.85, p = .065].

9. HS among courses: Table 30 supplies mean first-semester GPA scores for all high-school students, organized by Clipper course taken. While the chemistry students had the highest first-semester GPA mean score (n = 29, M = 3.04, SD = .61), a one-way between-groups ANOVA found no significant difference among the groups at the $p < .05$ level [F(4, 286) = .809, p = .520].

Table 30: High school student first-semester GPA mean scores by course.

Clipper course		*n*	*M*	*SD*
Calculus		86	2.96	.60
Chemistry		29	3.04	.61
Economics		82	2.86	.45
Engineering		27	2.89	.74
English		63	2.86	.60
	Total	287	2.91	.58

10. HS online across participant characteristics: Table 31 breaks out first-semester GPA mean scores for the high school students by categorical participant characteristics (gender, race, college of enrollment).

Table 31: First-semester GPAs for high school students by categorical participant characteristics.

Participant characteristic		*n*	*M*	*SD*
Gender	Male	158	2.85	.58
	Female	129	2.98	.57
Race	White, non-Hispanic	35	2.83	.76
	Non-white, Hispanic	232	2.92	.55
College of Enrollment	Arts and Sciences	106	2.92	.61
	Business and Economics	79	2.90	.47
	Engineering	95	2.92	.63

i. *Gender*: Females generally did better (n = 129, M = 2.98, SD = .57) than their male counterparts (n = 158, M = 2.85, SD = .58) in their first semester, as measured by overall GPA. While this difference was significant [t(285) = -2.00, p = .046], the effect size was very small (eta squared = .01).

ii. *Race*: White, non-Hispanics did better (n = 232, M = 2.92, SD = .55) than their non-white and Hispanic colleagues (n = 35, M = 2.83, SD = .76) in their subsequent course. This difference was not significant, however [t(39.45) = -.665, p = .510, equal variances not assumed].

iii. *College of enrollment*: Levene's test revealed that the variances of the groups was not equal, violating the homogeneity of variance assumption for ANOVA. We continued with the ANOVA, however, because the size of the groups was sufficiently similar (e.g., largest/smallest = 1.5, Stevens, 1996). Nonetheless, the difference among groups was not significant [F(2, 279) = .035, p = .966].

Table 32 supplies Pearson correlations between first-semester GPAs by continuous participant characteristic (technology skills, goal orientation, academic skills/enablers).

Table 32: First-semester GPAs for high school students compared to continuous participant characteristics.

Participant characteristic		Pearson Correlation	Sig. (2-tailed)	*n*
Technology skills	Beginning proficiency with technology	-.056	.347	280
	Beginning comfort with technology	-.064	.288	279
Goal Orientation	Ego subscale	.145	.110	123
	Task subscale	.114	.210	123
Academic Skills	Reading/Writing Skills	.086	.181	241
	Mathematics/Science Skills	.016	.807	238
	Critical Thinking Skills	.057	.377	241
	Academic Skills Subtotal	.063	.327	241
Academic Enablers	Interpersonal Skills	-.063	.332	242
	Engagement	-.011	.869	242
	Motivation	.075	.245	242
	Study Skills	.099	.124	242
	Academic Enablers Subtotal	.040	.537	242

iv. *Technical competence:* The potential relationships between beginning technical skills (comfort and proficiency) and first-semester GPA were explored using Pearson product-moment correlation coefficient. There were no significant correlations among these variables.

v. *Task/ego orientation:* A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and first-semester GPA. According to the Cohen (1988) guidelines, while there was a small amount of correlation between an ego-orientation and first-semester GPA [$r = .145$, $n = 123$, $p = .110$] and task-orientation and first-semester GPA [$r = .114$, $n = 123$, $p = .210$], the relationships were not statistically significant and the coefficient of determination (amount of overlap in the variances) indicated these relationships accounted for only 1-2% shared variance.

v. *Academic skills/enablers*: We also explored the potential relationships among academic skills/enablers and final online Clipper course grades. There were no statistically significant correlations among these variables.

First-semester GPA Discussion

Our finding that the students who took an online Clipper course during high school had significantly lower first-semester GPAs than the students who did not (F2F and online college) bears further analysis given our earlier discussion about the intelligence of volunteers and the F2F students' significantly higher SAT scores. In fact, as illustrated in Table 29, when we remove the F2F students from our *t*-test, the difference between the high school and college students is no longer significant [$t(333) = 1.924$, $p = .055$ (2-tailed)] with a very small effect size (eta squared = .01). In addition, given that the female students had higher first-semester GPAs than their male counterparts, the high school students' first semester GPA mean score might have been bolstered further if more of the female high school students had been involved initially (recall that we had a 60% male/40% female gender split) and had gone on to complete their online course.

Additional research is needed to explore whether college students who have taken an online college course while still in high school might have higher first-semester GPAs than the general university population, as opposed to collecting data only on research volunteers.

Preparation for College Outcomes: SACQ

SACQ items are scored in the direction of positive adjustment to college, so that the higher the score, the better the student's self-evaluated adaptation to college.

Table 33: Comparison of SACQ scores between 1st-year college and high school students.

	College			High School					
	n	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p**
Full Scale	94	434.54	63.060	170	463.91	55.640	262	-3.913	.000
Academic Adjustment	97	150.98	25.424	172	159.35	21.166	267	-2.894	.004
Social Adjustment	97	130.35	26.317	173	143.48	21.636	268	-4.184	.000**
Personal-Emotional Adjustment	97	94.19	17.125	173	98.06	18.004	268	-1.725	.086
Attachment	97	104.93	20.982	173	116.87	14.383	268	-5.523	.000

*2-tailed
**equal variances not assumed

7. <u>All HS vs. 1st year Coll</u>: Table 33 provides general summary data on SACQ mean scores for all high school and first-year college students by participant type. (Note that by "first-year college students" we mean Clipper students who participated in the project during their first semester at Lehigh and, as such, would have had the SACQ instrument administered to them at the same time as the high school Clipper participants --namely, six weeks into the first semester of the first year.)

As shown in Table 33, the high school students' SACQ mean scores on the full scale and each of the subscales was higher than the first-year college students'. Independent-samples *t*-tests indicated the difference was significant for the full scale and every one of the subscales except personal-emotional adjustment.

Table 34: Comparison of SACQ scores between high school students enrolled in HSOnly and mixed online sections.

	HSOnlyOnline			MixedOnline					
	n	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p**
Full Scale	104	457.32	58.748	66	474.29	49.001	168	-1.954	.052
Academic Adjustment	106	156.79	22.143	66	163.47	18.939	170	-2.030	.044
Social Adjustment	107	142.91	23.196	66	144.41	18.969	171	-.443	.659
Personal-Emotional Adjustment	107	95.59	18.376	66	102.06	16.756	171	-2.326	.021
Attachment	107	115.80	15.500	66	118.59	12.279	171	-1.240	.217

*2-tailed

8. <u>HS only vs. HS mixed</u>: Table 34 compares SACQ scores between high school students enrolled in "HS only" sections of their online course and their counterparts in the "mixed" sections. The "mixed" high school students scored higher on the full scale and all subscales except social adjustment and attachment.

9. <u>HS among courses</u>: Table 35 supplies mean SACQ scores for all high-school students, organized by Clipper course taken.

Full Scale: The calculus students had the highest overall SACQ mean score ($n = 50$, $M = 472.66$, $SD = 54.00$) and a one-way between-groups ANOVA found a significant difference among the groups at the $p < .05$ level [$F(4, 169) = 2.98$, $p = .021$]. Post-hoc comparisons using the Tukey HSD test indicated the mean score for the English group ($M = 435.19$, $SD = 59.07$) was significantly lower than the Calculus group ($M = 472.66$, $SD = 54.00$) and the Economics group ($M = 471.56$, $SD = 56.22$).

Academic Adjustment: The chemistry students had the highest academic adjustment mean score ($n = 21$, $M = 166.38$, $SD = 19.78$) and a one-way between-groups ANOVA found a significant difference among the groups at the $p < .05$ level [$F(4, 171) = 2.561$, $p = .04$]. However, post-hoc comparisons using the Tukey HSD test indicated only a near significant difference between the chemistry and English groups ($p = .058$).

Social Adjustment: The calculus students had the highest social adjustment mean score ($n = 50$, $M = 147.76$, $SD = 18.54$), but a one-way between-groups ANOVA found no significant difference among the groups at the $p < .05$ level [$F(4, 168) = 1.74$, $p = .143$].

Personal-emotional Adjustment: The economics students had the highest personal-emotional adjustment mean score ($n = 56$, $M = 102.41$, $SD = 18.09$) and a one-way between-groups ANOVA found a significant difference among the groups at the $p < .05$ level [$F(4, 168) = 2.455$, $p = .048$]. Post-hoc comparisons using the Tukey HSD test indicated the mean score for the English group ($M = 90.16$, $SD = 18.25$) was significantly lower than the Economics group ($M = 102.41$, $SD = 18.09$).

Attachment: The calculus students had the highest attachment mean score ($n = 50$, $M = 120.42$, $SD = 10.98$), but Levene's test revealed that homogeneity of variances could not be assumed and a one-way between-groups ANOVA found no significant difference among the groups at the $p < .05$ level [$F(4, 168) = 2.40$, $p = .052$].

Table 35: Comparison of SACQ scores high school students' SACQ scores among courses.

		n	*M*	*SD*
Full Scale	Calculus	50	472.66	53.995
	Chemistry	21	472.14	46.637
	Economics	54	471.56	56.218
	Engineering	14	454.36	47.540
	English	31	435.19	59.073
Academic Adjustment	Calculus	50	161.32	22.169
	Chemistry	21	166.38	19.745
	Economics	55	161.49	22.430
	Engineering	14	153.43	15.032
	English	32	150.59	18.139
Social Adjustment	Calculus	50	147.76	18.537
	Chemistry	21	143.33	21.205
	Economics	56	145.16	21.274
	Engineering	14	139.14	17.879
	English	32	135.84	26.900
Personal-Emotional Adjustment	Calculus	50	97.94	17.847
	Chemistry	21	98.00	14.869
	Economics	56	102.41	18.092
	Engineering	14	99.21	18.230
	English	32	90.16	18.248
Attachment	Calculus	50	120.42	10.975
	Chemistry	21	118.24	15.320
	Economics	56	117.13	14.785
	Engineering	14	115.14	9.347
	English	32	110.72	17.875

10. <u>HS online across participant characteristics</u>: The following subsections present SACQ mean scores for the high school students by categorical participant characteristics (gender, race, college of enrollment).

Table 36: SACQ mean scores for high school students by gender.

	Male			Female					
	n	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p**
Full Scale	95	455.83	53.946	75	474.13	56.424	168	-2.152	.033
Academic Adjustment	96	155.14	20.919	76	164.68	20.387	170	-3.006	.003
Social Adjustment	97	140.56	21.407	76	147.21	21.489	171	-2.026	.044
Personal-Emotional Adjustment	97	97.12	16.856	76	99.25	19.420	171	-.770	.442
Attachment	97	115.30	13.944	76	118.87	14.776	171	-1.628	.105

*2-tailed

i. *Gender*: Table 36 supplies SACQ mean scores for high school students by gender.

Full scale: Females generally scored higher overall on the SACQ (n = 75, M = 474.13, SD = 56.42) than did their male counterparts (n = 95, M = 455.83, SD = 53.95). While this difference was significant [t(168) = -2.15, p = .033], the effect size was small (eta squared = .03).

Academic adjustment subscale: Females generally scored higher on the SACQ Academic Adjustment subscale (n = 76, M = 164.68, SD = 20.39) than did their male counterparts (n = 96, M = 155.14, SD = 20.92). While this difference was significant [t(170) = -3.00, p = .003], the effect size was small to moderate (eta squared = .05).

Social adjustment subscale: Females generally scored higher overall on the SACQ social adjustment subscale (n = 76, M = 147.21, SD = 21.49) than did their male counterparts (n = 97, M = 140.56, SD = 21.41). While this difference was significant [t(171) = -2.02, p = .044], the effect size was small (eta squared = .02).

Personal-emotional adjustment subscale: Females generally scored higher overall on the SACQ personal-emotional subscale (n = 76, M = 99.25, SD = 19.42) than did their male counterparts (n = 97, M = 97.12, SD = 16.86). This difference was not significant, however [t(171) = -.77, p = .442 (2-tailed)].

Attachment subscale: Females generally scored higher overall on the SACQ attachment subscale (n = 76, M = 118.87, SD = 14.78) than did their male counterparts (n = 97, M = 115.30, SD = 13.94). This difference was not significant, however [t(171) = -1.63, p = .105 (2-tailed)].

Table 37: SACQ mean scores for high school students by race.

	Non-white and/or Hispanic			White, non-Hispanic					
	n	*M*	*SD*	*n*	*M*	*SD*	*df*	*t*	*p**
Full Scale	18	433.33	14.644	152	467.53	53.904	168	-2.504	.013
Academic Adjustment	18	157.33	4.578	154	159.59	21.407	170	-.427	.670
Social Adjustment	18	129.67	6.422	155	145.08	20.395	171	-2.924	.004
Personal-Emotional Adjustment	18	92.06	4.953	155	98.75	17.567	171	-1.500	.136
Attachment	18	105.89	4.847	155	118.14	12.987	171	-2.471**	.023

*2-tailed
**equal variances not assumed

ii. *Race*: Table 37 supplies SACQ mean scores for high school students by race.

Full scale: White, non-Hispanics scored higher (n = 152, M = 467.53, SD = 53.90) than their non-white and Hispanic colleagues (n = 18, M = 433.33, SD = 62.13). This difference was significant at the $p < .05$ level [t(168) = -2.504, p = .013 (2-tailed)]. The effect size was small to moderate, however (eta squared = .04).

Academic adjustment subscale: White, non-Hispanics scored higher (n = 154, M = 159.59, SD = 21.41) than their non-white and Hispanic colleagues (n = 18, M = 157.33, SD = 19.42). This difference was not significant, however [t(170) = -.427, p = .67].

Social adjustment subscale: White, non-Hispanics scored higher (n = 155, M = 145.08, SD = 20.40) than their non-white and Hispanic colleagues (n = 18, M = 129.67, SD = 27.25). This difference was significant at the $p < .05$ level [t(171) = -2.92, p = .004 (2-tailed)]. The effect size was small to moderate, however (eta squared = .05).

Personal-emotional adjustment subscale: White, non-Hispanics scored higher (*n* = 155, *M* = 98.75, *SD* = 17.57) than their non-white and Hispanic colleagues (*n* = 18, *M* = 92.06, *SD* = 21.01). This difference was not significant, however [$t(171) = -1.50$, $p = .136$ (2-tailed)].

Attachment subscale: White, non-Hispanics scored higher (*n* = 155, *M* = 118.14, *SD* = 12.99) than their non-white and Hispanic colleagues (*n* = 18, *M* = 105.89, *SD* = 20.57). While Levene's test revealed that equality of variances could not be assumed, this difference was significant at the $p < .05$ level [$t(18.61) = -2.47$, $p = .023$ (2-tailed)].

Table 38: SACQ mean scores for high school students by college of enrollment.

	CAS			B&E			ENG		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Full Scale	55	468.02	62.543	45	472.84	52.523	68	454.22	51.684
Academic Adjustment	56	161.98	22.356	45	161.24	21.847	69	156.22	19.827
Social Adjustment	56	145.79	23.559	45	148.69	15.801	70	138.13	22.625
Personal-Emotional Adjustment	56	98.61	20.994	45	98.36	18.004	70	96.94	15.462
Attachment	56	117.68	16.091	45	118.87	11.655	70	114.91	14.680

iii. *College of enrollment*: Table 38 supplies SACQ mean scores for high school students by college of enrollment.

Full scale: While Business & Economics students had the higher full scale score, a one-way between-groups ANOVA found no significant difference among students' overall SACQ full scale mean scores across college of enrollment.

Academic adjustment subscale: College of Arts and Sciences students had the highest mean academic adjustment subscale. However, as can be seen by the closeness of the mean scores, a one-way between-groups ANOVA found no significant difference among students' academic achievement mean scores across college of enrollment.

Social adjustment subscale: While Levene's test revealed that homogeneity of variances on social adjustment subscale mean scores could not be assumed, the size of the college of enrollment groups was reasonably similar (largest/smallest = 1.5, Stevens, 1996). A one-way between-groups ANOVA found a significant difference among the groups at the $p < .05$ level [$F(2, 168) = 3.85$, $p = .023$]. Post-hoc comparisons using the Tukey HSD test indicated the mean score for the Engineering group (*M* = 138.13, *SD* = 22.63) was significantly lower than the Arts & Sciences group (*M* = 145.79, *SD* = 23.56).

Personal-emotional adjustment subscale: Here again, the College of Arts and sciences students had the highest mean score on the personal-emotional adjustment subscale. However, a one-way between-groups ANOVA found no significant difference among the groups at the $p < .05$ level [$F(2, 168) = .155$, $p = .857$].

Attachment subscale: While the Business and Economics students scored highest on the attachment subscale, a one-way between-groups ANOVA found no significant difference among the groups at the $p < .05$ level [$F(2, 168) = 1.16$, $p = .317$].

The remaining subsections in this section report Pearson correlations between overall SACQ mean scores with continuous participant characteristic (technology skills, goal orientation, academic skills/enablers).

Table 39: SACQ mean scores for high school students compared to overall technology skills.

	Proficiency with technology			Comfort with technology		
	Pearson Correlation	Sig. (2-tailed)	*n*	Pearson Correlation	Sig. (2-tailed)	*n*
Full scale	.067	.462	123	.138	.128	123
Academic adjustment subscale	.040	.659	125	.116	.197	125
Social adjustment subscale	.104	.246	126	.118	.189	126
Personal-emotional adjustment subscale	.063	.486	126	.184	.039	126
Attachment subscale	.016	.859	126	.018	.842	126

iv. *Technology skills:* Table 39 supplies Pearson correlations between overall SACQ mean scores and technology skills.

Full scale: The potential relationships between beginning technical skills (comfort and proficiency) and the overall SACQ Full Scale were explored using Pearson product-moment correlation coefficient. According to the Cohen (1988) guidelines, there was a statistically significant, small positive correlations between students' overall SACQ scores and their beginning proficiency with technology [r = .197, n = 168, p = .01] and beginning comfort with technology [r = .196, n = 167, p = .011]. However, the coefficient of determination indicated these relationships accounts for only 4% of the shared variance.

Academic adjustment subscale: The potential relationships between beginning technical skills (comfort and proficiency) and the SACQ Academic Adjustment subscale were explored using Pearson product-moment correlation coefficient. According to the Cohen (1988) guidelines, there was a statistically significant, medium correlation between students' beginning proficiency with technology and academic adjustment scores [r = .305, n = 170, p = .000]. However, the coefficient of determination indicated this relationship accounts for only 9% of the shared variance. There was not a significantly large correlation between beginning comfort with technology and the academic adjustment subscale.

Social adjustment subscale: The potential relationships between beginning technical skills (comfort and proficiency) and the SACQ Social Adjustment subscale were explored using Pearson product-moment correlation coefficient. According to the Cohen (1988) guidelines, there was a statistically significant, small positive correlation between students' social adjustment scores and their beginning proficiency with technology [r = .180, n = 171, p = .019] and beginning comfort with technology [r = .154, n = 170, p = .045]. However, the coefficient of determination indicated these relationships accounts for only 2-3% of the shared variance.

Personal-emotional adjustment subscale: The potential relationships between beginning technical skills (comfort and proficiency) and the SACQ Personal-emotional Adjustment subscale were explored using Pearson product-moment correlation coefficient. According to the Cohen (1988) guidelines, there was a statistically significant, small positive correlation between students' personal-emotional adjustment scores and their beginning proficiency with technology [r = .225, n = 171, p = .003] and beginning comfort with technology [r = .247, n = 170, p = .001]. However, the coefficient of determination indicated these relationships accounts for only 5-6% of the shared variance.

Attachment subscale: The potential relationships between beginning technical skills (comfort and proficiency) and the SACQ Attachment subscale were explored using Pearson product-moment correlation coefficient. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the technology variables and the attachment subscale scores.

Table 40: SACQ mean scores for high school students compared to goal orientation.

	Ego subscale			Task subscale		
	Pearson Correlation	Sig. (2-tailed)	*n*	Pearson Correlation	Sig. (2-tailed)	*n*
Full scale	-.100	.424	66	-.047	.709	66
Academic adjustment subscale	-.042	.738	66	.122	.330	66
Social adjustment subscale	-.161	.197	66	-.107	.391	66
Personal-emotional adjustment subscale	-.076	.547	66	-.121	.335	66
Attachment subscale	-.084	.503	66	-.124	.321	66

v. *Task/ego orientation:* Table 40 supplies SACQ mean scores for high school students as compared to their goal orientation.

Full scale: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and SACQ Academic Adjustment subscale scores. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the goal orientation variables and the academic adjustment subscale.

Academic adjustment subscale: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and SACQ Academic Adjustment subscale scores. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the goal orientation variables and the academic adjustment subscale.

Social adjustment subscale: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and SACQ Social Adjustment subscale scores. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the goal orientation variables and the academic adjustment subscale.

Personal-emotional adjustment subscale: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and SACQ Personal-emotional Adjustment subscale scores. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the goal orientation variables and the academic adjustment subscale.

Attachment subscale: A Pearson product-moment correlation coefficient was also used to explore the potential relationship between goal orientation (task/ego) and SACQ Attachment subscale scores. According to Cohen's (1988) guidelines, there was not a significantly large correlation between either of the goal orientation variables and the academic adjustment subscale.

Table 41: SACQ mean scores for high school students compared to academic skills/enablers.

	Academic skills			Academic enablers		
	Pearson Correlation	Sig. (2-tailed)	*n*	Pearson Correlation	Sig. (2-tailed)	*n*
Full scale	.180	.020	166	.323	.000	166
Academic adjustment subscale	.256	.001	168	.361	.000	168
Social adjustment subscale	.049	.530	169	.252	.001	169
Personal-emotional adjustment subscale	.158	.040	169	.198	.010	169
Attachment subscale	.021	.786	169	.194	.012	169

vi. *Academic skills/enablers:* Table 41 supplies SACQ mean scores for high school students as compared to their academic skills/enablers mean scores on the ACES.

Full scale: There was a statistically significant, but small positive correlation between the SACQ full scale and the academic skills subtotal [$r = .180$, $n = 166$, $p = .020$]. There was a statistically significant, medium positive correlation between students' scores on the full scale and the academic enablers subtotal [$r = .323$, $n = 166$, $p = .000$].

Academic adjustment subscale: There was a statistically significant, but small positive correlation between the academic adjustment subscale and students scores on the academic skills subtotal [$r = .256$, $n = 168$, $p = .001$]. There was a statistically significant, medium positive correlation between students' scores on the academic adjustment subscale and the academic enablers subtotal [$r = .361$, $n = 168$, $p = .000$].

Social adjustment subscale: There was a statistically significant, but small positive correlation between the SACQ social adjustment scale and students' scores on the academic enablers subtotal [$r = .252$, $n = 169$, $p = .001$]. There was not a statistically significant correlation between students' scores on the social adjustment scale and academic skills [$r = .049$, $n = 169$, $p =.530$].

Personal-emotional adjustment subscale: There was a statistically significant, but small positive correlation between the SACQ personal-emotional adjustment scale and students' scores on academic skills [$r = .158$, $n = 169$, $p = .040$] and academic enablers subtotal [$r = .198$, $n = 169$, $p = .010$].

Attachment subscale: There was a statistically significant, but small positive correlation between the SACQ attachment scale and students' scores on the academic enablers subtotal [$r = .194$, $n = 169$, $p = .012$].

SACQ Discussion

As discussed in the "Instrumentation" section, above, the SACQ is designed to assess student adjustment to college. According to Baker and Siryk (1999), the academic adjustment subscale is an indication students' success in coping with the various educational demands characteristic of the college experience and measures constructs such as motivation, application, performance, and satisfaction with the academic environment. The social adjustment subscale measures a student's success in coping with the interpersonal-societal demands inherent in the college experience and focuses on the extent of social activities, relationships with other people on campus, dealing with social relocation, and satisfaction with social aspects of the college environment. The personal-emotional adjustment subscale focuses on a student's intrapsychic state during his/her adjustment to college, and the degree to which he/she is experiencing general psychological distress. The attachment subscale is designed to measure a student's degree of commitment to college in general and the institution he/she is attending in particular.

The findings presented above provide a good deal of self-report evidence that, in their first semester at Lehigh, the Clipper high school participants were adjusting to college than more readily their college counterparts who did not have an online course in their senior year of high school. Thankfully, the college participants did not also report significantly lower personal-emotional adjustment scores, indicating general psychological distress.

Interestingly, comparisons of SACQ scores from the "HSOnly" versus "Mixed" sections of the online course yielded higher mean scores across all scales and significant differences on all but social adjustment and attachment. Thus, mixing high school and college students in an online course not only might have had a positive impact on the high school students' retention (as measured by subsequent course grade), but it appears also to have had a positive impact on the high school students' adaptation to college across a variety of constructs. As recommended earlier, this seems to be a promising area for future research.

SACQ mean score comparisons across courses yielded few statistically significant differences, except to find that the high school students who took the English course may have been having more trouble adjusting to college generally. One possible explanation for this finding might, once again, have to do with the reasons students chose the Clipper course they chose to take. Students who selected Engineering, Chemistry, Calculus, or Economics are far more likely to have done so to fulfill a major requirement --meaning that they had a good idea of what their major, or content area of interest, was likely to be. Students who selected to take the Clipper English course are far more likely to have done so because it is a generally University requirement that did not yet require commitment to an area of study. A second explanation for the lower English mean scores might also be that the course content in the other four areas as more concrete and transferred more directly into a subsequent course that students were taking in their first semester.

Given the earlier finding that females had significantly higher final online course grades and first-semester GPAs than their male counterparts, the fact that females also scored higher on every SACQ scale and significantly higher on the full scale and academic and social adjustment subscales is particularly interesting. Here again, early success in science/math-oriented courses may be contributing to these female students' easier adjustment to college.

Significantly lower scores for non-white and Hispanic students across many of the SACQ variables is disappointing, but not surprising. White, non-Hispanic students are more likely as a group to have had prior family members go to college and, as such, to be better prepared for what it would be like. In addition, although Lehigh is working hard on issues of diversity, Lehigh and the Lehigh Valley in which it is situated is historically a white, middle-class community --one in which many of our students of color unfortunately report having trouble adjusting.

Comparisons across college of enrollment yielded few statistically significant differences, except the finding that the Engineering students had a significantly lower social adjustment mean score than the Arts and Sciences students. This might be due to the heavy demands of the engineering curriculum that does not allow for many electives or free time to socialize with students from across the campus.

Interestingly, we found significant small to medium positive correlations between technology skills and several of the adaptation to college constructs, particularly academic and social adjustment. Given the breadth and depth of instructional technology use at Lehigh, it may well be that students with higher technology skills truly do have a "leg up" on their less-technically-capable colleagues. In addition, communication technologies may be contributing to these students ability to stay in touch with friends and family at home and, thus, further easing their transition to college life.

While our study did not yield significant correlations between goal orientation and any of the SACQ scales, it should be noted that both ego and task orientation were negatively correlated on several of the variables. Once again, sample size is the likely culprit for our lack of significantly large correlations. When using psychological surveys it is recommended that there be at least 10-15 participants per question and so our sample size would need to be expanded to ensure greater chance for statistical significance. We recommend further study on these variables with a larger participant pool.

Comparisons of the SACQ data with students' ACES scores on the academic skills and academic enablers subscales yielded small to medium significant correlations across every SACQ subscale. What is surprising about these findings is that the data from these two instruments are not even more highly correlated. It stands to reason, for example, that a student with high academic skills (reading/writing, mathematical/science, and critical thinking) and academic enablers (interpersonal skills, engagement, motivation, and study skills) should adapt academically and socially to college more easily. It would be interesting to conduct more research in this area to see if the ACES instrument might serve as a good predictor of students' adaptation to college.

Thus, analyses of the SACQ data generally indicated that students who had the opportunity to participate in an online, college-level course prior to matriculation were adjusting more easily to college in their first semester than their colleagues. In particular, white, non-Hispanic students and students who were involved in online sections that included a mixture of high school and college students seemed to have an advantage, perhaps because both these groups were more likely to know from others what college would be like. Female students within the high school group also had an easier time adjusting to college than their male colleagues --a finding that may be partially explained by their early academic success in their Clipper course. Lastly, and not surprisingly, our findings indicate that students who enter college with higher technical skills and academic skills/enablers are also more likely to adjust to college more readily.

Preparation for College Outcomes: 4th-year Follow-up Survey

Just prior to graduation in their 4th year, Clipper students are being asked to fill out a "Fourth-year Follow-up Survey" that asks them to reflect on their Clipper experiences. While our sample sizes are still to small for statistical analysis and/or to draw any conclusions, the raw data collected in April 2005 from the first cohort of Clipper students (2001) are reported in Table 42.

Table 42: Fourth-year follow-up survey data for first cohort of Clipper students.

		Participant type					
		On-campus student			High school student		
		M	*N*	*SD*	*M*	*N*	*SD*
When I think back on my social experiences, I believe that…	I had an established social network of Lehigh peers prior to coming to campus in my first semester.	2.00	8	1.079	2.25	24	1.359
	I adjusted easily to college life in my first year.	3.25	8	1.165	3.75	24	1.073
	I am satisfied overall with the quality of my social experiences at college.	3.75	8	.886	3.88	24	.992
	I have made lifelong friends at college.	4.50	8	.535	4.25	24	.897
When I think back on my academic experiences, I believe that…	I had a good understanding of what would be expected of me academically before I came to campus.	3.38	8	.744	3.00	24	1.216
	I adjusted easily to college-level academic expectations in my first year.	4.13	8	.641	3.33	24	1.167
	I am satisfied overall with the level of my academic performance at college.	4.13	8	1.126	3.83	24	1.049
	I have developed lifelong learning skills at college.	3.75	8	.886	3.96	24	1.042

		Participant type					
		On-campus student			High school student		
		M	*N*	*SD*	*M*	*N*	*SD*
When I think back on my instructional technology experiences, I believe that…	I was prepared before coming to college for utilizing various instructional technologies that I have encountered during my time at Lehigh.	3.75	8	.707	3.42	24	1.100
	My experiences with various instructional technologies at Lehigh have been valuable.	3.63	8	1.061	4.00	24	.722
	I am satisfied with the extent to which my professors incorporated instructional technologies into their courses and enhanced my knowledge.	3.63	8	.744	3.71	24	.999
	I am well prepared to use technology in the future.	4.13	8	.991	4.33	24	.702
When it comes to Web-based learning, I think…	Students learn substantially more from teachers when face-to-face rather through Web-based technologies.	4.13	8	.835	4.00	24	.834
	The best Web-based learning experiences support, but do not replace, face-to-face instruction.	4.38	8	.518	3.88	24	.797
	A teacher's job is to teach, not design and develop Web-based instructional technologies.	3.75	8	1.282	3.75	24	1.073
	Web-based courses are better suited to some content areas than others.	3.75	8	.886	3.83	24	.917
	Technology teaches things that teachers cannot.	3.00	8	.926	2.67	24	1.007
	Web-based courses are a waste of time.	2.13	8	.641	2.46	24	.932
	I would take (take another) online course myself.	3.13	8	.835	3.38	24	1.345
	I would (or have) recommend taking Web-based courses to others.	3.00	8	.756	3.62	24	1.096
When I picture myself after college, I expect that I will…	Continue to seek out opportunities for learning.	4.13	8	.354	4.08	24	.776
	Be actively engaged in some sort of community service.	3.75	8	.707	3.58	24	1.176
	Regularly get together with my college friends.	3.63	8	1.061	4.13	24	.992
	Look forward to opportunities to come back and visit Lehigh.	3.38	8	.744	3.50	24	1.319
	Actively seek out ways that I can give back to Lehigh through financial contributions and/or volunteering on alumni committees.	2.63	8	1.061	2.63	24	1.209

Table 43 provides a visual summary of the student outcomes findings discussed above. The table is broken into two sections, one for the students' performance in the Clipper course and one for their college preparation. Row labels correspond with subsection headers, above. Numbered column labels correspond to the numbered research questions found above.

Table 43: Summary table of student outcomes.

		1. F2F vs. all online	2. F2F vs. all HS online	3. All HS online vs. college online	4. HS only vs. HS mixed	5. F2F vs. online among courses	6. All online across participant characteristics					
							Gender	Race	College	Tech skills	Goal orient.	ACES
Course results	Course Completion Rates	S	S	S	NQS	S	S	NS	S	S	NS	S
	Final Clipper course grades	NS	NS	NS	NS	S	S	NS	NS	NS	NQS	NQS
	Grade for subs course in content area	S	S	NS	S	S	NQS	NS	S	NQS	NQS	NQS

		7.		8. HS only vs. HS mixed	9. HS among courses	10. HS across participant characteristics					
		All college vs. all HS	All HS vs. 1st yr F2F			Gender	Race	College	Tech skills	Goal orient.	ACES
Preparation for College	First-semester GPA	S		NQS	NS	S	NS	NS	NS	NS	NS
	SACQ (full scale)		S	S	S	S	S	NS	S	NS	S
	SACQ (academic adjustment subscale)		S	S	S	S	NS	NS	S	NS	S
	SACQ (social subscale)		S	NS	NS	S	S	S	S	NS	S
	SACQ (personal-emotional adjustment subscale)		NS	S	S	NS	NS	NS	S	NS	S
	SACQ (attachment subscale)		S	NS	NQS	NS	S	NS	NS	NS	S

S = significant difference
NS = no significant difference
NQS = not quite significant

Students' Assessment of Experience

11. <u>How did Clipper students evaluate their online course?</u> Table 44 provides general student course assessment data from the Survey of Course and Teaching Effectiveness. Generally Clipper students rated their course experience as "good" or better.

Table 44: Clipper students' overall evaluations of their online course.

		Instructional Delivery Subscale	Assessment/ Feedback/ Evaluation	Interactions with students	Overall course experience	Level of challenge presented by the course	Coverage of content	Instructor's contributions to the course	Instructor's effectiveness in teaching
Calculus	*M*	3.93	4.10	4.11	3.94	4.48	4.26	4.36	4.22
	n	50	50	50	50	50	50	50	50
	SD	.506	.598	.764	.890	.677	.694	.802	.864
Chemistry	*M*	3.80	3.84	3.63	3.63	4.21	4.02	4.19	4.05
	n	44	44	44	43	43	43	43	43
	SD	.73816	.85662	.844	1.235	.833	.913	.932	1.068
Economics	*M*	3.89	3.84	3.73	3.97	4.23	4.32	4.00	3.87
	n	72	72	72	71	71	71	71	70
	SD	.504	.678	.751	.910	.814	.789	.926	.883
Engineering	*M*	4.11	4.30	4.20	4.31	4.10	4.33	4.51	4.45
	n	49	49	49	49	49	48	49	49
	SD	.570	.624	.736	.796	.872	.724	.794	.792
English	*M*	4.29	4.49	4.63	4.59	4.43	4.41	4.70	4.64
	n	44	44	44	44	44	44	44	44
	SD	.575	.561	.561	.622	.587	.658	.594	.685
Total	*M*	3.99	4.09	4.03	4.08	4.28	4.28	4.32	4.21
	n	259	259	259	257	257	256	257	256
	SD	.593	.711	.812	.953	.776	.765	.861	.904

1=poor, 2=fair, 3=adequate, 4=good, 5=excellent

Table 45: Clipper students' overall evaluations of support services and technologies.

		Supportive Services		Supportive Technologies	
		Helpfulness	Ease of Use	Helpfulness	Ease of Use
Calculus	*M*	3.52	3.79	3.78	4.18
	n	50	49	49	48
	SD	.700	.791	.675	.560
Chemistry	*M*	3.53	3.86	3.34	4.03
	n	43	43	41	41
	SD	.665	.615	.944	.746
Economics	*M*	3.77	3.80	3.67	4.08
	n	72	72	69	69
	SD	.642	.708	.732	.672
Engineering	*M*	3.71	3.87	3.43	3.90
	n	49	49	48	48
	SD	.711	.624	.913	.871
English	*M*	3.83	3.65	3.90	4.07
	n	43	43	44	44
	SD	.672	.782	.619	.636
Total	*M*	3.68	3.79	3.63	4.05
	n	257	256	251	250
	SD	.682	.706	.799	.702

1=very unhelpful/difficult; 2=unhelpful/difficult; 3=somewhat helpful/easy; 4=helpful/easy; 5=very helpful/easy

Table 45 supplies feedback data from Clipper students about their satisfaction with the level of support services and technologies they received while taking their online course. Students generally rated both supportive services and technologies as helpful and easy to use.

Table 46 supplies frequency and relative percentage data for the online students' willingness to repeat their online course experience and/or recommend it to others. Here again, the students were generally positive.

Table 46: Frequency data for student opinions about repeating/recommending the online course experience.

	Yes		Unsure		No		Total	
	#	%	#	%	#	%	#	%
Take another course from this instructor?	154	83	27	14	5	3	186	100
Recommend this course to others?	137	73	30	16	20	11	187	100
Take another online course?	97	52	61	33	28	15	186	100

The last, open-ended item of the Survey of Course and Teaching Effectiveness invited students to provide any additional comments or suggestions. Qualitative analyses of the 60 responses received revealed that the majority of the comments could be characterized generally as positive (“"The course was excellent and the prof did an awesome job with everything…”), 25 could be characterized generally as negative (“I felt the course was completely unorganized…”, and 24 could be characterized generally as neutral (“"taking an online course is a lot different than being in the classroom…”). Further breakdown on those responses follows in Table 47.

Table 47: Frequency of category reflected in open-ended end-of-course survey item.

	Frequency of response		
Response category	-	-/+	+
course concerns or suggestions		20	
developed new skills; learned content; learned things about myself			15
learned what's expected academically			11
time consuming/ heavy load; tech got in the way	9		
disliked lack of contact/ interaction	8		
would have done better in F2F	8		
liked freedom of schedule; liked JIT ability to repeat course materials			7
good way to pick up credits			6
good way to meet other new students before matriculating			5
some content is more difficult to learn online than other content		4	
Totals	25	24	44

Table 48: Clipper students' assessment of time/effort involved to complete their online course.

		Hrs per wk spent on course	How many hrs spent per week were valuable	Amt. of effort put into course	Amt. of effort necessary to succeed in course
Calculus	*M*	2.72	2.32	3.26	3.08
	n	50	50	50	50
	SD	1.011	1.039	1.306	1.353
Chemistry	*M*	2.23	2.02	3.57	3.91
	n	44	44	44	44
	SD	.886	.976	1.021	.830
Economics	*M*	2.10	1.79	3.03	3.07
	n	72	71	72	72
	SD	.735	.695	.978	1.167
Engineering	*M*	1.96	1.76	3.51	3.55
	n	49	49	49	49
	SD	.676	.596	1.043	1.119
English	*M*	2.55	2.32	4.11	3.84
	n	44	44	44	44
	SD	.848	.857	.784	.834
Total	*M*	2.29	2.02	3.44	3.44
	n	259	258	259	259
	SD	.870	.864	1.096	1.147

1=less than 5; 2=5-10; 3=11-15; 4=15-20; 5=more than 20
1=very low; 2=low; 3=moderate; 4=high; 5=very high

12. How much time/effort did Clipper students report was required for their online course? Table 48 provides student report data on the level of time/effort involved to complete their Clipper course. Students reported putting in between 5-10 hours per week on their course with moderate to high effort.

13. To what extent did Clipper students believe their academic and technology skills improved as a result of taking their online course? Table 49 illustrates the extent to which the Clipper students believed their academic skills improved as a result of taking the online course. Students reported that their knowledge of course-related content and appreciation for the related field of study improved.

Table 49: Clipper students' assessment of academic skills improvements.

		Knowledge of course-related content	Knowledge of "real world" skills that I will be able to use professionally and/or personally	Appreciation for this field of study	Problem solving	Decision-making	Critical thinking skills	Written communication skills	Analytical skills
Calculus	*M*	4.24	3.68	3.84	3.94	3.60	3.78	3.38	3.94
	n	50	50	49	50	50	50	50	50
	SD	.687	.653	.825	.620	.700	.679	.602	.682
Chemistry	*M*	4.16	3.68	3.95	3.84	3.77	3.77	3.59	3.75
	n	44	44	44	44	44	44	44	44
	SD	.680	.674	.888	.680	.677	.743	.787	.686
Economics	*M*	4.42	4.08	4.06	3.76	3.68	3.82	3.54	3.82
	n	72	72	71	72	72	71	72	72
	SD	.575	.666	.876	.702	.728	.703	.711	.699
Engineering	*M*	4.57	4.08	4.24	4.20	3.86	4.20	3.53	4.12
	n	49	49	49	49	49	49	49	49
	SD	.677	.731	.751	.790	.736	.707	.767	.666
English	*M*	4.59	4.09	4.23	3.73	3.79	4.02	4.23	4.00
	n	44	44	43	44	43	44	44	44
	SD	.542	.640	.868	.758	.709	.762	.677	.682
Total	*M*	4.40	3.94	4.06	3.89	3.73	3.91	3.63	3.92
	n	259	259	256	259	258	258	259	259
	SD	.647	.696	.852	.725	.713	.730	.758	.691

1=significantly decreased; 2=decreased; 3=remained the same; 4=improved; 5=significantly improved

Table 50: A comparison of Clipper students' reported beginning and ending technology proficiency/comfort.

		Beginning		Ending	
		Proficiency	Comfort	Proficiency	Comfort
Calculus	*M*	3.64	3.74	3.83	3.84
	n	109	109	50	50
	SD	.635	.656	.720	.700
Chemistry	*M*	3.77	3.83	4.04	4.03
	n	67	67	44	44
	SD	.637	.709	.674	.633
Economics	*M*	3.67	3.82	3.85	3.94
	n	118	117	72	72
	SD	.625	.651	.712	.639
Engineering	*M*	3.85	3.93	4.21	4.23
	n	68	67	49	49
	SD	.709	.656	.549	.637
English	*M*	3.68	3.75	3.97	3.97
	n	80	80	44	44
	SD	.559	.622	.588	.592
Total	*M*	3.71	3.81	3.97	4.00
	n	442	440	259	259
	SD	.633	.657	.669	.650

1=very low; 2=low; 3=moderate; 4=high; 5=very high

Table 50 shows how Clipper students reported their ending technology proficiency/comfort as compared to their beginning levels.

Paired-samples t-tests were conducted to evaluate the impact that the Clipper course had overall on students' beginning and ending technology proficiency/comfort scores. There was a statistically significant increase in both the proficiency scores from beginning (M = 3.74, SD = .649) to ending (M = 3.97, SD = .669), $t(257) = -7.21$, p = .000) and the comfort scores from beginning (M = 3.85, SD = .644) to ending (M = 4.00, SD = .650), $t(255) = -4.59$, p = .000). The eta squared statistics indicated a large effect for proficiency (.17) and a moderate effect for comfort (.08).

Table 51: Qualitative data from open-ended drop survey.

Item	Response category	#	%
1.Why were you originally interested in the Clipper courses?	convenient way to get required course/ credits out of the way / head start	49	54
	experience academic expectations/ workload	14	15
	experience online course / participate in research project	12	13
	free/ save money	9	10
	interested in tech / content area/ expand on knowledge	7	8
	Totals for item #1	91	100
2.What did you expect from your online Clipper course? How did your experience differ from your expectations?	expected it to be a lot of independent, self work with few scheduled activities or deadlines	29	25
	expected it to be more like traditional course	19	17
	expected it to require less time and/or work than it did	15	13
	wasn't sure what to expect / don't know / didn't get far enough in course	15	13
	expected to pass/ learn the content /earn credits	13	11
	my experience didn't differ from my expectations	12	11
	expected tech to work / tech support / expected to have access to online lectures and notes	11	10
	Totals for item #2	114	100
3.What factors led to your decision to drop the course?	time / falling behind in other things	40	40
	lack of social connectedness	19	19
	getting or anticipating bad grades	14	14
	logistical / timing issues / tech problems	12	12
	delay in receiving help / feedback	6	6
	didn't feel was measuring up to classmates	3	3
	was not learning as much as I wanted to learn	3	3
	lack of motivation to do the work / course wasn't interesting	3	3
	Totals for item #3	100	100
4.What did you like about the course and why?	liked schedule / flexibility / review / easy access / convenience / working at own pace	19	24
	liked instructor support / responsiveness / feedback	15	19
	liked to see how online course worked / plan / technologies used / book	14	17
	liked receiving credit / experience before matriculation	13	16
	liked interactions / meet others / synchronous sessions / discussions	11	14
	liked challenge of learning the content / subject matter / technology	8	10
	Totals for item #4	80	100
5.What didn't you like about the course and why?	discomfort with online communication / lack of connectedness / interactions	34	51
	disliked course format / plan	14	21
	technical / logistical difficulties	10	15
	too much work / effort required	9	13
	Totals for item #5	67	100
6.What recommendations do you have for improving the course in the future?	recommended changes to course format / plan / text	15	24
	improve / increase communications, interactions, connectedness	14	22
	improve program infrastructure, logistics, organization	9	14
	none	8	13
	fix tech problems / improve technical support	6	9
	more self-paced learning and asynchronous materials, increase flexibility	5	8
	set expectations / make clearer time / effort involved	3	5
	offer a different course (different sub) online	3	5
	Totals for item #6	63	100

14. Why did Clipper students drop their online course? Table 51 provides data from the open-ended drop survey. Sixty-one students who dropped their Clipper course prior to completion responded to the drop survey.

It appears from the results that respondents' expectations of the course and their suggestions for improving it were rather mixed. A majority of the respondents reported that they were originally interested in the Clipper course because they viewed it as a convenient way to get required course credits out of the way (54%), but eventually found they had to drop their online course because of a lack of time given all their activities (40%). While many reported that they liked the flexibility of the online course format (24%), the majority of students who responded were uncomfortable with the lack of social connectedness with their instructor and other students (51%).

Faculty Outcomes

Five key faculty were identified to develop the first five online courses for Clipper: David Johnson, Ph.D., Calculus (DJ); Natalie Foster, Ph.D., Chemistry (NF); Tom Hyclak, Ph.D., Economics (TH); Jacob Kazakia, Ph.D., Engineering (JK); and Ed Gallagher, Ph.D., English (EG). When asked, faculty reported having a variety of motivations for agreeing to participate in the Clipper Project:

> *I have been involved with using computers for a very long time. I am a UNIX user. This has presented some particular challenges for the Clipper project. (DJ)*

> *I was primarily interested in using the new technology that would be available through the Clipper project to see how we could enhance teaching here in the Chemistry department, and to drive changes in my own teaching. (NF)*

> *I thought it would be a good way to develop materials that could be used in the regular economics class. I am not that good with technology, but I am very open to it. Most of the time, I use computers as a research tool rather than as a teaching tool. But I was an early adopter of Blackboard. I found it to be useful right from the start. (TH)*

> *I had a website in support of the Engineering course before Clipper. This is a big course, and I designed the website to help the TA's. This course has been in place for thirty years. Faculty present the lectures and TA's do the recitations with the students. The website was already helping students. I saw Clipper as an opportunity to improve what we were already doing with the Web. I have long imagined that some students could work online. In fact, some where already doing this by simply not attending class. Clipper, of course, is aimed at high school students. (JK)*

> *The course is a real experiment. Clipper came at just the right moment for me. The access to resources that it has provided has been so helpful. Clipper was made for someone like me. The challenge is very appealing. We are testing the hypothesis that you have to teach writing face-to-face. Another question is whether we can create the kind of community online that Lehigh prides itself on in its regular courses. Some people said that you can't enable the social construction of knowledge online. I said, "Let's do it." (EG)*

Online and F2F Course Compared

15. How did participating instructors compare their Clipper and face-to-face courses? Faculty were asked at various junctures during the project to compare their online and F2F teaching experiences in terms of workload, social connections, and outcomes.

Workload: Generally the Clipper faculty viewed teaching online as more demanding than teaching face-to-face courses.

> *Preparation is extremely demanding in online. In a regular class, when I walk into the classroom, I usually know what I am going to say after twenty plus years of teaching. But I can make adjustments on the spot based on student questions. In online, it is much more challenging to know what to say and how to say it. Maybe in another twenty years, teaching online will be as easy as it is in the classroom. There are 60 students in my regular class, and I have a half-time TA to help me. If I had more than 25 in the online class, I would need to TA to help manage the workload. (DJ)*

> *The preparation to teach online is where the time and workload are. I have a TA to help with the actual implementation of the course. (NF)*

> *Although delivering an online course is easier than I had imagined, the preparation for teaching online is very demanding. (JK)*

> *[Before taking on an online course] Make sure you have a very good reason, personal or pedagogical, to carry you through the initial learning curve and the time drain. (EG)*

Social Connections: Four of the 5 Clipper faculty reported from time-to-time during the project that they felt interaction was a problem in their online course.

> *The students don't ask many questions. (JK)*

> *Interaction was a problem, In comparison with past clipper classes this group did not ask many questions or post observations about things on the bulletin board. I had 2 Centra sessions so they could ask questions and these deteriorated into lectures. (TH)*

> *Once the course was running, I actually didn't have a lot of interaction with the students. I think I had two or three calls from them the whole time. When I taught Chemistry through a teleconferencing system before, I got calls from the students all the time. (NF)*

> *In a face-to-face course, you are able to put a lot of emphasis on the material as you present it, make it unique for your students. It is harder to do that online. (DJ)*

However, in their summative evaluations Clipper faculty thought generally the technology-enhanced communications and smaller sections allowed them to get to know the Clipper students better than their counterparts in the face-to-face sections.

> *In Clipper, I feel that I do know the [online] students a lot better than I do in the regular class. Of course, in the regular class there are 60 students and it is hard to get to know many of them anyway. By contrast, I think the students in the face-to-face class have more of a connection with each other than online. Students in the regular class are more prone to help each other. In the online class, the students may participate in chat rooms, but it isn't very substantive, and it certainly isn't about Math. (DJ)*

> *I enjoyed the Clipper section more and felt I had more contact with the students even though I wouldn't be able to recognize any of them on the street. (TH)*

> *I know the students so much more in the online discussion groups. We often break out into personal areas online. Not every student likes this. Some would prefer to be more passive than this approach allows. (EG)*

Outcomes: While acknowledging the higher drop-out rate, faculty generally thought that Clipper students were at least as engaged and successful as their face-to-face counterparts.

> *There is definitely a higher dropout rate in online. A few can't handle the technology. Some don't have the time. They did not realize how much time this takes, and they found that this course conflicts with all the extra-curricular activities they have. (DJ)*
>
> *There is heavy attrition. Some students dropped right away. They perceived that it was too much work. Others found that the course expectations interfered with their extracurricular activities. Some thought that the online would be easier than the regular class. I admire the ones who finish this course. They are a special group. (NF)*
>
> *I have not observed much difference in performance between the students in the online and regular versions of the course. Some seem to get it from the beginning whereas others just barely muddle through the material. (TH)*
>
> *[Aside from the large number of drops] in general, the students in the Clipper course are more interested and better motivated. They did very well in assignments and tests. (JK)*
>
> *My sense is that the students were better in the Clipper course than in my regular English 1. It's a bit like the experience teaching English 11 here, the course we offer in lieu of English 1 for students who achieve advanced placement. I didn't feel I was dragging any of them along – which is a very common occurrence in English 1. (EG)*

Long-term Pedagogical Shifts

16. What, if anything, did participating faculty take away from their Clipper course and adopt as part of their regular pedagogical style? Just about every faculty member reported incorporating in some way the technologies and materials developed through the Clipper project into their "regular" courses:

> *I am already using in all my classes all tools used for the Clipper course (on line notes, Blackboard, automated tests, surveys, etc.). (JK)*
>
> *I don't feel much difference between my online and face-to-face courses anymore. They have blended. On campus I teach in a computer classroom, and all student work comes via the computer and most of the important interaction comes via the computer as well. Funny, but not seeing the students doesn't seem to make an especially big difference in this writing course. (EG)*

More importantly, however, the faculty also observed that the online technologies employed in their Clipper courses challenged them to think differently about teaching and learning in all contexts:

> *I think the online course highlights the importance of peer learning. In most course that is informal but I think I will try to make that a more formal part of my on campus classes in the future. (TH)*
>
> *I like the fact that everyone's work is public. It enables peer feedback. The old model was students would write a paper and only the professor would read it. This is better. (EG)*
>
> *Eventually, I would like to use a blended model in the regular class. But people don't realize how much support is needed. There are just simple things that can eat up your time, like figuring out how to get the textbooks to the Clipper students. There is also a need for a great deal of computer support for the students. It requires a great deal of*

support from the Clipper staff, especially administrative support. (NF)

...the online course shifts the burden to the student to learn rather than from the faculty to teach. In the regular course, students show up expecting you to interpret the material for them, and then they will learn the interpretation you give them. (TH)

One example [of our pedagogy] is that online, I pose a question, have the students answer, and then have them compare their answer to an expert's answer. We are trying to get them to think like a real chemist. The molecular view of the world held by chemists is unique. I like this strategy, but I don't know if it works. (NF)

The Clipper Project provided the chance for participating faculty to learn how to design and develop instruction for online delivery. More than that, however, it became a test bed for exploring best practices for instructing in *any* medium and renewed interest among faculty in the "scholarship of teaching" – whereby a portion of their time was devoted to assessing their pedagogical styles and seeking alternatives to "chalk and talk" methodologies.

Institutional Outcomes

17. To what extent did Clipper courses increase the number of students who ultimately complete their Lehigh University degree? Of the 293 early decision high school students who participated in the Clipper project, 288 matriculated the next fall for a 98% yield (actual entrance numbers as compared to admittance numbers). To date, only 12 (4%) of the 288 who matriculated have withdrawn from the University prior to degree completion –for a projected 6-year graduation rate among Clipper students of approximately 96%. While we will be unable to make direct comparisons until May 2006, it appears that the Clipper students' 6-year graduation rate may be as much as 10-13 percentage points higher than the general Lehigh student population (see Table 52).

Table 52: Graduation rates for Lehigh students generally.

Cohort year	Initial #	# Graduated within 6 years	%
1994	1105	929	84
1995	1045	866	83
1996	1101	923	84
1997	1099	940	86

Of the 12 Clipper high school students who have withdrawn from the University to date, 10 (83%) did so at some point prior to the start of their second year. That said, this also means that 97% (278 of 288) of the Clipper students who matriculated enrolled the following fall semester, as compared to rates between 93-94% for the general University population (see Table 53).

Table 53: First-year retention rates for Lehigh students generally.

Cohort's 1st year	% enrolled following fall semester
2000-2001	94.0
2001-2002	92.4
2002-2003	93.0
2003-2004	93.0

18. In what ways did Lehigh have to adjust its standard procedures, policies, and cultures in order to accommodate the Clipper courses/students? Clipper was the first concerted effort that Lehigh

University made in offering online courses. As such, there were many changes to procedures, policies, and cultures needed to be adjusted along the project's tenure.

Procedure Changes

ID Assignments – Prior to Clipper, in order to receive an email account students first had to report physically to the "ID Office" to have their photo-ID picture taken.

Withdrawal dates – Various logistical difficulties among admissions, financial aid, and LTS meant that the Clipper courses couldn't start with the "regular" spring semester. Different start dates and late registrations for Clipper courses throw off all withdrawal dates with the Registrar's office.

Textbook orders – Prior to Clipper, the bookstore was used to accommodating walk-in students only. Mail-order procedures had to be put into place to accommodate students at-a-distance as well.

Technical support – Supporting students' technology needs at a distance also necessitated procedural changes in the University's Library and Technology Services (LTS) division. Typical assumptions about the technologies to which on-campus students have access (like Microsoft Office products) could not be made for Clipper students. In addition to working out "baseline" technology needs, LTS staff had to work hard to supply better initial print materials and ongoing phone support to Clipper students.

Grade mailings – Just prior to the start of the Clipper Project, the implementation of the University's new "Banner" administration software meant that students' semester grades would be available online and the Registrar's Office could stop sending out hard-copy grade sheets unless requested. Since Clipper students had not officially matriculated, they did not have access to the Banner system and had to have their grades mailed to them.

Policy Changes

Intellectual Property Policy – Discussions early in the project over ownership of the online course materials after they had been produced was part of what prompted the Provost's Office and the Board of Trustees to review and revise the University's Policy on Intellectual Property in 2001 (available online at http://www.lehigh.edu/~policy/university/ip.htm).

Academic Probation Policy – Prior to Clipper, the University's policy was to review all students at the end of every semester. First-year students with a cumulative GPA of less than 1.70 were automatically put on academic probation. This meant that those few who made the "growth choice" to take a difficult college-level course during their senior year of high school and ended up doing poorly in their Clipper course ended up on probation as well. The irony of it is that it appears that if these students had taken their Clipper course along with the other 12-14 credits that makes up the typical first-semester course load, they would not have ended up on probation. The policy was changed in February 2003 to put off initial progress evaluations of incoming students until after they have completed 12 credits or more.

Code of Conduct Statement – During orientation, entering first-year students read and sign a "Code of Conduct Statement" that establishes the University's expectations of students for academic integrity, responsibilities, and respect for others, property, and self. An unfortunate incident in 2003 during one of the Clipper course offerings made clear that the Code of Conduct Statement would need to be extended to and signed by the Clipper students thereafter as well.

Culture Changes

Among the many positive influences that the Clipper Project had on the larger institution was to help increase recognition on campus that large scale course redesign using information technology would involve a partnership among faculty, LTS staff, and administrators in both planning and execution. The faculty/LTS staff collaborative model piloted as part of the Clipper Project became a partial impetus for extensive reorganizations during the late 1990s and early 2000s that united academic computing, media services, administrative computing, distance education, digital initiatives, library services, and faculty development into a single organization, with the goal of advancing a vision of systemic change in the classroom. Among the initiatives to come out of that reorganization was Lehigh Lab, for which the University received an EDUCAUSE "Systemic Progress in Teaching and Learning Award" in November 2004. Like Clipper, Lehigh Lab was founded on the idea that the University as a whole is a laboratory, in which faculty, staff, and students work and experiment together, across departments and disciplines, to advance learning.

The Clipper Project also has helped to clarify Lehigh's vision of online learning and to crystallize its role within the University. One member of the Library and Technology Services staff assigned to Clipper noted:

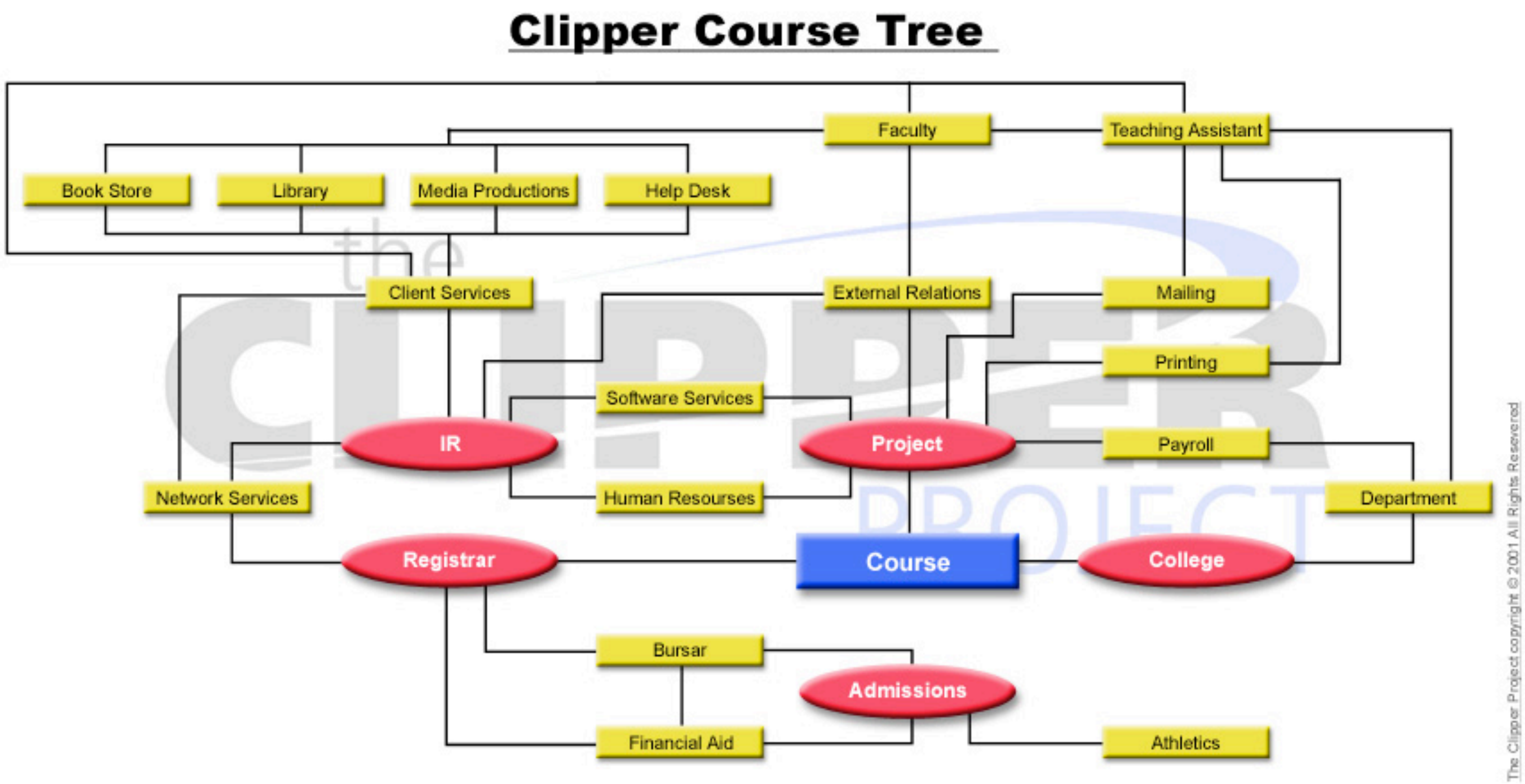
> *We don't favor the mass production mode of online learning here, developing courses that anyone, anywhere can use. We serve a specific niche market in higher education. We should continue to develop online courses, but only to serve our specific market. It's given us a vision of the possibilities for online learning. It's changed our distance education model from video delivery to learning objects. There is a much better atmosphere for innovation, thanks to Clipper.*

Further, faculty and students appear to be in consensus that the Clipper Project has enhanced the reputation of Lehigh University by providing an innovative model for the delivery of postsecondary courses. One faculty member projected:

> *Clipper also provides more visibility for Lehigh University in terms of innovative distance education. I expect our summer enrollment to increase, and we may be adding students from outside… students looking to earn credits that they can transfer elsewhere…*

Thus, at some level, just about every division within the institution has made adjustments in order to accommodate students who are not physically present on campus and courses delivered outside the limitations of time and space. The extent of Clipper's institutional effects are illustrated in Figure 1.

Figure 1. The extent of the Clipper Project's effect on University procedure, policy, and culture.



The Future of the Clipper Project

We are now more than a decade into the Internet revolution. Yet there are still many more questions than answers about how or whether the use of online technologies enhances K-16 education. There is widespread agreement, however, that Web-based instruction is a major breakthrough in teaching and learning (Kahn, 1997). Moreover, as many universities have shown through their enormous success in providing hundreds of thousands of students with online courses, Web-based instruction makes higher education more accessible, convenient, and flexible. Owston (1997) observed that, in addition, Web-based instruction provides learning opportunities for a more diverse body of students who would not otherwise have access to such experiences.

Thanks to the support of the Andrew Mellon Foundation the undergraduate online courses developed by the Clipper Project have been effective in providing students with an opportunity to transition into college-level learning. Given the potential impact of online learning on higher education and the lack of empirically based results regarding its effectiveness, the Clipper Project must continue to disseminate these results and conduct new research into the consequences of technology-based coursework on teaching and learning as well as its effects on the overall processes of higher education.

Future Directions

While there are almost unlimited opportunities to translate the discoveries of Clipper into practice, Lehigh University currently is identifying priorities to be addressed as we move forward, including:

1) addressing the logistical issues involved in offering Web-based college courses to high school seniors,
2) exploring new pedagogical models for the design of online communities of learners; and
3) engaging incoming students in important thinking-skills and life-strategies topics early in their college experience.

Addressing the Logistical Issues

Data collected during the first and second phases of the project suggest 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. We would like to explore the feasibility of offering courses during the summer before students matriculate instead of during the spring of their senior year. This approach would allow more incoming students to participate in Web-based introductory college-level courses and enable us to explore a wider variety of course topics.

Exploring New Web-based Pedagogical Models

In his November 2002 external evaluation report on the Clipper Project, Dr. Thomas C. Reeves, professor of instructional technology and assessment expert from the University of Georgia, wrote:

> *The design of the CLIPPER courses appears to have been guided by the principle that the high school students enrolled online should engage in course activities as closely matching those of the courses they will eventually experience at Lehigh University as possible. In other words, the online courses have been designed, for the most part, to replicate most of the components of traditional classroom instruction. For example, classroom lectures have been replaced by PowerPoint presentations with audio or mini-*

lectures or demonstrations using software such as Camtasia and Flash. The presentation of information, textbook readings, structured problems, and multiple-choice exams are the major components of most of the Clipper courses.

As Reeves observed, several factors have likely contributed to the "high fidelity" between the Clipper courses and their F2F counterparts. First, in the absence of guidelines, educators—like everyone else—have tended to adopt newer technologies as a substitute for the older technologies (Saettler, 1990). Second, some Web-based course management technologies (like Blackboard) primarily support traditional instructional activities, with little support for helping instructors think differently about online teaching and learning methodologies. Third, it appears some content areas and topics may lend themselves more naturally to alternative pedagogical approaches. For example, one particularly successful online pedagogical model has emerged from Clipper English, a course focused on personal expression. There, students are encouraged to engage in writing and collaborative critique through a simulated "history-on-trial" approach. Interestingly, more so than any of the other four Clipper courses, the Clipper English students have exhibited signs of having established strong social bonds and formed a "community" of learners.

Lehigh is not alone in the evolution of its thinking about Web-based instruction—it appears the conservative, "replication" approach to the design of online courses has been a necessary first step for many institutions as they have explored this new teaching and learning delivery system (Kearsley, 2000). And, like the others, we are finding that students do at least as well in these online courses as their F2F counterparts. We are anxious now to explore ways in which we might capitalize on what we have learned from Clipper I and II to exploit the unique affordances of the available technologies in order to *enhance* learning from online courses—to move away from the talking head at the chalkboard and to think differently about teaching and learning (Lockee, 2001).

Engaging Incoming Students in Thinking-skills and Life-strategies Topics

The first year of college is a time of tremendous opportunity as well as significant risk for students. Both from the student affairs perspective as well as from social psychology literature, it is known that individuals who feel competent and skilled, and who believe that they have the ability to organize and execute a course of action, succeed and challenge themselves to the highest levels (Bandura, 1977). Even more so, the academic success of a student in his/her first semester is highly related to the student's overall academic and social adjustment to college life (Bishop & White, 2004, paper presented on preliminary data from Clipper II at the Ed Media Conference in Lugano, Switzerland). If this holds true, then what students experience and how good their study skills are before entering college ultimately sets the course for their academic career and success in higher education.

In addition, more than any other group, first-year students are most receptive to the development of new habits and behaviors regarding personal time management, study habits, socialization, and personal health. Over the last 5 years, Lehigh has identified a number of "first-year experience" initiatives—such as global citizenship, enhancing student life, and information literacy—that are aimed at shaping each student's expectations, values, and intrinsic sense of what matters as he or she makes the transition from high school to college life.

Global Citizenship

With support from the Andrew W. Mellon Foundation, Lehigh University has recently undergone a two-year study that examined the need for integrating a global and civic education program into the curricula. In their March 2004 report, the planning group argued that "contemporary liberal education requires us to look critically, imaginatively, and comparatively at the problematic of citizenship." As a result of the committee's efforts, the University will launch a new 26-credit Global Citizenship program in the fall of 2004 that will engage students in classroom instruction, study abroad, service-based learning, and co-curricular study. While study abroad is typically offered in the sophomore and junior years of study, the Global Citizenship program will require students to study abroad during the winter break of their first year through cooperative learning programs with overseas universities using Web-based technologies. In addition, Lehigh is exploring ways to cultivate other global citizenship-based projects that will support this broad-based initiative. While admission to the Global Citizenship program will be limited, the plan is to offer all first-year students opportunities to work on global citizenship as one of several small, intellectual, co-curricular communities currently under development.

Enhancing Student Life

Like fraternity and sorority systems nationwide, Lehigh's Greek system today faces major challenges. While some institutions have dealt with the situation by abandoning their fraternities and sororities, Lehigh has chosen to explore ways in which the Greek system might thrive –but for all the right reasons—to enrich the academic and social life of Lehigh undergraduates. Early in 2003, President Gregory Farrington charged the Task Force for Strengthening Greek Life with examining these issues and making recommendations for change. In his January 2004 letter to the campus community, Task Force Chair Joe Sterrett recommended that all parties involved adopt clear roles and responsibilities for raising standards and expectations for the University's Greek system. As part of this goal, the committee proposed a commitment to leadership training and student development. Plans to reach that goal include developing a credit-bearing curriculum in life-skills and leadership services.

Information Literacy

In response to faculty concerns and the new Middle States Commission on Higher Education standards and guidelines for information literacy, the University has recently convened a committee to identify the base-line competencies necessary for Lehigh students to effectively find, evaluate, apply, integrate, and ethically use information. While campus discussions about making information literacy a student-learning goal are taking place among faculty, librarians, instructional technologists, and administrators, the committee has proposed several programs to be implemented over the next five years.

An underlying theme behind each of these efforts is the resolve that such "first-year experience" topics be integrated *early* into the students' academic experience at Lehigh, both to engage their minds as well as to help them form social communities centered on good values right from the start. The Clipper Project has demonstrated that Web-based courses can be particularly good at academically and socially engaging students in the University before they even set foot on campus. We would, therefore, like to explore ways in which the lessons of Clipper might be extended to help high school seniors make the transition to college.

Future Project Plans

Some ideas for translating the lessons of Clipper include:

- Designing, developing, and implementing an online assessment tool that would be completed by first-year students during the summer before matriculation, coordinated with their shared reading experience and potentially with co-curricular programming.

- Applying a taxonomy approach, similar to Bloom's Taxonomy of Critical Thinking Skills, to organize higher order and lower order information literacy skills, which would be tied to empirical research questions to continue to address some of the most profound questions concerning technology-enhanced teaching and learning.
- Testing students across an array of information literacy skills, such as finding relevant and credible sources, evaluating bias in a source, using a source to help build an argument, and learning and retention strategies. Because these skills cannot be easily taught when they are out of context, they might be situated within the larger context of exploring issues, such as global citizenship. Unlike traditional "high fidelity" Web-based course offerings, however, this course might follow something closer to the successful Clipper English model by using the available technologies to help establish communities of learners; groups who might be led, in part, by third- and fourth-year "mentor students" who themselves would be required to engage in leadership training prior to being eligible to participate (which comes from the Enhancing Student Life program).
- Bringing together instructional designers, cognitive psychologists, and educational researchers, to develop modules with simulation components that would enhance the information literacy skills of incoming first-year student to Lehigh University. The goal of the modules would be to provide transitioning students with the core skills for success in the first semester of their academic career and beyond. These modules would be self-paced, providing the student with corrective feedback and offering strategies for success—all components of a good tutorial.

The Clipper team plans to continue meeting with individuals involved in the initiatives discussed above, to explore the feasibility of extending the Clipper model to *all* incoming students in the summer before they matriculate, which might help to address some of the topics Lehigh has identified as important to the first-year experience.

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Background Information Survey

Background Information

If you are a pre-admit student and would like to enroll in Lehigh University's Clipper Project, please respond to this brief questionnaire. Please note that all information received is confidential to the Clipper Project ONLY. Thank you for your interest.

Please answer each question. Click on the appropriate answer where multiple options are provided.

Personal Information

First Name:		MI:	Last Name:	
Street Address:			City:	
State:	-- Select One --		Zip:	
Phone:			E-mail Address:	
Date of Birth:	mm/dd/yyyy		Social Security #	
Sex:	Male	Female		

Expected College Major(s):

Occupation you intend pursue after graduation:

Expected College of Enrollment: Arts & Sciences Business & Economics Engineering & Applied Science

Location of High School: Urban Suburban Rural

High School GPA: (4-pt.Scale)

SAT Verbal: Not Taken (If applicable. Enter numbers only.)

SAT Math: Not Taken (If applicable. Enter numbers only.)

ACT Composite: Not Taken (If applicable. Enter numbers only.)

AP Courses Taken in HS: Calculus Chemistry Economics English Other

Total AP Courses Taken in HS:

Please rank order (1 = first choice, 2 = second choice, etc.) your enrollment preference for the following web-based courses during the Spring term (Jan. 28th – May 17th). If you are not interested in taking a specific course, please check the appropriate box.

	1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice	Not Interested
Chemistry I (Intro to Chemical Principles)						
Economics I (Principles of Economics)						
English I (Composition and Literature)						
Engineering I (Engineering Computations)						

Calculus I

Currently, Lehigh web-based courses are offered at no cost to incoming students, and successful completion of these courses allow you to receive credit toward your degree. With this in mind, please indicate the number (0, 1, 2, 3, 4, or 5) of web-based courses you would take if offered at the following times during the year.

2nd semester senior year of high school: [ ]

Summer following high school graduation: [ ]

Internet Information

1) Do you currently have access to the Internet?	No Yes		
2) Where do you primarily access the Internet?	School Home Other No Access		
3) What time(s) during the day do you typically have access to the Internet?	06:00 - 08:00 12:00 - 14:00 18:00 - 20:00	08:00 - 10:00 14:00 - 16:00 20:00 - 22:00	10:00 - 12:00 16:00 - 18:00 22:00 - 24:00
4) Are you able to access the Internet during the summer?	No Yes		
5) What web browser do you typically use?	**Netscape:**	4.7	6.0
	Internet Explorer:	5.0 6.0	5.5
6) What is the processor of the computer you usually use to access the Internet?	**PC:**	486 or lower Pentium II or equivalent Pentium IV or equivalent	Pentium I or equivalent Pentium III or equivalent
	Mac:	PowerMac G3 PowerBook	iMAC/iBook G4
7) What is the operating system of your computer?	**Windows:**	95/98/ME XP	2000
	Mac:	9.1	10.1
8) At what speed do you typically access the Internet?	**Dedicated Line:**	TI Connection Network	ISDN Cable Modem
	Dial-up Modem:	14.4 56	28.8
9) Have you taken or are you taking any Web-based courses during high school?	No Yes (If No, skip question 9 below)		

10) Please provide the name or a brief description for each web-based course in which you are or have been enrolled, the institution that offered the course (e.g. your school, a corporation, college or university, etc.) and whether or not you completed the course.

Web-based Course	Institution	Completed?
		No Yes
		No Yes
		No Yes
		No Yes

Please rate your current level of proficiency and comfort in using the following technologies.

Technology Skills	Level of Skill Proficiency					Level of Comfort				
	Very Low	Low	Moderate	High	Very High	Very Low	Low	Moderate	High	Very High
Computers										
Internet										
E-mail										
Bulletin or Discussion Board										
Chat Room										
Word processing software										
Data management software										
Web page authoring software										

Additional Comments

Submit

Academic Competence Evaluation Scales (ACES)

ACES
Academic Competence Evaluation Scales™

Academic Competence Evaluation Scales

James C. DiPerna and Stephen N. Elliott

College Form

Student Information

Name ______________________ Date ______________________

Birthdate ____ / ____ / ____ Major ______________________ Current GPA __________
month day year

Year in College ☐ First ☐ Second ☐ Third ☐ Fourth ☐ Other ______________________

Directions

The Academic Competence Evaluation Scales assess a student's academic skills and academic enablers (interpersonal skills, engagement, motivation, and study skills). For each item, two ratings are required. The first rating should reflect your best estimation of your skill level in comparison to other students at your college or university. The second rating concerns the importance of the skill for academic success in your studies. Remember to circle two responses for each item. Below is an example.

Reading/Writing Skills	Far Below	Below	At Grade Level	Above	Far Above	Not Important	Important	Critical
Reading comprehension	[illegible]	(2)	[illegible]	4	[illegible]	1	[illegible]	(3)

For the Proficiency rating of the skill, the student circled a 2, which means the student judged the skill to be below that of other students at the college or university. For the Importance rating, the student circled a 3, which means it is critical for academic success.

Please be sure to answer all of the questions on the following pages. There are no right or wrong answers, just your ideas about how often you use these skills.

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A Harcourt Assessment Company

1 2 3 4 5 6 7 8 9 10 11 12 A B C D E

1

Academic Competence Evaluation Scales

College Student Rating Form

The Academic Competence Evaluation Scales assess a student's academic skills, interpersonal skills, academic motivation, study skills, and participation. For each item, **two** ratings are required. The first rating should reflect **your best estimation of your skill level** in comparison to other students at your college or university. The second rating concerns its **importance** for academic success in **your** studies. Please do not skip any items. If you have not had the opportunity to compare yourself to other students on a particular item, estimate your performance as best you can. Remember to circle two responses for each item.

♦ ***If you do not understand an item, please circle the item number along the left side of the page.***

ACADEMIC SKILLS

	Far Below	Below	At Grade Level	Above	Far Above	Not Important	Important	Very Important
1. Reading comprehension	1	2	3	4	5	1	2	3
2. I try to read unfamiliar words by sounding out each of the letters separately to myself.	1	2	3	4	5	1	2	3
3. Vocabulary	1	2	3	4	5	1	2	3
4. Identifying a main idea	1	2	3	4	5	1	2	3
5. Reading fluency	1	2	3	4	5	1	2	3
6. Spelling	1	2	3	4	5	1	2	3
7. Punctuation	1	2	3	4	5	1	2	3
8. Capitalization	1	2	3	4	5	1	2	3
9. Grammar	1	2	3	4	5	1	2	3
10. Written communication	1	2	3	4	5	1	2	3
11. Oral communication	1	2	3	4	5	1	2	3
12. Articulation	1	2	3	4	5	1	2	3
13. Computation	1	2	3	4	5	1	2	3
14. Pattern analysis	1	2	3	4	5	1	2	3
15. Measurement	1	2	3	4	5	1	2	3
16. Understanding of spatial relationships	1	2	3	4	5	1	2	3
17. Mental math	1	2	3	4	5	1	2	3
18. Using numbers to solve daily problems.	1	2	3	4	5	1	2	3
19. Using mathematical concepts to solve daily problems.	1	2	3	4	5	1	2	3
20. Breaking down a complex problem	1	2	3	4	5	1	2	3
21. Problem-solving	1	2	3	4	5	1	2	3
22. Critical thinking	1	2	3	4	5	1	2	3
23. Synthesizing related information	1	2	3	4	5	1	2	3
24. Drawing conclusions from written material	1	2	3	4	5	1	2	3
25. Critically evaluating written material	1	2	3	4	5	1	2	3
26. Drawing conclusions from observations	1	2	3	4	5	1	2	3
27. Comparing similarities or differences among objects or ideas	1	2	3	4	5	1	2	3
28. Classifying objects or ideas into categories	1	2	3	4	5	1	2	3
29. Generalizing from information or experiences.	1	2	3	4	5	1	2	3
30. Identifying specific principles and how they are used.	1	2	3	4	5	1	2	3
31. Analyzing errors in information or processes	1	2	3	4	5	1	2	3
32. Constructing support for or against a position on an issue	1	2	3	4	5	1	2	3
33. Analyzing supporting and opposing viewpoints on an issue	1	2	3	4	5	1	2	3
34. Identifying patterns from information	1	2	3	4	5	1	2	3
35. Deciding among alternative solutions	1	2	3	4	5	1	2	3
36. Investigating a problem or issue	1	2	3	4	5	1	2	3
37. Developing a solution to a problem	1	2	3	4	5	1	2	3
38. Testing hypotheses	1	2	3	4	5	1	2	3
39. Inventing something that meets a need	1	2	3	4	5	1	2	3

INTERPERSONAL SKILLS, STUDY SKILLS, MOTIVATION AND PARTICIPATION

Please rate **how often** the statement describes you, and its **importance** in your studies.

	Never	Seldom	Sometimes	Often	Almost Always	Not Important	Important	Very Important
40. I am considerate of others	1	2	3	4	5	1	2	3
41. I am willing to compromise	1	2	3	4	5	1	2	3
42. I express dissatisfaction appropriately	1	2	3	4	5	1	2	3
43. I accept suggestions from others	1	2	3	4	5	1	2	3
44. I work effectively in large group activities	1	2	3	4	5	1	2	3
45. I initiate conversations appropriately	1	2	3	4	5	1	2	3
46. I listen to what others have to say	1	2	3	4	5	1	2	3
47. I get along with people who are different	1	2	3	4	5	1	2	3
48. I work effectively in small group activities	1	2	3	4	5	1	2	3
49. I interact appropriately with other students	1	2	3	4	5	1	2	3
50. I am motivated to learn	1	2	3	4	5	1	2	3
51. I prefer challenging tasks	1	2	3	4	5	1	2	3
52. I produce high quality work	1	2	3	4	5	1	2	3
53. I critically evaluate my own work	1	2	3	4	5	1	2	3
54. I attempt to improve on previous performance	1	2	3	4	5	1	2	3
55. I make the most of learning experiences	1	2	3	4	5	1	2	3
56. I persist when a task is difficult	1	2	3	4	5	1	2	3
57. I look for ways to academically challenge myself	1	2	3	4	5	1	2	3
58. I assume responsibility for my learning	1	2	3	4	5	1	2	3
59. I am goal-oriented	1	2	3	4	5	1	2	3
60. I complete course assignments	1	2	3	4	5	1	2	3
61. I edit my work before I submit it	1	2	3	4	5	1	2	3
62. I finish my assignments on time	1	2	3	4	5	1	2	3
63. I take notes in class.	1	2	3	4	5	1	2	3
64. I review notes and other class materials	1	2	3	4	5	1	2	3
65. I use strategies to remember information	1	2	3	4	5	1	2	3
66. I manage my time effectively	1	2	3	4	5	1	2	3
67. I correctly anticipate what will be on tests	1	2	3	4	5	1	2	3
68. I complete assignments according to directions	1	2	3	4	5	1	2	3
69. I prepare for exams	1	2	3	4	5	1	2	3
70. I prepare for class (e.g., complete readings, review notes)	1	2	3	4	5	1	2	3
71. I am relaxed during exams	1	2	3	4	5	1	2	3
72. I use outlines to organize my written work	1	2	3	4	5	1	2	3
73. I speak in class when called upon	1	2	3	4	5	1	2	3
74. I pay attention in class	1	2	3	4	5	1	2	3
75. I ask questions about exams or other assignments	1	2	3	4	5	1	2	3
76. I participate in class discussions	1	2	3	4	5	1	2	3
77. I volunteer answers to questions	1	2	3	4	5	1	2	3
78. I assume leadership in group discussions	1	2	3	4	5	1	2	3
79. I attend class	1	2	3	4	5	1	2	3
80. I ask questions when I am confused	1	2	3	4	5	1	2	3
81. I attend review sessions	1	2	3	4	5	1	2	3
82. I stay on-task during lectures.	1	2	3	4	5	1	2	3

Additional comments or observations about your academic skills, interpersonal skills, study skills, motivation, or class participation:

____

____

Perceptions of Learning Success Questionnaire (PLSQ)

YOUR NAME: ____

Directions:

Please read each of the statements listed below and indicate how much you personally agree or disagree with each statement by circling the number that represents your response.

I feel most successful as a student when . . .	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I'm the only one who can learn the material presented in class.	1	2	3	4	5
2. I learn something new and it makes me want to work harder in class.	1	2	3	4	5
3. I do better than the other students in the class.	1	2	3	4	5
4. Other students don't do as well as me in class.	1	2	3	4	5
5. I learn something in class that is enjoyable and this makes me try harder.	1	2	3	4	5
6. Other students fail to learn in class but I don't.	1	2	3	4	5
7. I learn by working harder than the other students in class.	1	2	3	4	5
8. I put a great deal of effort into being a good student.	1	2	3	4	5
9. I learn easily regardless of my level of effort, as I am intelligent.	1	2	3	4	5
10. Something in class that I learned makes me to want to learn more.	1	2	3	4	5
11. I'm the best student in my class.	1	2	3	4	5
12. I work really hard in class and challenge myself to learn.	1	2	3	4	5
13. I do my very best and work hard to learn.	1	2	3	4	5

Survey of Course and Teaching Effectiveness (SCTE)

CLIPPER PROJECT **SURVEY OF COURSE AND TEACHING EFFECTIVENESS**

Before you begin, please answer this question:

Course	Calculus	Chemistry	Economics	English	Engineering
Which course are you taking?	O	O	O	O	O

Please rate **how often** the instuctor used the following strategies

Instructional Delivery	Never	Seldom	Sometimes	Often	Almost Always
1. Used activities that promoted learning of key concepts.	O	O	O	O	O
2. Made connections between current and previous material.	O	O	O	O	O
3. Demonstrated cultural sensitivity.	O	O	O	O	O
4. Emphasized and reviewed key points.	O	O	O	O	O
5. Provided opportunity for practice of new concepts and skills.	O	O	O	O	O
6. Assigned readings that facilitated learning.	O	O	O	O	O
7. Presented content clearly.	O	O	O	O	O
8. Asked clear questions.	O	O	O	O	O
9. Allowed time for students to respond to questions during instruction.	O	O	O	O	O
10. Provided clear answers to questions.	O	O	O	O	O
11. Provided clear examples of concepts.	O	O	O	O	O
12. Clearly communicated what was expected of students.	O	O	O	O	O
13. Selected activities that were challenging but appropriate.	O	O	O	O	O
14. Referred to objectives periodically throughout instruction.	O	O	O	O	O
15. Used a variety of formats for instruction (large group, small group, student presentations, etc.)	O	O	O	O	O
16. Maintained an appropriate pace of instruction.	O	O	O	O	O
17. Used time effectively.	O	O	O	O	O
18. Communicated learning objectives for an instructional activity.	O	O	O	O	O
19. Set challenging but attainable goals.	O	O	O	O	O

FORWARD

CLIPPER PROJECT SURVEY OF COURSE AND TEACHING EFFECTIVENESS

Please rate **how often** the instuctor used the following strategies

Assessment/Feedback/Evaluation	Never	Seldom	Sometimes	Often	Almost Always
20. Provided standards and scoring criteria for assignments.	○	○	○	○	○
21. Provided feedback in a timely manner.	○	○	○	○	○
22. Provided feedback that was helpful.	○	○	○	○	○
23. Provided feedback that was clear.	○	○	○	○	○
24. Returned assignments (tests, papers, etc.) promptly.	○	○	○	○	○
25. Graded assignments (tests, papers, etc.) fairly.	○	○	○	○	○
26. Developed assignments (tests, papers, etc.) that were consistent with course objectives.	○	○	○	○	○
27. Evaluated student performance according to objective standards.	○	○	○	○	○
28. Used student performance to guide subsequent instruction.	○	○	○	○	○
29. Monitored student progress across the semester.	○	○	○	○	○
30. Monitored student understanding of content.	○	○	○	○	○

Interactions with Students	Never	Seldom	Sometimes	Often	Almost Always
31. Expressed interest in students' achievement(s).	○	○	○	○	○
32. Expressed interest in students as individuals.	○	○	○	○	○
33. Encouraged student participation.	○	○	○	○	○
34. Treated students with respect.	○	○	○	○	○
35. Valued students' opinions.	○	○	○	○	○
36. Was available to discuss non-academic issues with students.	○	○	○	○	○
37. Was available to help students.	○	○	○	○	○

BACKWARD FORWARD

CLIPPER PROJECT **SURVEY OF COURSE AND TEACHING EFFECTIVENESS**

Please indicate **how your skills have changed** as a result of taking this course.

Academic Skills

	Significantly Decreased	Decreased	Remained the Same	Improved	Significantly Improved
38. Knowledge of course-related content	O	O	O	O	O
39. Knowledge of "real world" skills that I will be able to use professionally and/or personally	O	O	O	O	O
40. Appreciation for this field of study	O	O	O	O	O
41. Problem solving	O	O	O	O	O
42. Decision-making	O	O	O	O	O
43. Critical thinking skills	O	O	O	O	O
44. Written communication skills	O	O	O	O	O
45. Analytical skills	O	O	O	O	O

Please rate **your current level of skill proficiency and comfort** in using the following technologies.

Technology

	Level of Proficiency					Level of Comfort				
	Very Low	Low	Moderate	High	Very High	Very Low	Low	Moderate	High	Very High
46. Computers	O	O	O	O	O	O	O	O	O	O
47. Internet	O	O	O	O	O	O	O	O	O	O
48. Email	O	O	O	O	O	O	O	O	O	O
49. Bulletin or discussion board	O	O	O	O	O	O	O	O	O	O
50. Chat room	O	O	O	O	O	O	O	O	O	O
51. Word processing software	O	O	O	O	O	O	O	O	O	O
52. Data management software	O	O	O	O	O	O	O	O	O	O
53. Web page authoring software	O	O	O	O	O	O	O	O	O	O

BACKWARD FORWARD

CLIPPER PROJECT **SURVEY OF COURSE AND TEACHING EFFECTIVENESS**

Please rate the **helpfulness** and **ease of use** of the following services.

Supportive Services	Helpfulness					Ease of Use				
	Very Unhelpful	Unhelpful	Somewhat Helpful	Helpful	Very Helpful	Very Difficult	Difficult	Somewhat Easy	Easy	Very Easy
54. Online course materials	O	O	O	O	O	O	O	O	O	O
55. Online tutorial(s)	O	O	O	O	O	O	O	O	O	O
56. Technical support	O	O	O	O	O	O	O	O	O	O
57. Online academic advising services	O	O	O	O	O	O	O	O	O	O
58. Library support services	O	O	O	O	O	O	O	O	O	O

Please rate the **helpfulness** and **ease of use** of the following online technologies if used in this course.

Supportive Technologies	Helpfulness					Ease of Use				
	Very Unhelpful	Unhelpful	Somewhat Helpful	Helpful	Very Helpful	Very Difficult	Difficult	Somewhat Easy	Easy	Very Easy
59. Discussion Board	O	O	O	O	O	O	O	O	O	O
60. Chat Room	O	O	O	O	O	O	O	O	O	O
61. Email	O	O	O	O	O	O	O	O	O	O
62. Video conferencing	O	O	O	O	O	O	O	O	O	O
63. Audio conferencing	O	O	O	O	O	O	O	O	O	O
64. Overall supportive technologies	O	O	O	O	O	O	O	O	O	O

BACKWARD FORWARD

CLIPPER PROJECT **SURVEY OF COURSE AND TEACHING EFFECTIVENESS**

Please rate your **learning behaviors** within this course.

Time/Effort

	Less than 5	5-10	11-15	16-20	more than 20
65. On average, how many hours per week did you spend on this course? (Include formal sessions, readings, reviewing notes, writing papers and any other course-related work in this estimate.)	○	○	○	○	○
66. From the total average hours above, how many do you consider were valuable in advancing your education?	○	○	○	○	○

	Very High	High	Moderate	Low	Very Low
67. Overall, how would you characterize the amount of effort that you put into this course?	○	○	○	○	○
68. Overall, how would you characterize the amount of effort necessary to succeed in this course?	○	○	○	○	○

	E-mail	Chat Room	Online Discussion Board	Telephone	Office Visit	Other
69. What method did you use most frequently to communicate with your instructor?	○	○	○	○	○	○

	E-mail	Chat Room	Online Discussion Board/ Forum	Video Conference	Real Time Audio Conference	Other
70. Please check all technologies that you used regularly as a part of this course.	☐	☐	☐	☐	☐	☐

	Less than 12 Hours	12-24 Hours	2-4 Days	5-7 Days	More than a Week	Other
71. When you contacted your instructor, how long did it usually take to receive a response?	○	○	○	○	○	○

BACKWARD FORWARD

CLIPPER PROJECT **SURVEY OF COURSE AND TEACHING EFFECTIVENESS**

Please rate **quality** of the overall course.

Overall Course Evaluation	Very Good	Good	Adequate	Poor	Very Poor
72. Course experience	O	O	O	O	O
73. Level of challenge presented by the course	O	O	O	O	O
74. Coverage of content	O	O	O	O	O
75. Instructor's contributions to the course	O	O	O	O	O
76. Instructor's effectiveness in teaching	O	O	O	O	O

	Yes	Unsure	No
77. Would you take another course from this instructor?	O	O	O
78. Would you recommend this course to others?	O	O	O
79. Would you be willing to take an online course in the future?	O	O	O
80. Would you be willing to participate in a follow-up interview/chat regarding your course experiences?	O	O	O

Please provide any additional comments/ suggestions in the space below.

BACKWARD SUBMIT

Drop Survey

Please respond to the following questions by replying to this email. Thanks.

1. Why were you originally interested in the Clipper courses?

2. What did you expect from your online Clipper course? How did your experience differ from your expectations?

3. What factors led to your decision to drop the course?

4. What **did** you like about the course and why?

5. What **didn't** you like about the course and why?

6. What recommendations do you have for improving the course in the future?

7. Would you be willing to participate in a chat and/or personal interview to further discuss your experiences and decision to drop the course? If so, when is a good time to contact you?

Student Adaptation to College Questionnaire (SACQ)

Student Adaptation to College Questionnaire (SACQ)

Robert W. Baker, Ph.D. and Bohdan Siryk, M.A.

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Name: ______________________ Date: __________

ID Number: __________ Sex: ☐ F ☐ M Date of Birth: __________

Current Academic Standing: ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior

Semester: ☐ 1 ☐ 2 ☐ Summer *or* Quarter: ☐ 1 ☐ 2 ☐ 3 ☐ Summer

Ethnic Background (optional): ☐ Asian ☐ Black ☐ Hispanic ☐ Native American ☐ White ☐ Other

Directions

Please provide the identifying information requested on the right.

The 67 statements on the front and back of this form describe college experiences. Read each one and decide how well it applies to you at the present time (within the past few days). For each statement, circle the asterisk at the point in the continuum that best represents how closely the statement applies to you. Circle only one asterisk for each statement. To change an answer, draw an *X* through the incorrect response and circle the desired response. Be sure to use a hard-tipped pen or pencil and press very firmly. Do not erase.

In the example on the right, Item A applied very closely, and Item B was changed from "doesn't apply at all" to "applies somewhat."

Example

A. (*) * * * * * * * *

B. * * * (*) * * * * ☒

Applies Very Closely to Me ← → Doesn't Apply to Me at All

1. I feel that I fit in well as part of the college environment. * * * * * * * * *
2. I have been feeling tense or nervous lately. * * * * * * * * *
3. I have been keeping up to date on my academic work. * * * * * * * * *
4. I am meeting as many people, and making as many friends as I would like at college. * * * * * * * * *
5. I know why I'm in college and what I want out of it. * * * * * * * * *
6. I am finding academic work at college difficult. * * * * * * * * *
7. Lately I have been feeling blue and moody a lot. * * * * * * * * *
8. I am very involved with social activities in college. * * * * * * * * *
9. I am adjusting well to college. * * * * * * * * *
10. I have not been functioning well during examinations. * * * * * * * * *
11. I have felt tired much of the time lately. * * * * * * * * *
12. Being on my own, taking responsibility for myself, has not been easy. * * * * * * * * *
13. I am satisfied with the level at which I am performing academically. * * * * * * * * *
14. I have had informal, personal contacts with college professors. * * * * * * * * *
15. I am pleased now about my decision to go to college. * * * * * * * * *
16. I am pleased now about my decision to attend this college in particular. * * * * * * * * *
17. I'm not working as hard as I should at my course work. * * * * * * * * *
18. I have several close social ties at college. * * * * * * * * *
19. My academic goals and purposes are well defined. * * * * * * * * *
20. I haven't been able to control my emotions very well lately. * * * * * * * * *
21. I'm not really smart enough for the academic work I am expected to be doing now. * * * * * * * * *
22. Lonesomeness for home is a source of difficulty for me now. * * * * * * * * *
23. Getting a college degree is very important to me. * * * * * * * * *
24. My appetite has been good lately. * * * * * * * * *
25. I haven't been very efficient in the use of study time lately. * * * * * * * * *
26. I enjoy living in a college dormitory. (Please omit if you do not live in a dormitory; any university housing should be regarded as a dormitory.) * * * * * * * * *
27. I enjoy writing papers for courses. * * * * * * * * *
28. I have been having a lot of headaches lately. * * * * * * * * *
29. I really haven't had much motivation for studying lately. * * * * * * * * *
30. I am satisfied with the extracurricular activities available at college. * * * * * * * * *
31. I've given a lot of thought lately to whether I should ask for help from the Psychological/Counseling Services Center or from a psychotherapist outside of college. * * * * * * * * *
32. Lately I have been having doubts regarding the value of a college education. * * * * * * * * *
33. I am getting along very well with my roommate(s) at college. (Please omit if you do not have a roommate.) * * * * * * * * *

PLEASE TURN THE FORM OVER NOW AND COMPLETE STATEMENTS 34 THROUGH 67.

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	Applies Very Closely to Me ← → Doesn't Apply to Me at All
34. I wish I were at another college or university.	* * * * * * * * *
35. I've put on (or lost) too much weight recently.	* * * * * * * * *
36. I am satisfied with the number and variety of courses available at college.	* * * * * * * * *
37. I feel that I have enough social skills to get along well in the college setting.	* * * * * * * * *
38. I have been getting angry too easily lately.	* * * * * * * * *
39. Recently I have had trouble concentrating when I try to study.	* * * * * * * * *
40. I haven't been sleeping very well.	* * * * * * * * *
41. I'm not doing well enough academically for the amount of work I put in.	* * * * * * * * *
42. I am having difficulty feeling at ease with other people at college.	* * * * * * * * *
43. I am satisfied with the quality or the caliber of courses available at college.	* * * * * * * * *
44. I am attending classes regularly.	* * * * * * * * *
45. Sometimes my thinking gets muddled up too easily.	* * * * * * * * *
46. I am satisfied with the extent to which I am participating in social activities at college.	* * * * * * * * *
47. I expect to stay at this college for a bachelor's degree.	* * * * * * * * *
48. I haven't been mixing too well with the opposite sex lately.	* * * * * * * * *
49. I worry a lot about my college expenses.	* * * * * * * * *
50. I am enjoying my academic work at college.	* * * * * * * * *
51. I have been feeling lonely a lot at college lately.	* * * * * * * * *
52. I am having a lot of trouble getting started on homework assignments.	* * * * * * * * *
53. I feel I have good control over my life situation at college.	* * * * * * * * *
54. I am satisfied with my program of courses for this semester/quarter.	* * * * * * * * *
55. I have been feeling in good health lately.	* * * * * * * * *
56. I feel I am very different from other students at college in ways that I don't like.	* * * * * * * * *
57. On balance, I would rather be home than here.	* * * * * * * * *
58. Most of the things I am interested in are not related to any of my course work at college.	* * * * * * * * *
59. Lately I have been giving a lot of thought to transferring to another college.	* * * * * * * * *
60. Lately I have been giving a lot of thought to dropping out of college altogether and for good.	* * * * * * * * *
61. I find myself giving considerable thought to taking time off from college and finishing later.	* * * * * * * * *
62. I am very satisfied with the professors I have now in my courses.	* * * * * * * * *
63. I have some good friends or acquaintances at college with whom I can talk about any problems I may have.	* * * * * * * * *
64. I am experiencing a lot of difficulty coping with the stresses imposed upon me in college.	* * * * * * * * *
65. I am quite satisfied with my social life at college.	* * * * * * * * *
66. I'm quite satisfied with my academic situation at college.	* * * * * * * * *
67. I feel confident that I will be able to deal in a satisfactory manner with future challenges here at college.	* * * * * * * * *

Fourth Year Clipper Follow-up Survey

Welcome!

Thank you for taking a few minutes to respond to one last "follow-up" task for the Clipper Project. It should take you only about 10-15 minutes to complete the survey, which asks you to reflect back over your time at Lehigh, your attitudes about instructional technologies and your learning abilities, and make some projections about your future plans. Upon completion of the survey, you will be entered into a drawing to receive a 20GB Apple iPod! And, since there are only about 100 of you who have been asked to complete the survey, your odds of winning are pretty good for once!

As has always been the case during your involvement with the Clipper Project, all of your answers to this survey will remain confidential and your participation is voluntary. You may report any concerns you have about this study to Ruth L. Tallman, Office of Research and Sponsored Programs, Lehigh University (610) 758-3024. General questions about the Clipper Project or this survey should be directed to MJ Bishop, Clipper Project Director at mj.bishop@lehigh.edu.

Please enter your name and email address in the spaces below so that we can enter you in the iPod drawing and contact you if you win. [PLEASE NOTE: Once the drawing has been completed, we will delete all personal information from our files. You will not be contacted by us for any other reason.]

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

When I think back over my SOCIAL experiences at Lehigh, I believe that…

1. I had an established social network of Lehigh peers prior to coming to campus in my first semester.
2. I adjusted easily to college life in my first year.
3. I am satisfied overall with the quality of my social experiences at college.
4. I have made lifelong friends at college.

When I think back over my ACADEMIC experiences at Lehigh, I believe that…

5. I had a good understanding of what would be expected of me academically before I came to campus.
6. I adjusted easily to college-level academic expectations in my first year.
7. I am satisfied overall with the level of my academic performance at college.
8. I have developed lifelong learning skills at college.

When I think back over my INSTRUCTIONAL TECHNOLOGY experiences at Lehigh, I believe that…

Note: "instructional technologies" include things like chat, discussion board, email, Blackboard, online database/research tools, and the like when used for teaching and learning purposes.

9. I was prepared before coming to college for utilizing various instructional technologies that I have encountered during my time at Lehigh.
10. My experiences with various instructional technologies at Lehigh have been valuable.
11. I am satisfied with the extent to which my professors incorporated instructional technologies into their courses and enhanced my knowledge.
12. I am well prepared to use technology in the future.

When it comes to Web-based learning, I think…

13. Students learn substantially more from teachers when face-to-face rather through Web-based technologies.
14. The best Web-based learning experiences support, but do not replace, face-to-face instruction.
15. A teacher's job is to teach, not design and develop Web-based instructional technologies.
16. Web-based courses are better suited to some content areas than others.
17. Technology teaches things that teachers cannot.
18. Web-based courses are a waste of time.
19. I would take (take another) online course myself.
20. I would (or have) recommend taking Web-based courses to others.

When it comes to my learning abilities, it turns out that…

21. I'm the only one who can learn the material presented in class.
22. I learn something new and it makes me want to work harder in class.
23. I do better than the other students in the class.
24. Other students don't do as well as me in class.
25. I learn something in class that is enjoyable and this makes me try harder.
26. Other students fail to learn in class but I don't.
27. I learn by working harder than the other students in class.
28. I put a great deal of effort into being a good student.
29. I learn easily regardless of my level of effort, as I am intelligent.
30. Something in class that I learned makes me to want to learn more.
31. I'm the best student in my class.
32. I work really hard in class and challenge myself to learn.
33. I do my very best and work hard to learn.

When I picture myself after college, I expect that I will…

34. Continue to seek out opportunities for learning.

35. Be actively engaged in some sort of community service.
36. Regularly get together with my college friends.
37. Look forward to opportunities to come back and visit Lehigh.
38. Actively seek out ways that I can give back to Lehigh through financial contributions and/or volunteering on alumni committees.

That's it!

Thank you for taking time to complete this survey.

You have been entered into the iPod drawing. If you win, we will contact you on Friday afternoon, May 20th, at the email address you gave us on the first page of this survey.

Clipper II End-of-Semester Clipper Faculty Questionnaire

NAME:

1. Please compare your experience in your Clipper course this semester to your experience in the same face-to-face course you taught last fall (if you didn't teach this course last fall, please compare your Clipper course this semester to your experience in other face-to-face courses you have taught recently).

2. Compare the levels of your Clipper students' motivation, workload, interaction, and progress to students in the same face-to-face course (or others you have taught recently).

3. Compare your Clipper experience this semester to your Clipper experiences in the past.

4. Did you or your students experience unusual levels of frustration in your online experiences? If so, what were some of them and how were these handled?

5. Is there anything that you will take away from the Clipper course and use in this same face-to-face course and/or other face-to-face courses?

6. What advice would you give a colleague who told you he/she wants to develop an online course for the first time?