

# SRI International

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## **AN EVALUATION OF THE VIRTUAL HIGH SCHOOL AFTER TWO YEARS OF OPERATION**

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## **EXECUTIVE SUMMARY**

The Virtual High School (VHS) is a consortium of high schools that offer network-based courses (netcourses) taught by consortium teachers for students in consortium schools. Each school contributes at least one teacher, who teaches a VHS course in place of teaching a section of a regular course at the school. Teachers in the VHS pool, with the help of experienced facilitators, design and develop netcourses during the academic year before the courses are first offered. Each school in the consortium can enroll 20 students in these netcourses for each section of a teacher's time (i.e., each netcourse) that it contributes to the pool. Each VHS school also provides a part-time coordinator who acts as a liaison among students, their VHS teachers, and the VHS administrative staff.

This report covers the second year that VHS offered courses. Because VHS' first year was a year of planning and preparation, not school operation, this report covers the third year of the 5-year Challenge Grant that principally funds VHS. Thus, the past year marked the midpoint of the project. With four semesters of operation completed, growth and interest in VHS remains very strong. During the 1998-99 school year, the Virtual High School offered 35 Internet-based, credit-bearing courses to about 700 students in 30 schools located in 12 states. The number of students enrolled as well as the average number of students per netcourse has been steadily increasing. The number of schools involved has increased as well, and more schools than VHS has the resources to serve have expressed interest in joining the consortium. Course offerings continue to expand, with over 100 courses listed in the 1999-00 VHS catalog. Approximately 2,000 students are expected to enroll each semester.

The VHS evaluation was designed and is being carried out by the Center for Technology in Learning at SRI International, under contract to Hudson Public Schools. As was the case last year, primary data sources for the evaluation include survey data from VHS participants, case study data from four VHS schools, interviews with consortium staff, and document reviews. In addition, survey data from the first year of operation of VHS (1997-98) was used to uncover changes and identify trends. This evaluation also explores emerging issues that face the project as it matures.

### **Major Findings**

In the second year of operation, the VHS project made considerable progress toward achieving its goals. Four major findings, briefly described here, characterize VHS' second year of operation:

### **Increased Satisfaction**

The most notable findings for the second year of operation are those related to the level of satisfaction with VHS expressed by participants. All participant groups expressed greater satisfaction with the VHS project overall during the second year of operation when compared to the first year of operation. On a 4-point scale (“1” meaning “very satisfied” and “4” meaning “not at all satisfied”), there was movement toward the “very satisfied” response among principals, teachers, and site coordinators. Among all participants (superintendents, principals, teachers, and site coordinators) the percentage of respondents who were either “somewhat satisfied” or “very satisfied” with the VHS project were very similar (92%, 96%, 97%, and 100%, respectively). As compared to last year, many more participants this year expressed being “very satisfied” with VHS. The increase in teacher satisfaction with VHS overall was statistically significant ( $t=3.11$ ,  $p<.0029$ ). Because VHS teachers must work hard to master a new medium and because they are the ones most responsible for creating and delivering high-quality courses, their satisfaction with the VHS experience is important.

### **Decrease in technical difficulties**

Technical difficulties related to computer server problems and to the use of the LearningSpace software diminished greatly in the 1998-99 school year. In the second year of operation, network capacity issues and technology troubleshooting were rarely mentioned as issues. Site coordinators reported fewer glitches, fewer password lockouts, shorter wait-times, and less time spent troubleshooting. Also, among site coordinators, 85% responded that Internet, LearningSpace, or other system problems occurred infrequently. This was a significant change from 1997-98, when only 52% of site coordinators made a similar estimate ( $\chi^2(1, N=49) = 6.05$ ,  $p<.014$ ). As one would expect, teachers found the second year much easier to manage, especially in terms of logistics and their personal efficiency in conducting VHS classes. More routine, less time consuming operation was a hallmark of VHS’ second year.

### **Roles more clearly defined**

As VHS matured, the roles of teachers, students, and site coordinators evolved. Teachers reported greater satisfaction with their VHS courses and greater understanding of how to teach on-line. Students in year two expressed a better understanding and appreciation of the time management skills and the level of responsibility required by

participation in VHS. The VHS staff managing the project as a whole was perceived as helpful and willing to address any lingering practical issues.

The role of site coordinators in assisting and monitoring students continues to be perceived as a necessary one, to help assure successful VHS experiences. Coordinators across case study schools described their roles as being more routine in year two, with less emphasis placed on providing technical support than in year one. Coordinators at schools that had required VHS students to meet during a designated period of the school day noted that this made monitoring of VHS students more efficient.

Teachers who were interviewed reported feeling more efficient and effective in managing the logistics of teaching on-line. Several teachers cited improving the pace of the activities in their courses and structuring activities so more students had a stronger start. Experience in the netcourse teacher role (over 60% of VHS teachers in year two had at least one year of on-line teaching experience) also may have contributed to this increased confidence and satisfaction with their courses.

### **Course quality**

Participants indicated that they were satisfied with the overall quality of VHS courses. Teachers were asked to rate their satisfaction with their regular classroom courses on the same 4-point scale as their VHS courses (“1” meaning “very satisfied” and “4” meaning “not at all satisfied”). In contrast to findings in year one when teachers rated their satisfaction with their regular classroom courses significantly higher than their VHS courses, this year their ratings of satisfaction with the quality of the two types of courses were very similar (mean scale rating VHS 1.4; regular 1.3)

The ability of schools to offer courses that would not have been available otherwise continued to be recognized by all participants as an important benefit of the project. To further strengthen the courses, considerable attention was paid to addressing remaining course quality issues during the 1998-99 school year, as described below.

### **Key Issues**

Three topics that were identified as key issues in the report about VHS’ first year of operation warrant a progress check one year later. These are: VHS course quality, the range of students served by the project, and project sustainability and scaling up.

## **Assuring High Course Quality**

Quality is, of course, a paramount concern for VHS staff and for the general public. The success of the VHS program will rest to a large degree on the reputation of the quality of its courses. Furthermore, assuring course quality in a highly distributed, virtual school structure is particularly challenging from a management perspective. Nonetheless, several mechanisms were instituted by the VHS administration to assure course quality. These include the Teacher Learning Conference (TLC), which provides professional development for prospective VHS teachers; a Netcourse Evaluation Board (NCEB) convened by VHS during 1998-99; and, an independent panel of content experts convened in 1999 by the SRI evaluation team. Other quality control mechanisms are being established beginning with the 1999-00 school year, notably the appointment and use of VHS faculty advisors. Each of these structures addresses the issue of quality in a different way and together they form an impressive overall quality control process.

Periods of rapid growth (“scaling up”) are the most challenging, in terms of netcourse quality control, because so many new courses need to be vetted for quality. While participants at all levels show continued enthusiasm for the on-line teaching and learning experience, a number of suggestions for VHS may be useful:

- Because of the potential for an increasing variation in course quality due to growth in course offerings, the important and timely work of the Netcourse Evaluation Board and the expert review panel should be institutionalized. This might be done by integrating reviews of course content into the TLC or by strengthening the role of faculty advisors. A major advantage of using the TLC is that low-quality courses might be identified before they are even offered.
- Isolated instances of grading inconsistencies serve to undermine the overall high quality of VHS instruction and should be ameliorated.

The bottom line for VHS is that continuing attention to course quality is important. A variety of mechanisms have been used to review course quality and overall course quality appears to be high. Nonetheless, a fully developed “system” for quality control is not yet in place but is especially needed during the projected period of scaling up during the next two years.

## **Broadening the Type of Student Served**

The initial Challenge Grant proposed that VHS would serve a range of students, including those entering the workforce after high school, and disadvantaged students. During the first year of operation it was found that VHS was serving a fairly narrow range of students, those who were academically advanced and college-bound. This

resulted in the recommendation that VHS develop courses and policies that increase the diversity of its student body and broaden its impact.

Progress has been made on this recommendation, as well. During the 1998-99 school year, site coordinators and principals reported that the students taking VHS courses have a wider range of academic success and are more representative of the full range of socioeconomic backgrounds present in their school than they were in the 1997-98 school year. Nonetheless, VHS courses are still predominantly designated as “honors” and students enrolled are mostly college-bound.

### **Successful Scalability and Project Sustainability**

VHS is growing at an unanticipated pace and it is expected to reach and exceed the enrollment projections set in the initial Challenge grant proposal, which estimated serving 6000 students during the five years of the grant. In fact, if the currently projected growth to 300 VHS courses is realized during the final year of the grant, 6000 students could possibly be enrolled in the 2000-01 school year alone.

With two years of funding left in the grant, VHS has made significant preparations for rapid growth and for its long-term future. For example, VHS staff made presentations to school superintendents and worked on forging partnerships with foundations, corporations, and state education agencies to prepare for continuing the project after the Challenge Grant ends. Still, more information, experience, and work are needed before the project’s sustainability is assured. For example, costs are still a concern for a significant number of participating schools and districts. Costs to participating schools would be reduced if the average number of participants per school, as well as the average VHS course enrollment, was closer to 20 students.

The number of groups and institutions that offer virtual courses for high school students seems likely to increase in the future, due to the continuing growth of the Internet. Thus, one issue that will face VHS as it sustains operation is distinguishing itself from these other groups in order to establish and preserve a “market niche” in the world of virtual education.

The niche that VHS can particularly call its own is characterized by:

- the participation of a consortium of schools that both originate and “receive” courses
- the use of current teachers, almost all of them in public schools, as the teachers of the virtual course offerings

- a special emphasis on offering semester-length elective courses, the great majority of which are unlikely to be available to students except through VHS
- the use of site coordinators at every school
- a very substantial emphasis on quality control (through such mechanisms as the TLC and the VHS department chairs)

To date, VHS is unique in successfully combining this set of characteristics, making its prospects for growing and succeeding look good.

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## I. INTRODUCTION

The 1998-1999 school year, the second year of operation for the Virtual High School, was another year of phenomenal growth for the Internet. According to a recent report from the U.S. Department of Commerce, nearly one-third (32.7%) of all Americans now use the Internet either from home or from outside their home. Although more than half of the Americans who use the Internet from outside their home access it from work, the second most popular point of access from outside the home is the K-12 school (U.S. Department of Commerce, 1999).

Not only is access to the Internet becoming more widespread, but the way that the Internet is used is also changing. The pursuit of on-line courses and school research is increasingly popular among Americans who access the Internet from their home (36.1%), as well as those whose access is from outside their home (38.8%). Fueled by factors such as more widely available and affordable hardware, more user-friendly software, and a strong economy that has increased consumers' affluence (Farrell, 1999, p28), the option of taking high school courses — and even acquiring one's entire secondary education — through the Internet is rapidly becoming a reality for increasing numbers of students in the United States.

It is in this context of rapid change that the current evaluation report examines the second year of operation of the Virtual High School (VHS). Because VHS's first year was a year of preparation, not school operation, this report covers the third year of the 5-year Challenge Grant that principally funds VHS. Thus, the past year marked the midpoint of the project, and while this evaluation continues to examine progress toward the project goals, it will also explore emerging issues that face the project as it matures.

### **The Growth of the Internet in Schools**

In the fall of 1998, 89% of public schools were connected to the Internet, an increase of 11 percentage points from the 78% reported a year earlier. A better measure of how many students actually have access to the Internet in school is the percentage of instructional classrooms connected to the Internet, which nearly doubled from 27% in 1997 to 51% in 1998. However, whereas the ratio of students per computer is approaching the ratio recommended by the President's Committee of Advisors on Science and Technology, the ratio of students to computers with Internet access is nearly double the Committee's recommended level (NCES Issue Brief, 2/99).

Federal funding is helping to stimulate the growth of the Internet in schools. In passing the Telecommunications Act of 1996, the U.S. Congress mandated that a portion of all telephone bills should be set aside to fund the development of telecommunications infrastructure and services in the nation's elementary and secondary schools. One benefit of the fund that is already being realized is that it has forced schools and school districts to develop long-term technology plans. State agencies are also beginning to require districts to submit technology plans as part of requests for state funding for education technology. Requirements to create and update technology plans encourage school district administrators to think ahead about how to spend technology funds and how to best integrate technology into the school curriculum. (Trotter, 1998).

The growth of the Internet is fostering new relationships as schools and school districts expand their curricular offerings and participate in educational cooperatives with other schools, school districts, state agencies, and universities. The Virtual High School is such a cooperative, which in many respects has raised new questions about interdistrict policies pertaining to grading, school scheduling, and course quality. Some of these questions will be explored in this report.

### **The Virtual High School Project**

In June 1996, Dr. Robert Tinker, President of the Concord Consortium, and Dr. Sheldon Berman, Superintendent of the Hudson, Massachusetts, Public Schools, wrote a grant application to the U.S. Department of Education. The proposal for a 5-year Technology Innovation Challenge Grant was accepted, and the Virtual High School was born in October of that year. Drs. Berman and Tinker are the principal investigators for the VHS project.

The Virtual High School is a consortium of high schools that offer network-based courses (netcourses) taught by consortium teachers for students in consortium schools. Each school contributes at least one teacher, who teaches a VHS course in place of teaching a section of a regular course at the school. Teachers in the VHS pool, with the help of experienced facilitators, design and offer netcourses over the Internet. Each school in the cooperative can enroll 20 students in these netcourses for each section of a teacher's time (i.e., one netcourse) that it contributes to the pool. Each VHS school also provides a part-time coordinator who acts as a liaison among students, their VHS teachers, and the central VHS administrative staff.

During the 1998-99 school year, the Virtual High School offered 35 Internet-based, credit-bearing courses to about 700 students in 34 schools located in 12 states. Additional information describing the operation of the Virtual High School can be found in Chapter II. The VHS evaluation was designed and is being carried out by the Center for Technology in Learning at SRI International, under contract to Hudson Public Schools.

Exhibit 1 provides a brief chronological overview of the growth of VHS over the past 3 years.

### Exhibit 1: Milestones of VHS

<b>October 1996</b>	<b>Hudson, Mass. Public Schools</b> , together with <b>Concord Consortium</b> , receives \$7.4 million, 5 yr. <b>Technology Challenge Grant</b> . First steps toward implementing the first nationwide high school program offering Internet-based courses begin.
<b>March 1997</b>	<b>Teachers Learning Conference (TLC)</b> , a 25-week graduate-level netcourse intended to prepare teachers to design and teach netcourses, is first offered.
<b>Spring 1997</b>	<b>Corporate partners</b> – 3Com Corp., Lotus Development Corp., and Motorola – provide equipment and technical help.
<b>Spring 1997</b>	<b>LearningSpace™</b> , developed by Lotus Development Corp., is selected as the course medium.
<b>September 1997</b>	<b>VHS courses are offered for the first time to about 500 students in 27 schools</b> in 10 states.
<b>May 1998</b>	Apple Computer Inc. presents <b>Apple Distinguished School Award</b> for exemplary integration of education and technology to VHS.
<b>September 1998</b>	<b>700 students, 35 courses, 34 high schools</b> in 12 states mark VHS's <b>second year</b> .
<b>April 1999</b>	<b>VHS accepted to Smithsonian</b> Institution's Permanent Research Collection of Information Technology.
<b>June 1999</b>	<b>Lotus</b> releases latest version of LearningSpace™ — teachers will have the ability to <b>host simultaneous on-line discussion</b> groups.

**Fall 1999** Through Lotus, **Interliant** of Texas provides **increased server support** for VHS. **1,700 students expected to enroll in more than 100 courses**, tripling the size of VHS.

The proposal submitted in 1996 to the Challenge Grant program identifies one overarching goal for the VHS consortium:

to create a national consortium of schools that expands members' curricular offerings through a wide range of excellent, current, innovative network-based courses that support reform. This can be done in a way that is scalable and can continue post-funding, while spawning independent, parallel efforts.

From this overarching goal and other proposal objectives, SRI staff, along with VHS staff and other consortium members, worked to create a set of seven concise goals for the VHS consortium:

1. The practical problems of establishing and managing the Virtual High School will be solved, demonstrating that the approach is feasible for many schools.
2. Students, teachers, schools, and districts will benefit from participating in VHS courses.
3. Courses offered through VHS will be of high quality and will support reform efforts aimed at raising education standards (e.g., VHS students will become more engaged in course work and take more responsibility for their own learning; greater attention will be given to teaching for understanding).
4. Internet-based VHS courses will demonstrate some advantages (e.g., an expanded community, new kinds of courses, technology skills for students), compared to traditional courses.
5. The VHS project will become a model of how to use the Internet to deliver high school courses.
6. VHS benefits will be made available to students equitably.
7. The network-based professional development provided to participating netcourse teachers will be of high quality and will make an important contribution to the quality of the netcourses offered to students.

Chapter III of this report is organized around these major goals of the VHS project.

## **Evaluation of the Virtual High School**

Similar to last year, primary data sources included survey data from VHS teachers, site coordinators, principals, and superintendents. Survey data was supplemented with case study data from four VHS schools. In addition, survey data from last year was used

to identify changes and begin tracking any emerging trends. This evaluation also draws on interviews with consortium staff and document reviews.

### **Surveys**

A total of 16 surveys have been administered to VHS participants over the past 3 years. Before the VHS project began operation in the spring of 1997, baseline data was collected from VHS teachers. Baseline data was also collected in the fall of 1997 from VHS site coordinators, principals from participating schools, and superintendents from participating districts. Members of these four groups provided additional information through a second set of surveys during the spring of 1998. In the spring of 1999, members of the four groups were asked to complete a questionnaire very similar to the one that was administered in the previous year. Having similar instruments during the past two years of operation allowed us to make comparisons and identify changes that have occurred since the first year of implementation. In all cases, these surveys have had a response rate of 80% or better.

In addition, the VHS central staff conducted on-line surveys of VHS students at the end of the first and second semesters for both the 1997-98 and 1998-99 school years. Unfortunately, only the spring 1998 survey had an acceptable response rate of 80%. Therefore, comparisons between student survey responses from the end of year 1 with year 2 cannot be made with confidence. Nevertheless, more than 200 students took a considerable amount of time to complete a questionnaire about their VHS experience, and more than 25% of those wrote thoughtful comments about the program. Some of these comments, along with thoughts expressed by students during case study interviews, are used in this evaluation.

### **Case Studies**

The SRI evaluation team conducted 1-day visits to Hudson and Westborough high schools in Massachusetts, Miramonte High School in California, and Allen High School in Texas in February and March 1999. Similar to last year, the site visits included interviews with the school and/or district administrator(s) overseeing the VHS implementation, the VHS site coordinator, the VHS teacher(s), and a sample of VHS students. Unlike the previous year, when SRI staff conducted student focus groups, this year interviews were conducted with students participating in courses that originated from other case study schools. SRI staff interviewed four to six students during each site

visit and inquired about the nature of the courses that they were taking to compare with teacher interviews from the other case study schools.

Each site visitor prepared a 10- to 12- page case study, which later was summarized to 4 pages. The four case study summaries can be found in Appendix B.

## **Organization of This Report**

This report is divided into four chapters and a separate set of appendices. This introduction is followed by the second chapter, which provides more in-depth description about how the Virtual High School currently operates and describes some of the changes and improvements that have taken place in the past year.

Chapter III is organized around the program's seven goals and highlights the major findings for year 2 of operation.

Chapter IV discusses several key issues in greater depth. Issues such as program scale-up and sustainability, course quality, and future directions for growth and improvement are explored in light of current trends in educational technology and the VHS efforts to address these issues.

A set of appendices in a separate volume includes a detailed description of the methodology used in this evaluation; summaries of the case studies; copies of the surveys for VHS teachers, site coordinators, principals, and superintendents; the Teachers Learning Conference (TLC) Evaluation Criteria; the NetCourse Evaluation Board Standards; and standards for course quality developed by an expert panel.

## II. VHS OPERATIONS

This chapter presents the operations of the Virtual High School in greater detail. The first section describes the organization of VHS, including the key players, both in the schools and at central VHS. The second section portrays the preparation that schools undertake to offer VHS courses, including any agreements with VHS, preparation of teachers, development of the netcourses, and student selection. Descriptions of the LearningSpace software and recent administrative improvements follow the preparation section. Finally, this chapter concludes with an inventory of netcourses that have been offered during the first 2 years of operation and their corresponding enrollments.

### Structure of VHS

As stated in the Introduction, the Virtual High School is a consortium of schools that provide teachers who offer netcourses and enroll students who take those courses. Each participating school offers 20% of a teacher's time to develop and deliver a netcourse for one or both semesters during the school year. In return for teaching the netcourse, the participating school can enroll up to 20 students in a variety of netcourses offered by other schools.

In addition to a VHS teacher (in rare cases, two teachers), the participating school assigns a VHS site coordinator at 20% time to manage day-to-day operations. Site coordinators are responsible for marketing VHS within the school, recruiting and selecting VHS students, troubleshooting technical and computer problems, supervising student performance, and logging grades and credits for students at their school.

The role of the site coordinator continues to be viewed as an important component of the VHS program. In response to open-ended survey questions, teachers wrote comments about the site coordinator role such as, "The site coordinator is a vital link between students and teachers," and "In our school, we tried last year without a coordinator and the students were to work on their own. We had a low success rate. This year they have a scheduled class with the coordinator and the success rate is much better."

Site coordinators have developed variations in their roles, depending on the needs of the school and their capacity to serve those needs. Several coordinators mentioned new procedures for screening and setting expectations for students who wish to enroll in a VHS course, such as using a teacher recommendation system and holding orientations

to help clarify course expectations for both students and parents. Other schools use guidance counselors to help select students, as is recommended by the project's guidelines.

The VHS project also includes a central administration that is based at the Concord Consortium and Hudson Public Schools, both located in Massachusetts. As mentioned in the first chapter, Dr. Robert Tinker, President of the Concord Consortium, and Dr. Sheldon Berman, Superintendent of the Hudson, Massachusetts, Public Schools are the principal investigators for VHS. However, Bruce Droste from the Concord Consortium and Elizabeth Pape from Hudson Public Schools have responsibility for the day-to-day management of the project and have the greatest interaction with the participating schools. Among the many responsibilities of these two individuals are managing the nationwide marketing of VHS; recruitment, selection, and preparation of schools; preparation of VHS teachers; and establishment of VHS policies to guide student selection, grading, and assignment of credits. A staff of about eight other people is also part of the central VHS administration.

In discussions at case study schools and in survey comments regarding administrative operations, the VHS staff were consistently praised for their willingness to work with participants at the schools to improve operations and for their efforts to resolve issues that confronted teachers and coordinators. One teacher commented, "The staff at VHS central was great. This was my first year and I never would have made it without their help."

### **Preparation for Participation in VHS**

Schools, with support from their school districts, enter into an agreement with the VHS project. The specifics of this agreement are outlined in the Memorandum of Understanding (see Exhibit 2) that each school's principal and corresponding district superintendent must agree to and sign before being able to participate in VHS. Schools typically enter into this agreement the previous school year, before VHS courses are actually offered.

Schools select a teacher and a site coordinator, each participating in a professional development netcourse that will prepare them for their responsibilities in VHS. The Teachers Learning Conference (TLC) is a 25-week graduate-level, credit-bearing netcourse that covers the operation of the LearningSpace software, the development of

## Exhibit 2: Memorandum of Understanding

### Memorandum of Understanding Between Hudson Public Schools Virtual High School Project and

\_\_\_\_\_ (name of school district)

I, \_\_\_\_\_ (superintendent's name) of

the \_\_\_\_\_ (school district name) have read and understand the Guidelines for Participation document which delineates the requirements needed to participate in the Virtual High School Collaborative Project.

I affirm that the \_\_\_\_\_ (name of school) will meet the minimum required participation requirements:

- Be accredited for grades 9-12.
- Have Internet connectivity and computers to support the participating teachers and students as delineated in the Guidelines for Participation in the Virtual High School Collaborative Project.
- Provide at least \$50K non-Federal matching contribution over the life of the grant.
- Be in compliance with all Federal Civil Rights legislation.
- Free teacher from teaching responsibilities .20 FTE for every VHS NetCourse taught. I understand that authorship rights to the VHS NetCourse developed by my school district's VHS teacher as part of the VHS Cooperative Project remain with the teacher. I also understand that the United States Department of Education, Hudson Public Schools, Concord Consortium and this school district each has a royalty-free, non-exclusive and irrevocable right to reproduce, publish or otherwise use this work, or authorize others to do so.
- Free teacher to participate in Teacher's Learning Conference (TLC) and have computer available for teacher to participate in TLC.
- Provide .20 FTE site coordinator who shall be primary point of contact for VHS National Offices in communications with school. Role of VHS Site Coordinator shall be to provide technical and administrative support to teachers and students, recruit VHS teachers, recruit and enroll VHS students, assure that the necessary level of technology to support VHS students and teachers is available.
- Assure participation of site coordinator in Site Coordinator Learning Conference.
- Provide materials, books, software, etc. which are required for NetCourse which VHS teacher of participating school teaches.
- Mail materials, books, software, etc. to VHS students.
- Return within 1 week of VHS semester end all materials, books, software, etc. which the participating school students used as part of their VHS NetCourse. Be fully responsible for lost or damaged VHS materials books, software, etc. Pay damages to NetCourse school within one month of receipt of loss or damage notice from VHS National Office.

The VHS site coordinator is \_\_\_\_\_

Site coordinator's e-mail address: \_\_\_\_\_

\_\_\_\_\_  
Superintendent's name (please print)

\_\_\_\_\_  
Superintendent's Signature

\_\_\_\_\_  
Date

Superintendent's address: \_\_\_\_\_

\_\_\_\_\_

VHS courses, and pedagogical techniques for course delivery. Central VHS staff closely monitor the progress of teachers and provide feedback where necessary.

A new development this year is the Site Coordinator Learning Conference, a netcourse designed by the Concord Consortium to augment the site coordinators' technological expertise and familiarize them with VHS policies and procedures. Although coordinators have varied roles in the project, VHS central staff realized that the previous experience and strengths of coordinators were equally varied. When the project included only 20 to 30 schools, in the first 2 years, direct technical assistance to coordinators was an achievable goal, but with growth to more than 100 schools, the essential knowledge needed by site coordinators was streamlined into the Site Coordinator Learning Conference. This netcourse is a requirement for all site coordinators.

### **Development of Netcourses**

Netcourses begin with the interest and determination of potential VHS teachers. Usually, the subjects of netcourses are chosen by the teachers who develop the courses. Through the TLC, central VHS staff provide the criteria and means to create an on-line course of high quality. With the help of TLC facilitators, teachers receive technical support, guidance, and feedback.

In the first 2 years of the VHS project, 20 to 30 potential VHS teachers were enrolled in the TLC each school year. Central VHS staff were able to keep close tabs on the progress of these teachers and improve on the TLC content. During the third year of the project, the number of teachers enrolled in the TLC grew to more than 100, and close monitoring of their progress became impossible for central VHS staff.

In an effort to continue to provide the guidance and feedback that had been available to a smaller number of teachers in previous years, the central VHS staff hired a number of TLC facilitators to mentor future VHS teachers in their new roles. During the 1998-99 school year, facilitators were selected from a cadre of former and current VHS teachers who had experience developing netcourses. In some cases, facilitators were teachers who had created exemplary netcourses but, because of low student enrollment, did not deliver their courses during the school semester. Ideally, central VHS staff match 10 teachers in the TLC with one facilitator.

Because the TLC is the arena in which potential VHS teachers develop the netcourse curriculum, it is also an appropriate venue in which to assess whether teachers

can successfully translate or prepare their courses for delivery on-line. VHS central staff hold teachers in the TLC accountable for completing development of at least the first 9 weeks of their VHS coursesw before allowing them to be offered in the VHS course catalog. In addition to course design and development, the TLC reviews innovative instructional methods, as well as course expectations and VHS policies.

### **Student Selection**

Site coordinators are responsible for spreading the news about VHS throughout the school and community. This marketing effort is designed to reach large numbers of students, teachers, administrators, and guidance counselors, as well as parents/guardians. Among schools visited, news about VHS is commonly found in school newspapers and bulletins. Site coordinators report having organized teacher orientations and familiarizing guidance counselors with the variety of VHS course offerings. In some cases, school site visits have also demonstrated an integration of VHS into the school curriculum by including netcourses among the regular courses in school catalogs.

The types of criteria used to select students for enrollment in VHS were remarkably consistent. Several coordinators mentioned that having a particular GPA or being college bound was not a prerequisite to enrolling in VHS courses; rather, the selection of students focused on whether the individual had a high degree of motivation and self-discipline, independent work habits and problem-solving skills, and time management skills. Another coordinator pointed out, however, that “many of the students most suited for VHS courses were college bound.” Through preenrollment activities, such as requesting teacher recommendations or holding VHS orientation sessions, site coordinators try to let students know early on that they will be accountable largely to themselves to complete work in the course. As one coordinator put it, “Basically, we want to know if that student wants to do something, can he or she take actions to get it done?”

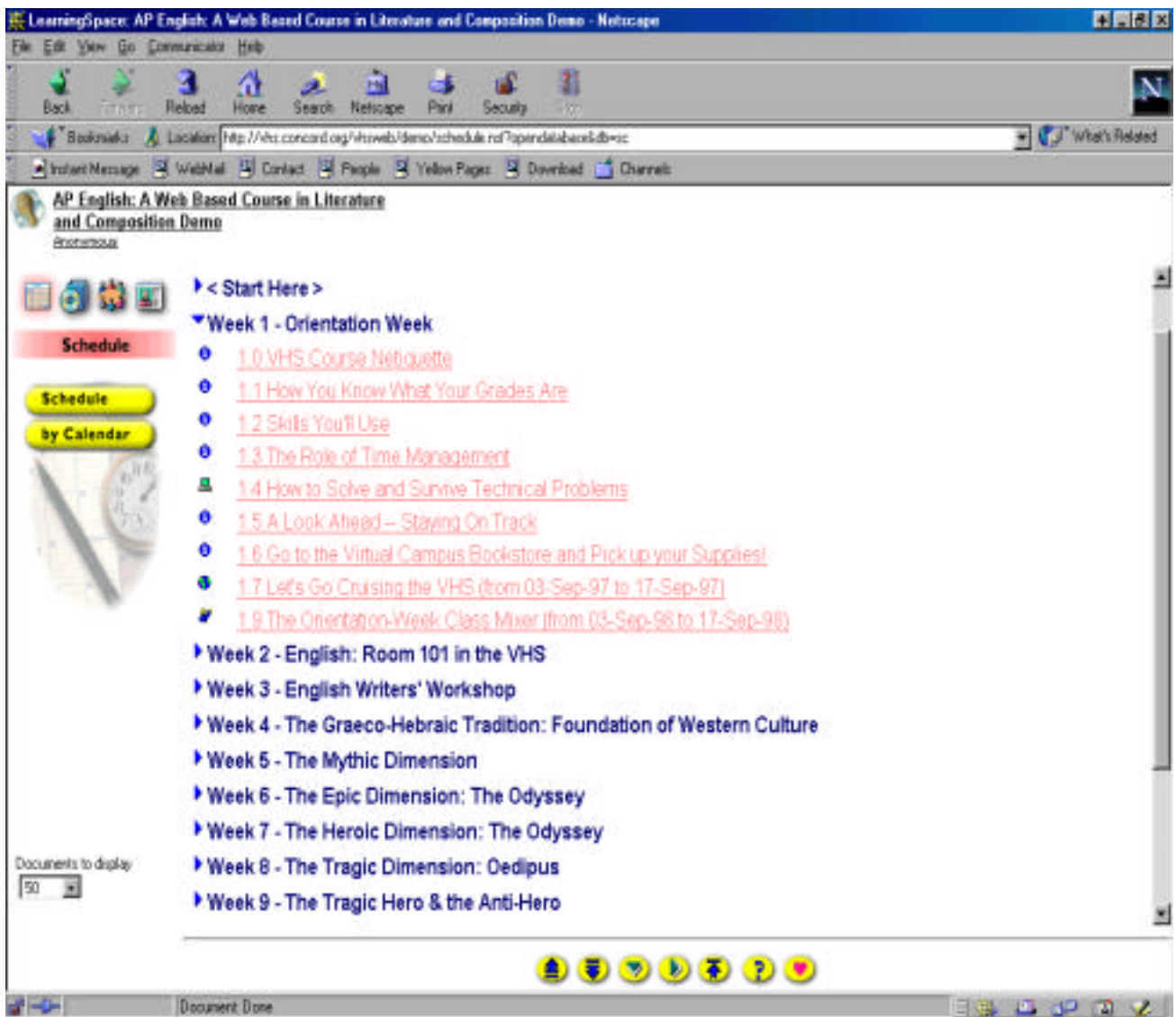
### **LearningSpace**

LearningSpace is software that is used to create and deliver netcourses. Developed and supported by Lotus Development Corp., LearningSpace has been upgraded in part to meet the needs of VHS. Technical difficulties in using LearningSpace diminished greatly in year 2 of operation. Participants in case study interviews reported that LearningSpace was, in general, much easier to use. Teachers reported greater efficiency in navigating the software and in managing the logistics of their courses. Nonetheless, several

participants commented that although changes in the software have made it better, LearningSpace is still difficult and time-consuming to learn how to use.

LearningSpace consists of five areas for teachers to develop and enhance their netcourses and to manage their students' work and grades. The five areas, accessible to students through a standard Web browser, are: the schedule, profiles of students and teachers, the MediaCenter, the CourseRoom, and an Assessment area. A sample view of the schedule is shown in Exhibit 3.

**Exhibit 3: Sample View of a VHS Netcourse**



Teachers and coordinators continue to offer suggestions for improvement of the software. For example, adding a “chat” (synchronous communication) function and improving the assessment/grading portion were suggestions that will appear in LearningSpace for the 1999-2000 school year. Several participants mentioned being pleased with the fact that Lotus was listening to them and had implemented their suggestions, such as improving the print feature. LearningSpace also provides procedures to enroll students, automate student-warning notifications, and report grades in a workable fashion.

## **VHS School Administration**

Site coordinators and teachers expressed concerns about course registration schedules, synchronization of school calendars, grading variability and access, and management of physical course materials. Each of these concerns will be explored in this section, and the solutions and policies developed by VHS staff to address these concerns will be presented.

### **Course Registration Schedule**

Case study interviews revealed concerns about student registration procedures. Some students felt frustrated when the VHS courses that they selected were not available because the courses were full. The explanation they received from school site coordinators and administrators was that the registration schedule for their school did not coincide with the VHS registration schedule. Nonetheless, the VHS policy for student registration is quite clear:

Registration for the following year usually starts in March or April of the previous year, on a specific day and time. Registration is on a first-come, first-served basis, and most courses are capped at 20 students. (VHS Guidance Handbook)

The responsibility to register students on a timely basis rests with the site coordinator.

Survey findings show that site coordinators experienced greater stability with VHS registration in year 2 than in year 1. In year 1, all site coordinators reported either an increase or a decrease of VHS students from the fall to the spring semester. In year 2, 62% reported the number of VHS students to be about the same.

### **School Calendar**

Concerns from all participants regarding the staggered school calendar reached a resolution during year 2. During each of the two years that VHS has operated, the

participating schools' starting and ending dates for their academic years have varied by more than a month. As a result, many students did not begin their VHS instruction until a month into their school's fall semester, and teachers were often forced to submit grades early to meet deadlines from some of their VHS students' schools.

In a policy that was developed during year 2, all VHS semester-long courses officially became 15 weeks long. Full-year courses are covered in 33 weeks. The 15-week VHS courses begin when most participating VHS schools begin, during the early part of September. To accommodate schools that start in August, VHS staff and VHS teachers have developed a series of Independent Learning Opportunities (ILOs) that range in duration from 1 to 3 weeks. These unmoderated "mini-courses" will not be graded or given credit by VHS, but they do have an assessment rubric that site coordinators can use for students who need additional learning activities before, after, or between VHS semesters. Site coordinators can incorporate completion of ILOs as a requirement of VHS courses.

### **Grading**

Grades for VHS courses can range from "A+" to "F," as well as "I" for incomplete. A student's grade depends on the teacher's assessment of the student's performance in meeting the requirements of a VHS course. Course requirements are made available to students and parents at the beginning of each netcourse.

Although there is a common grading system for all VHS courses, participating high schools translate these grades into their own system. Most courses provided clear expectations for students; however, grading policies might not have been so clear. Some teachers felt pressured by coordinators and students to change grades after the final date for posting grades had passed; other teachers wanted more flexibility to accept late work; and still others did not respond to coordinators' requests for clarification on a grade. In response to these concerns, central VHS has established clear policies to address grading questions:

Netcourse teachers will clearly delineate weight of each assignment in determining grades, as well as penalties for late submission of work. A student or parent may request from a teacher how a grade was determined. The teacher will then indicate in writing how the grade was determined. (VHS Faculty Handbook)

Additionally, VHS now provides official written warnings that must be signed by parents if a student is at risk of failing.

With regard to late or make-up work, the VHS policy states that “teachers will be available on-line for make-up work and help. It is the responsibility of the student to make up work missed due to absence. Unless there are extenuating circumstances, work should be made up within one week of a student’s return to school.”

Another concern raised by site coordinators pertained to the availability of student grades by mid-semester, usually needed in response to school activity requirements. VHS staff requested that VHS teachers post an on-line grading document that will remain up-to-date for the duration of the course. Central VHS staff also provide VHS coordinators with student grades in an Excel spreadsheet format, facilitating the logging of grades at the school site.

### **Course Materials**

Teachers from case study schools expressed concern about textbooks and other physical materials that were sent to VHS students. In particular, they were frustrated about the lack of recourse when materials were not returned. Since it is the responsibility of the school delivering the netcourse to provide VHS students with appropriate textbooks and materials, loss or damage to these items can be a detriment to the subsequent group of VHS students enrolled in that course. VHS policy designates the site coordinator of the receiving school to distribute these materials and to return them within 2 weeks if a student has withdrawn from the course. The receiving school is also held accountable for loss or damage to course materials. Grades will not be mailed to the schools at the end of the second semester until all course materials from that school have been returned to the netcourse teachers’ schools.

### **VHS Netcourses**

The comments of site coordinators, principals, and superintendents who were interviewed as part of case studies, or who made comments on surveys, mostly support the claim that VHS courses are excellent. There was marked improvement in teachers’ perceptions of the effectiveness of their VHS courses. However, several participants mentioned that with the planned growth of VHS to more than 100 courses offered in the 1999-2000 school year to more than 90 schools, control of course quality will be a significant issue. Course quality will be covered in greater detail as one of the goals in the next chapter.

Although some administrators reported concerns about filling VHS student slots, the average number of students per netcourse has been steadily rising since the project began (see Exhibit 4). Still, student enrollment in VHS courses showed great variability, ranging from 3 to 36 students. Having a course with a low enrollment is not normally a cause for concern, but having a school with a low enrollment of VHS students would pose a problem for many school administrators because the costs to that school could be difficult to justify.

In four semesters of operation, VHS has offered 42 different courses. The number of students enrolled and the average number of students per netcourse have been steadily increasing. In total, about 1,300 different students have taken 1,632 semester credits of coursework in the 2 years that VHS has been operating.

A list of the 35 netcourses offered and their corresponding enrollments during the 1998-99 school year is included in Exhibit 4. In year 2, 15 courses were offered for the first time. In contrast to year 1, when nearly all courses offered were listed as honors courses, in year 2, the courses offered represented a wider range; 20 were listed as honors, 13 as open to all, 1 as advanced placement, and 1 as eligible for college credit. Of the courses offered, 31 were offered in repeating semesters, 2 were year-long courses, and 4 were offered one semester only. One course was cancelled during the fall semester. As can be seen from Exhibit 4, the subject matter of VHS courses continued to range from those commonly found in high school catalogs (AP Statistics) to the unique (Photography as Visual History). This expanded variety of course offerings continued to be one of VHS's most appealing features.

**Exhibit 4**  
**VHS Courses and Enrollments\* during School Years 1997-98 and 1998-99**

<b>Course Title**</b>	<b>Originating School</b>	<b>Fall '97 Enrollment</b>	<b>Spring '98 Enrollment</b>	<b>Fall '98 Enrollment</b>	<b>Spring '99 Enrollment</b>
101 Ways to Write a Short Story	John F. Kennedy High School, Fremont, CA	----	----	14	18
Aeronautics and Space Travel – and Record Breaking with Model Airplanes	Forks High School, Forks, WA			17	19
Astronomy: Stars and the Cosmos (Introduction to Stellar Astronomy)	Hudson High School, Hudson, MA	13	14	14	14
American Music Heritage: Song and Society	Radnor High, Radnor, PA	----	----	11	15
A Model United Nations Simulation Using the Internet	Algonquin High School, Northborough, MA	10	9	12	13
AP Statistics	Collingswood High School, Collingswood, NJ	15	13	18	17
The Bioethics Symposium	Westborough High School, Westborough, MA	15	12	14	15
Business in the 21st Century	Northampton High School, Gaston, NC	12	15	16	15
Computer Graphics on the Internet	Thomasville High School, Thomasville, GA	----	----	----	12
Computer Technology I	New Hanover High School, Wilmington, NC	16	18	----	----
Creative Problem Solving in Math & Logic	Hudson High School, Hudson, MA	13	16	----	----
Current Issues in Nutrition and Health	Framingham (MA) State College ***	--	12	16	13
Earth 2525: A Time Traveler's Guide to Planet Earth	Allen High School, Allen, TX	11	14	12	14
Eastern and Western Thought – A Comparison	Campolindo High School, Moraga, CA	13	15	16	16
Environmental Ethics	Myers Park High School, Charlotte, NC	----	----	12	17
Explorando Varios Aspectos de Culturas Hispanas Através del Internet	Allen High School, Allen, TX	7	8	9	10

\* Enrollments are based on the numbers of students who completed each course and were assigned a grade.

\*\* Course titles in parentheses were used in year 1.

\*\*\* These institutions are not high schools but did offer a VHS course.

**Exhibit 4**  
**VHS Courses and Enrollments\* during School Year 1997-98 (continued)**

<b>Course Title**</b>	<b>Originating School</b>	<b>Fall '97 Enrollment</b>	<b>Spring '98 Enrollment</b>	<b>Fall '98 Enrollment</b>	<b>Spring '99 Enrollment</b>
Exploring America Through Its Writers (Regional Literature of the United States)	Windsor High School, Windsor, CA	2	5	7	16
The Folklore and Literature of Myth, Magic, and Ritual	Shrewsbury High School, Shrewsbury, MA	11	20	17	13
Global Lab	Mendocino High School, Mendocino, CA Strath Haven High School, Wallingford, PA	8 (term 1)	9 (term 2)	----	----
Hands-on Physics	Concord Consortium, Concord, MA ***	13	6	----	----
Informal Geometry: A Construction Approach	Lumberton Senior High, Lumberton, NC	6	9	3	----
Integrated Ecospheric Systems	Myers Park High School, Charlotte, NC	11	12	----	----
Introduction to Botany	Center High School, Center, CO			11	11
Introduction to Computer Programming	Hillside High School, Durham, NC	35	31	36	26
Introduction to Microbiology	Center High School, Center, CO	19	17	17	12
La Connection Francophone	Acalanes High School, Lafayette, CA	4	5	7	8
Logic, Deductive Reasoning, and Proof	Lumberton High School, Lumberton, NC	----	----	7	----
Multicultural Literature	West Bloomfield High School, West Bloomfield, MI	----	----	13	14
Music Appreciation and Composition	Westborough High School, Westborough, MA	16	15	13	14
The Native American Experience	Marlborough High School, Marlborough, MA	8	9	7	14
Oceans; Living Space for the Future	Northampton County High School, Gaston, NC	----	----	16	14
Photography as Visual History	Marlborough High School, Marlborough, MA	----	----	11	15
Poetics and Poetry for Publication	John F. Kennedy High School, Fremont, CA	16	17	16	15
Project Sail	Tyngsboro High School, Tyngsboro, MA	----	----	14	14
Russian, Soviet, and Post-Soviet Studies	Miramonte High School, Orinda, CA	8	12	10	11

\* Enrollments are based on the numbers of students who completed each course and were assigned a grade.

\*\* Course titles in parentheses were used in year 1.

\*\*\* These institutions are not high schools but did offer a VHS course.

**Exhibit 4**  
**VHS Courses and Enrollments\* During School Year 1997-98 (concluded)**

<b>Course Title</b>	<b>Originating School</b>	<b>Fall '97 Enrollment</b>	<b>Spring '98 Enrollment</b>	<b>Fall '98 Enrollment</b>	<b>Spring '99 Enrollment</b>
Screenwriting Fundamentals	Littleton High School, Littleton, CO	----	----	16	18
Space Based Astronomy	Keystone Oaks High School, Pittsburgh, PA	10	11	----	----
United States Government Issues (Washington, DC: American National Government and Politics Simulation)	Escalante High School, Tierra Amarilla, NM	13	9	11	15
Web Page Design: HTML and Beyond	Massachusetts Communications College, Boston, MA***	----	----	17	11
Web Writing (Writing Through Hypertext – 1st 3 sem)	Las Lomas High School, Walnut Creek, CA	12	15	9	13
Webquest: A Literary Odyssey (2 terms) (AP English: A Web-Based College Level Course in Literature & Composition )	Forks High School, Forks, WA	13 (term 1)	12 (term 2)	10 (term 1)	11 (term 2)
Writing: From Inner Space to Cyber Space	Rutgers Preparatory Upper School, Somerset, NJ	7	13	----	----
<b>TOTAL VHS ENROLLMENT</b>		<b>337</b>	<b>373</b>	<b>449</b>	<b>473</b>
<b>MEAN CLASS SIZE</b>		<b>12.0</b>	<b>12.9</b>	<b>13.2</b>	<b>14.3</b>

\* Enrollments are based on the numbers of students who completed each course and were assigned a grade.

\*\* Course titles in parentheses were used in year 1.

\*\*\* These institutions are not high schools but did offer a VHS course.

### III. VHS's SECOND YEAR OF OPERATION

In its second year of operation, the VHS project made considerable progress toward achieving its goals. These goals, which were defined before the first student enrolled in a VHS course, continue to guide VHS and to serve as the basis for evaluating its impact. (The goals were presented as in Chapter I.)

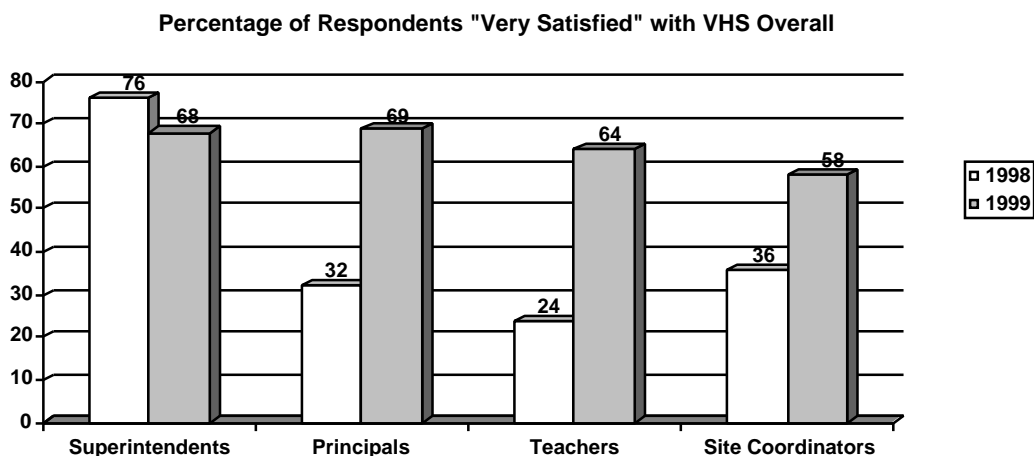
In a process similar to the one used last year, SRI evaluators gathered and synthesized data from school case studies, participant surveys, and VHS project documents. The data were analyzed in relationship to the project's goals and, when applicable, in relation to findings from the evaluation of VHS's first year of operation. This chapter includes a discussion of the important findings.

#### **Increased Satisfaction**

Nearly all participants expressed greater satisfaction with the VHS project during its second year of operation than during its first year. The increase in satisfaction corresponds to progress toward achieving a number of the project's goals, including solving implementation problems (Goal 1); providing benefits to students, teachers, and other participants (Goal 2); offering courses of high quality (Goal 3); and making the benefits of VHS available to schools and students equitably (Goal 6).

On a 4-point scale (1 meaning "very satisfied" and 4 meaning "not at all satisfied"), there was movement toward the "very satisfied" response among principals, teachers, and site coordinators. Among all participants (superintendents, principals, teachers, and site coordinators), the percentages of respondents who were either "somewhat satisfied" or "very satisfied" with the VHS project were very similar (92%, 96%, 97%, and 100%, respectively). Compared with last year, many more participants this year expressed being "very satisfied" with VHS (Exhibit 5). The increase in teacher satisfaction with VHS overall was statistically significant ( $t=3.11$ ,  $p<.005$ ). Because VHS teachers must work hard to master a new medium and because they are the ones most responsible for creating and delivering high-quality courses, their satisfaction with the VHS experience is important.

## Exhibit 5



When asked to rate their satisfaction with the VHS courses they taught, on a 4-point scale (1 meaning “very satisfied” and 4 meaning “not at all satisfied”), all teachers reported that they were either “very satisfied” (59%) or “somewhat satisfied” (41%) with their VHS courses, for a mean of 1.4. This was a significant increase from last year, when 31% of teachers were “very satisfied” with the quality of their VHS courses, 62% were “somewhat satisfied,” and the mean was 1.8 ( $t=2.54$ ,  $p<.05$ ).

Most participants interviewed as part of the case studies also expressed a high level of satisfaction with the VHS program overall. Teachers made comments such as, “Overall, I was delighted with VHS.” Similarly, a number of students provided positive comments in their surveys, including this one:

I really enjoyed my VHS course. The experience was unique and interesting. I don't think anyone should miss out on the opportunity to take a virtual class.<sup>1</sup>

Site coordinators and principals also expressed enthusiasm about the extended curriculum offerings, the quality of course instruction, and the organization of the VHS program. Additionally, all superintendents reported that their school board's response to VHS was either very positive (77%) or somewhat positive (23%).

Overall, the major findings that emerged from the data about VHS's second year of operation were positive. Participants expressed greater satisfaction with the VHS project, teachers and coordinators reported that program operations were becoming more

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<sup>1</sup> The student survey response rate was only 45.4%, and comments from students may not be representative. Student comments are used only for the purpose of supplementing survey findings from other participant groups.

routine and less time-consuming, and all participants indicated satisfaction with the quality of the VHS courses. Concerns about VHS are still evident, of course, and more detailed findings are discussed in the sections that follow, goal by goal.

### **VHS Goal 1: Implementation Problems Will Be Solved**

Technical difficulties related to server problems and use of the LearningSpace software diminished greatly in the 1998-99 school year. The impact of technology-related problems in the 1997-98 school year is illustrated by this comment from a year 1 VHS teacher: "I think I lost half of the kids because of technology." In year 2, network capacity issues and technology troubleshooting were rarely mentioned. In fact, the percentage of teachers who said they were able to implement their second-semester courses as planned rose from 54% in year 1 to 69% in year 2. As a point of reference, 19% of teachers reported being able to implement their first-semester courses of the 1997-98 school year as planned. This year, there were many comments from teachers such as, "VHS service and efficiency of the server improved, lessening technical frustrations."

When site coordinators were asked to characterize students' problems with the Internet and LearningSpace, 85% responded that very few students had problems and that system problems occurred infrequently. This was significantly more than in 1997-98, when only 52% of site coordinators made a similar estimate ( $\chi^2(1, N=49) = 6.05, p < .05$ ). Site coordinators reported fewer glitches, fewer password lockouts, shorter wait-times, and less time spent troubleshooting.

#### **Administrative Operations**

Participants consistently reported that the operation of VHS ran far more smoothly in year 2 than in year 1. Procedures for enrolling students, helping them during their VHS courses, warning them if they fell behind, and reporting grades had become more routine. Some concerns, however, remain to be addressed adequately in the areas of registration, grading, and course management (see Chapter II).

#### **Refinement of Roles**

In addition to operations being more routine and less time-consuming in year 2, participants appear to have a better understanding of their roles and responsibilities. When teachers were asked in the end-of-year survey whether the VHS site coordinator role was important and should be continued, there was a significant increase in teachers

responding “yes.” In 1998-99, 88% of teachers responded “yes,” and 13% responded “yes, but with changes.” A year earlier, only 56% responded “yes,” 41% responded “yes, but with changes,” and 4% responded “no” (for percentage of “yes” responses,  $t=2.82$ ,  $p<.01$ ). These findings suggest that teachers perceived the site coordinator role to have worked more effectively in year 2 than in year 1. All site coordinators said they felt that the coordinator role should be either continued (77%) or continued with changes (23%).

Coordinators across case study schools described their roles as being more routine in year 2, with less emphasis placed on providing technical support than in year 1. One site coordinator said that the role was becoming so routine that she could rotate out of the position and others could take over without hurting the program. She added that a teacher no longer needed to be a “techie” to be a coordinator. Coordinators at schools that had required VHS students to meet during a designated period of the school day noted that this requirement made monitoring of VHS students more efficient. A coordinator at one of these schools, who was adamant in year 1 that she could not take on more than 20 VHS students, reported in year 2 that she might be able to monitor 30 VHS students with the current arrangement.

Teachers who were interviewed reported feeling more efficient and effective in managing the logistics of teaching on-line. Several teachers cited improving the pace of the activities in their courses and structuring activities so more students had a stronger start. Experience in the netcourse teacher role (more than 60% of VHS teachers in year 2 had at least one year of on-line teaching experience) also may have contributed to this increased confidence and satisfaction with their courses.

## **VHS Goal 2: Participants Will Benefit**

Schools, teachers, and students continued to benefit from participation in VHS in year 2. The ability of schools to offer courses that would not have been available otherwise continued to be recognized by all participants as an important benefit of the project.

### **Benefits to Students**

“Taking this course was the only way I could take AP English.”

The student who is quoted above points to two major benefits of VHS courses: the availability of new course options and flexibility in scheduling. Even when the same course is offered in the school as a face-to-face option, it may not be scheduled in a time

slot that is available on the student's schedule. Although student surveys did not have a response rate suitable for statistical purposes, most students who did respond reported that taking a course that would not have been available otherwise was a major benefit of VHS. Students also consistently indicated in interviews and comments on the surveys that the increased flexibility of scheduling their work and the break from the traditional classroom setting were benefits of VHS participation.

Although the flexibility and the break from the traditional classroom setting were frequently mentioned benefits, students wrote many other insightful comments. One student wrote, "I think asynchronous discussion is wonderful and the most intelligent, deep conversations I've ever had in school have all been in VHS." Another student mentioned the benefit of being able to communicate without physical appearance being a factor: "The people that are within your class do not really see you. It is all based on your mental and not your physical appearance."

Students indicated a strong appreciation for the experience of working independently and improving their time management skills as a result of VHS participation. Several comments from students reflected a sense of pride in monitoring their own work habits and learning material on their own.

Site coordinators appeared to agree with the students' perceptions regarding benefits. One coordinator summarized the benefits of the program for students with the comment, "The Virtual High School experience prepares students...by having them work independently."

Some students also pointed out that many college courses are now taught on-line or have Internet-based components. One student wrote,

I did not enjoy the VHS experience as a whole, but it was a good idea for me to take the class. Lots of colleges are using the Internet for instructional material, and I needed the experience of taking a class on-line.

Students mentioned that the VHS experience not only would look favorable on a college application, but that it also prepared them for such experiences in the future.

Advancing technological skills was also a benefit of VHS participation. On the question of whether students had more access to or took greater advantage of technological experts as a result of VHS participation, significantly more site coordinators this year (91%) than last year (56%) responded that this was a benefit to students. ( $\chi^2(1, N=48) = 7.56, p < .01$ ).

## **Benefits to Teachers**

In a written comment, a teacher said, "I've greatly enjoyed VHS both personally and professionally, being on the cutting edge of technology in education." Teachers reported having benefited from the excitement surrounding the project. One teacher had given several presentations on her course at Stanford University and at teacher conferences. Another appeared in an article about VHS in the January 4, 1999, issue of *U.S. News and World Report*.

The increased flexibility provided by the asynchronous nature of netcourses and the increased knowledge of technology continued to be important benefits of VHS participation for teachers. In 1997-98, 59% of teachers indicated that they were "very satisfied" with the flexibility they had in teaching their VHS courses. In 1998-99, that percentage increased to 75%. The percentage of teachers indicating that, as a result of VHS participation, they acquired new technological skills was 79% in 1997-98 and 82% in 1998-99. Teachers indicated that they were using their new skills outside of VHS in comments such as, "This [VHS] course has increased my computer knowledge and I have used it in other classes." Teachers in case study schools also frequently mentioned that their new technological skills, such as managing a variety of electronic file formats, operating HyperStudio software, and consulting cyberspace experts, were being used in the regular classroom.

Similar to what was found in year 1, majorities of coordinators (78%), principals (77%), and superintendents (67%) reported that their teachers were able to teach courses that they could not have taught otherwise. Other findings on teacher benefits of participation in VHS in year 2 were similar to those in year 1. Teachers indicated that, as a result of participation in VHS, they had acquired new subject matter knowledge (year 2, 61%; year 1, 59%), increased existing subject matter knowledge (year 2, 88%; year 1, 86%), acquired new teaching or assessment skills (year 2, 70%; year 1, 69%), and had access to and took advantage of pedagogical experts that they otherwise would not have (year 2, 70%; year 1, 66%).

Administrators confirmed that teachers had benefited. Both principals and superintendents reported that, as a result of participating in VHS, teachers had acquired new technological skills (principals 81% and superintendents 96%), acquired new subject matter knowledge (65% and 60%), and acquired new teaching or assessment skills (85% and 88%).

VHS teachers also indicated an increase in interactions with teachers at other schools (82%). A majority of principals (77%) and superintendents (76%) agreed that, as a result of participating in VHS, teachers had the opportunity to collaborate and/or network with teachers from other schools and districts.

### **Benefits to Schools**

Benefits to teachers extended to non-VHS courses. Aside from using new technological skills in regular classrooms, teachers indicated that they were using new teaching or assessment approaches in their other courses (year 2, 61%; year 1, 55%). Both principals (62%) and superintendents (68%) also said that teachers used new teaching and assessment approaches in other courses.

All superintendents and large majorities of principals (90%) and coordinators (88%) said that VHS courses were important. Other benefits of the VHS program that superintendents mentioned in comments were that the program helped the whole school make use of technology and made a difference in how the school was perceived. Attention and enthusiasm surrounding the program have been factors for schools and teachers. As one administrator put it, “Whenever I talk about VHS, people want to know more.”

### **VHS Goal 3: Courses Will Be of High Quality**

By all indications, in year 2 of operation, the VHS project offered high-quality courses taught by highly qualified teachers. All participants indicated satisfaction with VHS courses. This opinion, expressed by one principal, was typical of those expressed by many other participants:

Judging by the enthusiasm showed by VHS students and their parents, and through my own observation, the vast majority of VHS courses show high quality.

Teachers in the 1998-99 school year also were more experienced than those of year 1. In year 1, more than 60% of VHS teachers had at least one year of experience teaching a VHS netcourse. This previous experience of VHS teachers suggests the strength of their qualifications.

During the 1998-99 school year, however, considerable attention was paid to addressing remaining course quality issues. The major issues participants described were variability in quality of course preparation, variability in course difficulty, and expectations of communication within the courses. With plans for VHS to scale up to

more than 100 courses and more than 90 schools in the 1999-2000 school year, establishing greater consistency with regard to course preparation and delivery was a paramount issue for VHS staff and participating schools. These issues are discussed in the next section.

### **Course Quality**

Participants indicated that they were satisfied with the overall quality of VHS courses. Teacher ratings of satisfaction with nearly all aspects of their VHS courses increased in year 2. Coordinators and administrators agreed with the teachers: 95% or more of the coordinators, superintendents, and principals indicated that they were either “very” or “somewhat” satisfied with the quality of VHS courses offered at their school. Several students in case study schools who had participated in both year 1 and year 2 of VHS said that the VHS teachers had improved and were more organized in year 2 of operation.

As mentioned previously, teacher satisfaction with the overall quality of their VHS courses increased significantly in year 2. Teachers were asked to rate their satisfaction with their regular classroom courses on the same 4-point scale as their VHS courses (1 meaning “very satisfied” and 4 meaning “not at all satisfied”). In contrast to findings in year 1, when teachers rated their satisfaction with the quality of their regular classroom courses significantly higher than satisfaction with their VHS courses, this year their ratings were very similar (mean ratings: VHS 1.4, regular 1.3).

One indication that variation in course quality (or perception of what constitutes VHS course quality) exists was participants’ ratings of the quality of VHS courses offered by *other* schools or districts compared with ratings of VHS courses offered by *their own* schools or districts. While administrators indicated increased satisfaction with VHS courses overall, their satisfaction with VHS courses offered by their own schools or districts was higher than satisfaction with those offered by other schools or districts. On a 5-point scale (1 meaning “very” and 5 meaning “not at all”), superintendents’ mean rating of satisfaction with VHS courses offered from their own districts was 1.2; for courses from other districts, it was 1.4. Principals’ satisfaction with VHS courses offered by their own schools or districts was significantly higher (1.2) than their satisfaction with the quality of VHS courses offered by other schools or districts (1.5) ( $t=2.27, p<.05$ ). For site coordinators, the difference in satisfaction was the most significant: 1.2 mean rating for quality of VHS courses offered by their own schools or districts and 1.7 mean rating for those offered by other schools or districts ( $t=4.07, p<.001$ ).

During case study interviews, several participants indicated that the on-line materials for some courses were better prepared than those for others. The most dramatic illustration of this problem was the cancellation of one VHS course (Electric Vehicle Technology) in the middle of the fall semester because of its low quality. As it happened, the teacher had years of successful experience teaching the course in a regular classroom but was unprepared for the kind of instruction that VHS courses required. Coordinators were left to find ways to provide some of the affected students with credits they needed. Needless to say, this was a source of great dissatisfaction for those affected.

Administrators have also requested more information about VHS courses to help them assess their quality and to help with the schools' often arduous process of gaining approval to offer VHS courses for credit. One administrator stated during an interview that it would be easier to communicate regarding a VHS course's quality if the VHS program would provide a statement about the academic rigor for each course. Such descriptions could specify the academic content covered by the course, the kinds of assignments and projects that are required, the level of difficulty of the textbook, and the prerequisite courses. This administrator felt that the descriptions provided in the course catalog were oriented more toward student recruitment than toward explaining the difficulty level of the course. Another suggestion that was made by participants, which will be implemented by VHS in 1999-2000, was to help maintain quality by using VHS academic faculty advisors. These faculty advisors will be responsible for such tasks as evaluating course quality and monitoring course delivery throughout the academic year.

The VHS project has taken significant steps during year 2 to alleviate the occasional, but nonetheless serious, problem of inadequately-prepared courses, and to provide participating schools with more substantive information about the courses. One major development by VHS staff was the NetCourse Evaluation Board (NCEB). Representing a broad range of educators, this board has developed a set of VHS standards, which will be used to monitor the quality of on-line courses. The board will also complete brief reviews of some of the VHS courses being offered in the 1999-2000 school year.

Importantly, the process for evaluating course quality is also designed to contribute to the Virtual High School's own internal, ongoing efforts to establish high standards for netcourses. To establish course quality more concretely through an independent evaluation, a panel of content experts was assembled by SRI in July 1999. The panel is expected to provide a significant, objective, unbiased perspective in assessing the quality

of a sample of VHS courses that have been taught over the past 2 years. The SRI expert panel's evaluation of course quality, while separate and distinct from the VHS review processes, is intended to inform those proceedings, particularly the more in-depth review process anticipated to be completed by the faculty advisors.

Information gathered from the SRI panel's evaluations and the NetCourse Evaluation Board will provide participants with a set of criteria by which to judge netcourses and will also contribute formative feedback to teachers to help with improvement of the individual courses.

### **Course Difficulty**

Standardization of the difficulty of the courses was an issue raised at all case study site visits. As one administrator put it, "We have a 'system' [in our school] that weighs honors classes when grade point averages are computed, and it is difficult to judge whether some of the VHS courses meet our standards." Of the courses offered in the 1998-99 catalog, 14 were listed as "open to all," 1 was offered for college credit, and 22 were offered as honors or AP. Participants have requested a way to know what to expect in terms of the rigor of a course. Many students who added a VHS course as their "eighth" period (i.e., above their normal course load) complained that the course required much more work and time than they were led to believe. Other courses were described as very easy, as in the following student's comment:

It was an enjoyable class to take, because it was relaxing and not demanding in any way. Deadlines were too flexible and assignments only provided general information—very little details about the topic. Overall, my VHS class was great—but I wouldn't list it as 'honors' in any way, shape or form.

Variability in students' background knowledge may explain variability in perceived course difficulty. One teacher mentioned wanting to break his VHS course into an honors section and a regular section because of the difficulty of meeting the needs of students who enter the course with such variable background knowledge. The development of some standardized way for participants to review the difficulty and preparation needed for a course was a primary concern among administrators.

### **Student-Teacher Communication**

Comments regarding communication in VHS courses generally fell into two categories: responsiveness of teachers and student-to-student interaction. In their comments on surveys and in case study interviews, students stressed the importance of

communication in VHS. When students wrote comments critical of their VHS experience, communication with their teacher, or lack thereof, was often the issue. This comment from a student indicates the type of frustration experienced by students who had communication difficulties:

Communication is a big factor in VHS, and my teacher did not communicate with me well, or at all. I would ask a question and not get a response for a long time, even if it was a very important question that was pertinent to an assignment due in a few days. This affected my grade adversely, thus causing me to get a lower grade than I think I deserved.

Surprisingly, several students who had difficulty with communication issues also mentioned that they valued the VHS experience. The following is a comment from a student who reported having difficulty in using LearningSpace:

I did most of the course totally on my own using guesswork...When I wrote to the teacher I got no response. Maybe she did respond but I didn't know where to find her response...Basically I really liked the course.

Another student wrote:

The teacher was unresponsive and vague...Overall, the class was a bad experience but since I think that this was unique to this class, I am willing to try VHS again.

Although most teachers clearly put in a great deal of their own time to provide in-depth responses to student questions, teachers and coordinators who were interviewed mentioned that some teachers put in much more time than others. Two VHS teachers indicated that they knew of VHS courses in which the teacher was absent for many days without notice or did not respond to students' questions or problems in a timely manner. Because communication is so essential to any high-quality on-line course offering, standards for teacher responsiveness are included in VHS course standards developed by the NCEB. One of the functions of VHS academic faculty advisors will also be to make sure that students have an instructor in the event of a teacher's absence for any reason.

Nevertheless, teachers' satisfaction with their ability to communicate with their VHS students increased in year 2. On a 4-point scale, (1 meaning "very satisfied" and 4 meaning "not at all satisfied" the mean rating was 1.6, with 94% of teachers either very (44%) or somewhat (50%) satisfied with their ability to communicate individually with VHS students. In year 1, only 79% of teachers were either very (31%) or somewhat (48%) satisfied, and the mean rating was 1.9. One teacher commented, "Given the nature of the technology, most of my contact with students is individual...this extra individual attention is extremely worthwhile."

## **Student-to-Student Collaboration**

Teachers' success in generating productive student collaboration on-line continues to be mixed. Teachers continue to report that it is very difficult to structure their courses and activities to foster substantive student discourse and to support work completed in groups. On the other hand, there are examples of VHS courses with high levels of student discussion and meaningful group activities. The degree to which sophisticated student interaction exists seems to vary according to course structure, subject matter, and personality of the students. One student who had enrolled in more than one VHS course explained:

There's almost no communication with other students in computer programming because you just have to program and send the programs to the teacher. But there was a lot in Western and Eastern Thought because communication was your whole grade.

One student suggested that an improvement to a course on Multicultural Literature would be to include more frequent discussions. Another student who was interviewed, who mentioned that there was a lot of discussion in his course, also said that the discussion was dominated by three or four of the most active students in the class.

Some curricular areas may lend themselves more readily than others to student interaction. In general, students indicated that they preferred more interaction to less. Where there was substantive conversation, the students recognized its contribution to their learning.

In year two of VHS, teachers reported a decrease in use of collaborative approaches and an increase in student-generated reports to be shared with others (discussed further in the section on advantages of VHS). One teacher described her modifications in her teaching approach from year 1 to year 2 as having formalized discussions more, exercised greater control over the CourseRoom (e.g., by including very specific instructions), and becoming more accepting of the fact that it is very difficult for students to engage in a lot of teamwork on-line. Another teacher reported having difficulty getting students to respond to collaborative assignments despite trying a number of different activities and allocating a significant percentage of the total course grade to participation.

Students also indicated problems with student collaboration on projects (as separate from student-to-student discussion). As one student put it:

I do not enjoy working in groups in a VHS course, because it is far too difficult to communicate adequately with the entire group. This is due to the fact that some people do not check comments regularly.

The difficulty of conducting group work for both teachers and students may help explain the decrease in use of the technique in year 2.

The netcourse evaluation standards include student collaboration as a criterion, indicating VHS's beliefs about the importance of collaboration in student learning experiences. But given the degree of variation in instances of student collaboration, it may be important to provide additional professional development and coaching support for teachers interested in generating more successful collaborative activities, while also recognizing that student collaboration and discourse may be easier to foster in some curricular areas than others.

#### **VHS Goal 4: Internet Courses Will Demonstrate Advantages**

Findings from year 2 were similar to those from year 1 with regard to the advantages of VHS courses, compared with traditionally offered courses. Significant differences emerged in the use of various teaching approaches. Collaboration with other teachers in year 2 was greater in regular courses than in VHS courses.

##### **Use of Technology**

VHS courses continued to provide advantages over regular courses in terms of students' learning to use technology. On a 4-point scale (1 meaning "very satisfied" and 4 meaning "not at all satisfied"), teachers gave a mean rating of 1.2 on their satisfaction with their VHS students' ability to use technology. Similar to year 1 findings, their satisfaction rating on this measure was significantly higher for VHS than for their regular courses, where the mean rating was 1.9 ( $t=4.83$ ,  $p<.0001$ ).

Large majorities of superintendents (88%), principals (89%), and site coordinators (92%) agreed that students acquired new technological skills as a result of their participation in VHS. These findings were similar to those in year 1.

##### **Use of Innovative Instruction**

Large majorities of superintendents (88%) and principals (81%) viewed VHS courses as different from traditional courses. Participants (principals 85%, coordinators 84%, and superintendents 80%) generally agreed that VHS students engaged in new kinds of pedagogical activities or produced new kinds of products as a result of

participating in VHS. Several students also commented that VHS offered a “different way to learn” from the regular classroom.

Examination of approaches that teachers indicated using in regular and VHS courses revealed some changes from year 1 to year 2. In year 2, 82% of teachers reported having had students generate reports to be shared electronically with the community or other audiences in VHS, a 17 percentage point increase from year 1. At the same time, the number of teachers indicating that they used cooperative learning techniques in VHS decreased significantly, from 90% in year 1 to 68% in year 2 ( $t=2.27$ ,  $p<.05$ ).

The drop in reported use of cooperative learning approaches by teachers in their VHS courses led to a significant difference in use of the approach in VHS, compared with regular courses, in year 2. In contrast to year 1, when similar percentages of teachers indicated using cooperative learning techniques in regular (96%) and VHS (90%) courses, in year 2 the percentage of teachers indicating use of cooperative learning techniques was significantly lower for VHS courses (68%) than for the regular classroom (91%) ( $t=2.49$ ,  $p<.05$ ).

In year 1, only one statistically significant difference was evident between approaches that teachers used in VHS courses and those they used in regular courses: teachers were more likely to have students generate reports to share electronically with other audiences in VHS than in regular classrooms (VHS 66%, regular 37%;  $t=2.27$ ,  $p<.05$ ). The difference was evident again, and was even greater, in year 2 (VHS 82%, regular 38%;  $t=4.91$ ,  $p<.0001$ ).

Most teachers reported using inquiry-based projects (91%) and performance-based assessment activities or materials that measure knowledge, reasoning, collaboration, and self-reflection (82%). As in year 1, teachers’ use of inquiry-based projects, portfolio assessment, and performance-based approaches was similar in regular and VHS courses. Teachers also continued to use the approach of connecting school learning with work or real-world experiences more in regular courses (84%) than in VHS courses (68%).

### **Use of Outside Resources**

Findings regarding the use of outside resources were similar to those of year 1, with the exception of the extent to which VHS teachers collaborated with other teachers during the academic year. In year 1, more teachers indicated that they collaborated “a lot” or “some” with other teachers more while teaching their VHS courses (78%) than their regular courses (70%). In year 2, the difference in the two types of courses with

regard to teacher collaboration was in the reverse direction. In their VHS courses, 57% of teachers indicated that they collaborated with other teachers “a lot” or “some” during the year, and 66% made the same estimate in their regular courses

Corroborating this decrease were teacher responses to a similar question, in which they were asked whether they collaborated with teachers from other schools and districts as a result of VHS participation. In year 1, 83% of teachers indicated that they did indeed collaborate with teachers from other schools as a result of VHS participation. In year 2 that figure was 55%, a significant decrease ( $t=2.49$ ,  $p<.05$ ).

The percentages of administrators who indicated that VHS teachers collaborated with teachers from other schools as a result of participation also went down in year 2, though not as dramatically. Site coordinators went from 82% in year 1 to 75% in year 2, superintendents went from 71% to 68%, and principals went from 91% to 77%.

These findings raise the question under what circumstances teachers find it beneficial to collaborate with other teachers. Given that the majority of VHS teachers in year 2 were not teaching their courses for the first time, it may be that more collaboration takes place during the development of a netcourse than during the implementation of one.

Teachers gave comparative ratings on the extent to which they took advantage of a wide variety of other outside experts to plan and implement their VHS courses. On a 4-point scale (1 meaning “a lot” and 4 meaning “not at all”), in year 1 teachers indicated using subject matter experts, curriculum and teaching experts, and technical experts in the use of technology significantly more in VHS courses than in their regular courses. In year 2, teachers continued to indicate only using technical experts in the use of technology significantly more in VHS (mean rating 2.0) than in regular courses (mean rating 2.7) ( $t=4.44$ ,  $p<.0001$ ). There was little difference indicated in teacher use of the following resources in VHS courses, compared with regular courses: use of subject matter experts (VHS 2.1, regular 2.3), use of expert materials (VHS 1.6, regular 1.8), and use of experts in curriculum or teaching (VHS 2.7, regular 2.7).

Consistent with year 1 findings, the extent to which teachers collaborated with others in teaching their courses or working with students was similar in VHS and regular courses, with one exception. As was the case in year 1, teachers indicated (on a 4-point scale, 1 meaning “a lot” and 4 meaning “not at all”) that parents were more likely to be involved with regular courses (mean rating 3.1) than with VHS courses (mean rating 3.7). There was little difference in teacher use of the following experts in the two types of

courses: corporate staff (VHS 3.3, regular 3.5), scientists (VHS 3.5, regular 3.4), college students (VHS 3.8, regular 3.5), and senior citizens (VHS 3.8, regular 3.7).

With regard to people such as parents, scientists, and corporate staff participating in students' education, site coordinators agreed with the teachers. Only 16% indicated that that this type of collaboration took place as a result of VHS, a 14 percentage point decrease from year 1. Principals concurred with coordinators, with 16% indicating that others (parents, scientists, senior citizens, etc.) were able to participate in students' education as a result of VHS. The principals' response reflected an 8 percentage point increase from year 1, however.

From these findings, it seems that the potential for the electronic classroom to foster a greater network of people who can be involved in student learning has not yet been realized. The following comment from a teacher may provide a clue as to the difficulty involved in arranging for others to participate:

I went to great lengths to line up expert mentors—corporate, scientists, and a senior citizen—for my far away students in the first semester—but then the schools in question made zero effort to accommodate them.

The experience of the teacher who offered a course on Russian studies and planned to involve participants from the Ukraine provides another example of the effort required to establish such participation. The initial problem was obtaining passwords for participants not formally enrolled in the course. The VHS teacher set it up so that the Ukrainian teacher had a guest password and the students were able to participate using that password. At the time of the case study interview, there had not been a lot of participation, but the teacher was still enthusiastic about the potential of this new development in her course.

### **Levels of Communication**

Changes in the comparison findings on communication in VHS courses, compared with regular courses, from year 1 to year 2 of operation were subtle. As mentioned in the section on course quality, teachers were more satisfied with the extent to which they were able to communicate with VHS students individually in year 2 than they were in year 1. However, when compared with their rating of satisfaction with individual communication with students in their regular classes (4-point scale, 1 meaning "very satisfied" and 4 meaning "not at all satisfied"), the mean for satisfaction in VHS continued to be significantly lower (VHS 1.6, regular 1.2;  $t=3.50$ ,  $p<.005$ ).

Students' most common complaint about communication in VHS courses was that the VHS teacher took too long to respond to their questions and/or assignments. Comments in case study interviews indicated that students had to put more effort into simply asking a question in VHS than in regular courses. As one teacher remarked, students in regular classes who are having difficulty can stay after school to receive extra help. VHS students who are performing poorly need to ask more questions in order to get the VHS teacher to focus on problem areas. One student went so far as to suggest that mathematics is not a suitable subject for a virtual course because answering students' questions quickly is so important and because even posing a question may be difficult on-line. In general, there seems little doubt that timely responses from teachers would be one hallmark of high-quality VHS courses.

Nonetheless, there were indications that students and teachers are adjusting to the challenges of communicating in a netcourse. Coordinator estimates of student communication in VHS were slightly more positive than in year 1. The percentage of coordinators estimating that student communication with their VHS teachers was less or a lot less than in their regular courses was 57% in year 1 and 48% in year 2. One coordinator noted that more students in year 1 complained that their VHS teacher was not as responsive as they would have liked and that they needed more attention, whereas in year 2 students were better able to cope with the variation in teacher attention and the lags in responses to questions. With regard to student-to-student interaction in VHS, 77% of coordinators estimated that student interaction with other students was less (50%) or a lot less (27%) than in their regular courses during year 1. In year 2, only 52% estimated that student-to-student interaction in VHS was less (40%) or a lot less (12%) than in regular classes.

### **Levels of Learning**

Participants generally indicated that VHS students learn about the same amount as regular classroom students. Teacher satisfaction with the amount students learn in VHS courses improved slightly in year 2, with all teachers indicating they were very or somewhat satisfied with the amount students learned in VHS, compared with 95% in year 1. Teacher satisfaction with the amount that students learned in VHS was lower than satisfaction with their regular courses, but not significantly lower, as it was in year 1. On a 4-point scale (1 meaning "very satisfied" and 4 meaning "not at all satisfied"), teachers responded with a mean rating of 1.8 on their satisfaction with the amount students learned in their VHS courses and a mean rating of 1.5 for regular courses. All project

coordinators felt that VHS students either learned more (28%) or about the same amount (72%) as students in regular courses.

### **VHS Goal 5: VHS Will Become a Model for Network-Based Courses**

For VHS to achieve this goal, the project must demonstrate scalability and sustainability without sacrificing course quality or participants' satisfaction with project implementation. Both scalability and sustainability will be discussed in greater depth in Chapter IV.

#### **Refined Roles and Scalability**

As mentioned earlier in this chapter, both teachers and coordinators reported that their roles were becoming more routine and better defined. In terms of scalability, the reduced burden for teachers and coordinators would signify an emerging trend toward more effective operation of VHS. But an overwhelming majority of coordinators (92%) said they believed that the coordinator role would change significantly if the number of VHS students at their school were to grow considerably. Most coordinators commented that their workload would increase with a greater number of VHS students in their school; when compared with the time needed to teach one section of a regular course, almost half (48%) reported that it would take more or a lot more time, and 36% said it would take about the same time. However, only 46% said that their role would change significantly if the number of course offerings were to increase considerably. Thus, from a coordinator's perspective, VHS can scale up more easily by including a larger number of participating schools, as opposed to a larger number of VHS students per school.

The great majority of teachers (91%) reported that, compared with regular courses, this year's VHS courses required more or a lot more time and effort to teach and manage. On a 5-point scale (1 meaning "a lot more than a regular course" and 5 meaning "a lot less than a regular course"), teachers responded with a mean rating of 1.7 on the relative requirement of time and effort to teach and manage a VHS course. This finding points to a significant difference from last year, when the corresponding mean was 1.2. It is likely that since the majority of teachers in year 2 had previously taught a VHS course, they found the second year of teaching a netcourse significantly easier. Although additional time and effort are, in fact, needed to teach and manage a VHS netcourse, 87% of teachers felt that the time and effort were justified and acceptable.

### **Continuation after Funding**

The Technology Innovation Challenge Grant that funds the VHS project covers the costs of 20% of a site coordinator's time and 20% of a teacher's time in each participating school. After the grant comes to a close in 2001, schools will have to cover these expenses. Are schools willing to pay for these costs? Half of the 18 principals who responded to this question said that if the school had to pay for the time of both a coordinator and a teacher, it would not continue to be part of VHS. Indeed, 84% of principals said that the cost of VHS is likely to be a significant barrier to continued participation.

Among superintendents, 33% indicated that if the school district had to pay for the time of both the coordinator and teacher, it probably would not continue to be part of VHS. For the majority of those superintendents (75%), the cost of VHS is likely to be a significant barrier to continued participation.

Many administrators commented that the cost of a VHS teacher and coordinator had to be balanced against the benefits gained by the school, particularly the number of students who benefit. With 34 schools participating in VHS during year 2, the average number of students enrolled in VHS per school per semester was under 15. This was considerably less than the 20 per school that VHS allows (for each VHS teacher based at the school). Maintaining a larger enrollment in VHS courses (e.g., closer to 20 students per course) would have the effect of further leveraging a school's contribution of resources for VHS, in particular, the 20% released time for each VHS teacher and site coordinator.

In spite of these findings, more school districts want to join the project than VHS can support with its original funding. Districts want to join regardless of whether they have to pick up these costs.

### **VHS Goal 6: Netcourses Will Be Equitably Available**

An important goal in the original VHS proposal is to make the resources of VHS equitably available to a wide range of students. In year 2 of operation, the VHS project made progress in increasing the diversity of students served.

#### **Socioeconomic Mix Among VHS students**

In the 1997-98 school year, 48% of site coordinators indicated that VHS students represented the full range of socioeconomic backgrounds present in their schools. In year

2, 72% of coordinators made that estimate—an almost, but not quite, statistically significant increase. Site coordinators were asked to compare VHS students with regular classroom students on the extent to which they came from economically disadvantaged backgrounds. In year 1, 29% of coordinators estimated that the two groups of students were “about the same” on this measure; in year 2, 58% of coordinators made that estimate, a significant increase ( $t=4.018$ ,  $p<.05$ ).

### **Academic Goals**

More coordinators in year 2 said that VHS students came from a wide range of academic backgrounds: 31%, compared with only 13% in year 1. Similarly, significantly fewer coordinators characterized VHS students as being “exceptional academically” in year 2 (4%) than in year 1 (28%) ( $t=4.93$ ,  $p<.05$ ).

If the students who enrolled in VHS in year 2 had a wider range of academic backgrounds, the reason for this change could very well lie in the number of VHS courses geared toward non-honors students. As stated in Chapter II, only 21 of the 37 VHS courses were listed as “honors” courses, and 14 VHS courses were open to all students. By comparison, year 1 had no VHS courses open to all.

### **Gender Mix**

In year 2 of operation, teachers reported that 52% of their VHS students were female. Approximately the same number of males and females dropped out after the first week of classes (mean 1.6 male, 1.5 female). This gender mix of VHS students is similar to that of year 1, indicating that VHS continues to enroll relatively equal numbers of male and female students.

## **VHS Goal 7: Professional Development Will Be of High Quality**

VHS continued its commitment to high-quality professional development for VHS teachers and site coordinators in year 2 of operation. Like the VHS courses themselves, the Teachers Learning Conference (TLC) is an evolving product. Changes were made to the course on the basis of feedback from year 1, and VHS continues to hear suggestions and use the TLC as a vehicle for improving course quality and VHS overall.

In year 2, teachers rated the TLC significantly more effective in preparing them to plan and implement VHS courses. On a 4-point scale (1 meaning “very satisfied” and 4 meaning “not at all satisfied”), the mean for effectiveness went from 2.0 in year 1 to 1.6

in year 2 ( $t=2.15$ ,  $p<.05$ ). On the effectiveness of the TLC in preparing them to use technology in teaching, 87% of teachers responded very (53%) or somewhat (34%) effective, a 12 percentage point increase over year 1. These findings indicate that changes in the TLC have made it more effective in preparing VHS teachers.

Changes that were made in the TLC involved putting greater emphasis on the details of developing and running an effective netcourse and less emphasis on more global issues. The TLC took care to model desired practices in on-line teaching. Teachers were given very specific criteria to use while developing their courses and more help in learning exactly how to teach on-line.

The experience of having a course dropped mid-semester during year 2 was one reason for the greater emphasis placed on course development during the TLC. The TLC can be viewed not only as an opportunity for teachers to learn how to develop netcourses, but also as an opportunity to assess a teacher's ability to successfully translate a course for delivery on-line. Beginning with the TLC for teachers teaching in the 1999-2000 school year, teachers are accountable for having prepared at least the first 9 weeks of their VHS course as part of their TLC course. This requirement will allow VHS staff to assess the quality of the preparation before a course is offered in the VHS course catalog.

In the 1998-99 school year, VHS offered an on-line site coordinator orientation. All coordinators indicated that the orientation was either very (50%) or somewhat (50%) effective in preparing them to use technology well, including LearningSpace. The great majority of coordinators (90%) also indicated that the course was very (40%) or somewhat (50%) effective in preparing them to work effectively as a coordinator.

## IV. KEY ISSUES

Three topics that were identified as key issues in the first-year report warrant a progress check 1 year later: VHS course quality, the range of students served by the project, and project sustainability and scaling up. Each is discussed below.

### **Assuring High Course Quality**

In the first year of operation, school administrators said they assumed that VHS courses were of high quality; however, survey responses from students and teachers raised some concerns. At the end of the first year, teachers rated the quality of their VHS courses as “high,” but they rated the quality of their regular courses as significantly higher. Although students and teachers also expressed satisfaction with what students learned from the VHS courses the first year, they reported that communication and learning were higher in their regular courses. These findings resulted in a first-year recommendation to institute standard criteria and procedures that can be used to review VHS course quality.

Findings from evaluation of the second year of operation indicate that significant progress has been made in this regard. Although there were a few exceptions, the indications are that VHS courses are of high quality overall. At the end of year 2, teacher ratings of VHS course quality had increased and were nearly identical to teachers’ quality ratings for their regular courses. Students also seem to be satisfied,<sup>1</sup> and administrators indicated increased satisfaction with course quality this year.

Quality is, of course, a paramount concern for VHS staff and for the general public. The success of the VHS program will rest to a large degree on the reputation of the quality of its courses. Furthermore, assuring course quality in a highly distributed, virtual school structure is particularly challenging from a management perspective. Nonetheless, the VHS administration has instituted several mechanisms to assure course quality. These include the Teacher Learning Conference (TLC), the NetCourse Evaluation Board (NCEB), and an independent panel of content experts convened by the SRI evaluation team. Other mechanisms will be established for the 1999-2000 school year, notably the appointment and use of VHS faculty advisors. Each of these structures addresses the

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<sup>1</sup> More than 87% of the students who responded to a spring 1999 survey were “satisfied” or “somewhat satisfied” with VHS, and more than 90% would recommend VHS to other students. However, because the response rate on the student survey was low, one cannot have as much confidence in these findings as in the findings from surveys of other respondent groups.

issue of quality in a different way and together they form an impressive overall quality control process. This section will review the quality control mechanisms, explore their strengths and weaknesses, and make suggestions for the future.

### **The Teachers Learning Conference (TLC)**

The primary mechanism by which the VHS program creates and assures course quality is the TLC.<sup>2</sup> In the TLC, new VHS teachers are provided with professional development materials and technical assistance to help them design high-quality network-based courses. Because the TLC is an on-line course, it also allows future VHS teachers to experience the netcourse from a student's perspective. During the spring 1999 TLC, the number of participants reached more than 100. To offer effective technical assistance to such a large number, VHS staff hired as facilitators former VHS teachers and teachers who had previously completed the TLC. About 10 facilitators assisted the participating teachers, for a teacher-to-facilitator ratio of 10:1. All facilitators had experience in designing a VHS netcourse, but not all of them had experience in delivering a VHS course. Facilitators who were not former VHS teachers had not had the opportunity to use their netcourse; they were selected because they had created high-quality work in their own TLC but their VHS course was canceled because of low enrollment. Nonetheless, as indicated in Chapter III, this year's survey found that teachers reported a significant increase in the effectiveness of the TLC in preparing them to plan and implement a netcourse.

In addition to providing instruction designed to increase course quality, the TLC also provided an opportunity for instructors, facilitators, and the teachers themselves to assess the quality of the netcourses under development. A set of standards called the TLC Evaluation Criteria was developed by VHS to assess specific indicators grouped into topics covered in the TLC, such as appropriateness and organization of content, proper use of LearningSpace, layout and presentation, and clear instructions to students. (See Appendix D.) Teachers who took the TLC had their draft netcourses assessed by VHS staff using an on-line version of the TLC Evaluation Criteria. Teachers were also expected to complete development of materials for at least the first 9 weeks of the netcourse by the time they finished the TLC. The teachers' work on their netcourses was assessed by staff as excellent, fair, poor, or not available.

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<sup>2</sup> The TLC was initially conceived in the VHS proposal as the Professional Development Workshop (PDW).

The TLC experience and the TLC Evaluation Criteria provide future VHS teachers with valuable tools to inform them about what is required to put together a high-quality netcourse. The criteria allow them to monitor and assess their own work. As the number of teachers in VHS continues to increase, a critical component of the course quality equation is to publish and distribute course quality standards that can be used both for teachers' self-assessments and for reviews by other parties.

The TLC Evaluation Criteria focus principally on the organization and presentation of course materials, rather than on the substance of what is taught. Other quality control mechanisms were designed by VHS to focus more on curriculum content.

### **The NCEB**

The NetCourse Evaluation Board was established by the VHS staff late in 1998 to set standards for design and delivery of VHS netcourses. VHS staff would like to establish standards that will be adopted not only by VHS itself but by any other group that wants to develop high-quality netcourses based on a proven model.

The NCEB consists of about a dozen individuals, including distance learning and curriculum experts, as well as VHS teachers, trainers, administrators, and students. To familiarize themselves with the operation of VHS netcourses, NCEB members themselves enrolled in a type of netcourse. The NCEB netcourse was a discussion forum for development of the netcourse standards and served to demonstrate to board members the experiences of VHS students. On the basis of discussions at a 1-day meeting, as well as interactions via the NCEB discussion forum on the Web, a draft set of standards was developed, which was then refined by VHS staff.

The NCEB standards are divided into two categories: instructional standards and operational standards (see Appendix D). Each standard includes a rubric with measurable indicators and specific examples of these indicators. The 30 instructional standards (which also include a focus on curriculum) are grouped under six "critical attributes" of netcourse design and delivery, which are presented below as Exhibit 6. These standards are most pertinent to teachers, students, and others interested in course quality.

The operational standards, on the other hand, are intended to provide administrators from participating VHS schools with indicators to help them assure the quality of VHS operations at their school. For example, the operational standards include dedicating

appropriate personnel and technology resources to VHS, as well as providing a support structure for participating VHS students and teachers.

Taken together, the two parts of the NCEB standards are intended to be comprehensive and to provide a framework for identifying quality expectations for the overall operation of VHS. As a result, VHS staff disseminated these standards widely. For example, teachers and schools interested in joining VHS were provided with a set of the NCEB standards.

**Exhibit 6**  
**Critical Attributes of Netcourse Evaluation Instructional Standards**

<b>Critical Attribute</b>	<b>NCEB Instructional Standards</b>
<b>Course Description/Schedule</b>	Virtual High School NetCourses are clear in their description of learning objectives, and assignments in the schedule area are structured to require consistent efforts from students throughout the term.
<b>NetCourse Content</b>	VHS NetCourses are developed and clearly matched to the performance objectives outlined in the National Models for each given content area. Interdisciplinary Objectives are encouraged.
<b>NetCourse Characteristics</b>	VHS NetCourses will maintain high levels of engaged learning and focus on the development of critical thinking skills. Every course should be an opportunity for the student to master a limited number of concepts in depth, rather than many concepts at a minimal level.
<b>Assessment and Student Portfolios</b>	VHS NetCourses clearly describe how student performance will be assessed. VHS teacher maintains current assessment results that are accessible to students.
<b>NetCourse Communications</b>	VHS NetCourses are structured to encourage frequent communications in the CourseRoom.
<b>NetCourse Pedagogy</b>	VHS NetCourses are structured to foster community-building within the NetCourse. VHS NetCourses use innovative instructional strategies to facilitate online learning.

The broad representation of different types of expertise on the NCEB meant that there was limited emphasis on curriculum standards. Thus, the NCEB standards are not as sharply focused on curriculum as they might be. In addition, many members of the NCEB were not in a good position themselves to review netcourses from the perspective

of expertise in specific subject disciplines, such as English or mathematics. The development and dissemination of the NCEB standards was a significant milestone for VHS and symbolized the project's commitment to high quality. At the same time, it is likely to be just one of many steps toward development of a robust quality control process.

### **Panel of Content Experts**

VHS's major funder, the Office of Educational Research and Improvement (OERI) of the U.S. Department of Education, believed that it was important to have an objective and reliable third-party review of netcourses. OERI requested that VHS establish an external panel of content experts to review the quality of selected netcourses. VHS, in turn, requested SRI to establish and convene such a panel. Both OERI and VHS felt that a third-party review would serve to increase confidence in the quality of VHS's work.

Whereas the NCEB standards provide broad criteria to evaluate the design and delivery of netcourses, as well as the quality of participating schools' environments, the expert panel assembled by SRI was expected to provide a significant, content centered perspective specifically in assessing VHS course quality.

As a group, the panel has statewide and national experience in the development and application of standards for curriculum, instruction, and assessment, as well as expertise in subject disciplines, including extensive secondary-level teaching experience in these fields. Several of the panel members selected by SRI are also familiar with the use of distance learning in elementary and secondary schools, such as Web-based technology and video instruction. Collectively, the panelists contribute substantial expertise to a review of netcourse quality (see Exhibit 7).

In July 1999, the panel developed a set of 19 standards for course quality (see Appendix F). Loosely based on the NCEB instructional standards, the new set of standards is especially focused on the quality of curriculum content.

Once the standards were developed, they were applied to the first 6 of 12 VHS courses that had been selected to represent the full range of courses in the program. The remaining course reviews will be completed and published later this fall.

All six of the courses reviewed to date are rated by the panel as satisfactory or better. Four of the six courses are rated as high quality. The review process has also generated significant interest and enthusiasm about VHS among the panelists. Panelists

acknowledged the excellent potential of the netcourse medium to support student learning, including, for example, the opportunity it provides for ongoing reflection and conversation that do not have to be truncated by a school bell. Also, the use of Internet references (e.g., links to primary sources) that can be embedded directly into hypertext means that these are available to students with just a click of the mouse. However, along with the benefits of the new medium come potential pitfalls. For example, panelists felt that VHS courses need to be carefully structured and managed to encourage and facilitate discussion, interaction, collaboration, and frequent feedback from the teacher.

**Exhibit 7**  
**Highlights of Panel Members' Expertise**

Steven Meiring	OH state mathematics supervisor for 25 years; author of addenda supplement to the NCTM mathematics standards; OH Statewide Systemic Initiative project.
Michael Padilla	Professor at University of GA; contributed to national science education standards; principal investigator on GA's Statewide Systemic Initiative project.
Joanne Grenier	Curriculum Content Specialist in Integrated History/Social Science and English/Language Arts, MA Dept. of Ed.; reviews courses for alignment with state standards; helped develop MA history/social science assessment.
Leo West	Past President of PA Council for the Social Studies and East Alleghany Education Assoc.; author of AP History software; 24 years as high school social studies chair.
Kathleen Fulton	Assoc. Director of Center for Learning and Educational Technology, University of MD; works with school districts to implement standards-based curriculum and instruction in English, language arts, and the social studies.
Linda Mayfield	Immediate Past President of VA Assoc. of Teachers of English; helped develop VA's English/Language Arts standards; has taught English courses for 25 years.

Although the external panel and the review process that they are piloting is an important addition to the VHS course quality equation, it is an “add-on” and is not fully integrated into the structure of VHS. It became apparent to VHS staff that there is a need for building into the regular structure of VHS a similar but more economical process.

**VHS Faculty Advisors**

The role of faculty advisors for VHS is a new one that is beginning in the 1999-2000 school year. Faculty advisors will have the curriculum expertise to assess course

content and will be able to offer assistance or guidance to teachers about both curriculum and instruction. They are supposed to observe a “caseload” of VHS courses, but the specifics of how they will interact with VHS teachers, and the extent to which they will be able to promote high course quality, is still unclear. It is possible that the faculty advisors will be able to continue the careful review of courses that is currently provided by the expert panel. However, exactly how the work of the faculty advisors will relate to the other quality control mechanisms established by VHS is not yet known.

### **The Future of the Netcourse Quality Control Process**

As noted earlier, the quality of the netcourses must be a paramount concern for VHS staff because the project’s reputation rests in large part on a favorable comparison of quality between virtual and face-to-face courses. For example, cancellation of the Electric Vehicle course during year 2 was disruptive for many students and site coordinators and illustrates what happens if netcourse quality is not maintained.

Assume, for the sake of argument, that just one other netcourse offered during year 2 (besides the Electric Vehicle course) was of less than satisfactory quality; then concerns about quality would have affected 6% of the netcourses offered. Although this would also mean that nearly 95% of the netcourses offered were of satisfactory quality (or better), the number of problematic courses might grow in direct proportion to the total number of netcourses offered. With 100 netcourses, 6 might be problematic; with 300 netcourses, perhaps 18 would be potentially disruptive. To put it another way, in year 3 (when about 100 courses are offered), if enrollments average 16 students per course, almost 100 students and as many as dozens of schools could be affected by low-quality courses. This level of quality problems would probably pose a difficult situation for VHS and clearly should be avoided, if possible.

Periods of rapid growth (“scaling up”) are the most challenging, in terms of netcourse quality control, because so many new courses need to be vetted for quality. That is an expensive process. For example, the expert panel review process is sufficiently expensive that it is not likely that it could be or should be sustained. Expert panel members needed at least 4 hours to review one course, and they often required twice that much time. Even at the minimum rate of 4-hour reviews per course, the number of courses in the 1999-2000 school year is close to 100, so reviewing all courses would require 50 person-days. To provide two reviews of each course, as the expert panel did, would require at least twice that much time. Given that the number of VHS courses is expected to triple again for the 2000-01 school year (i.e., grow to 300),

expecting an expert panel to review just the 200 new courses seems unrealistic. At best, a sample of new courses can be selected for such an in-depth review, at least during periods of rapid growth. This problem suggests the need for new approaches to quality control.

The benefits of early reviews of netcourses seem especially large. It saves a great deal of disruption to prevent low-quality courses from being offered at all. Therefore, a particularly promising approach would be to use the TLC as an opportunity to review in greater detail the curriculum content of prospective courses. This review would be in addition to the current review of the organization and presentation of the courses using the TLC Evaluation Criteria. It might be feasible to hire current VHS teachers whose courses are recognized as high quality to help review the content of new netcourses, or the faculty advisors might play a similar role. Because this academic year and the next one are projected to be ones of rapid growth for VHS, this seems like a good time to try to add to the TLC greater attention to the quality of netcourse curriculum content.

Another promising approach is to try to discover predictors of problems with netcourses. For example, it might turn out that those netcourses that appear weak in terms of the TLC Evaluation Criteria also turn out to be problematic when examined by content experts. Or it may be that the faculty advisors' 1-hour or 2-hour reviews of netcourses correlate highly with ratings by members of the expert panel, in which case the briefer reviews could be adopted as a valuable quality control mechanism.

The bottom line for VHS is that continuing attention to course quality is important. A variety of mechanisms have been used to review course quality, and overall course quality appears to be high. Nonetheless, a fully developed "system" for quality control is not yet in place and is especially needed during the projected period of scaling up over the next 2 years.

### **Broadening the Types of Student Served**

The initial Challenge Grant application proposed that VHS would serve a range of students, including those entering the workforce after high school and disadvantaged students. During the first year of operation, it was found that VHS was serving a fairly narrow range of students, those who were academically advanced and college bound. This finding resulted in the recommendation that VHS develop courses and policies that increase the diversity of its student body and broaden its impact.

Progress has been made on this recommendation, as well. During the 1998-99 school year, site coordinators and principals reported that the students taking VHS

courses had a wider range of academic success and were more representative of the full range of socioeconomic backgrounds present in their school than they were in year 1. Nonetheless, VHS courses are predominantly designated as “honors,” and students enrolled are mostly college bound.

In year 1, only 13% of site coordinators reported that VHS students had a wide range of prior academic success. In year 2, that percentage rose to 31%. Similarly, whereas 26% of coordinators in year 1 claimed that VHS students had high/exceptional academic performance, only 4% claimed such an academic history for their VHS students in year 2. Most site coordinators (58%) reported that VHS students came from economically disadvantaged backgrounds as much as other students at the school, a significant increase from year 1, when only 29% of site coordinators made that claim.

Overall, in year 2, the VHS schools were representative of secondary schools nationally. In year 1, baseline data from principals and superintendents showed that the VHS schools had, on average, 18% of their students receiving free or reduced-price lunch, only slightly less than the national average of 22%. With a greater number of schools participating in year 3, it is reasonable to expect a greater range of students. Because of the large number of new schools in Massachusetts and Georgia joining in year 3, VHS staff began to charge schools in those states a fee to offset the cost of administering VHS. The fee averaged \$6,000 and was waived for schools located in depressed urban or rural areas. Policies such as this one are likely to encourage schools with high percentages of economically disadvantaged students to obtain the benefits offered by VHS. Additionally, VHS staff have established other policies, such as the following one, that may help the project reach this goal:

The VHS is committed to improving the education of disadvantaged students. The VHS will institute policies and procedures to ensure that these students can take advantage of the opportunities created by the project. Schools should set a priority on recruiting disadvantaged students and teachers should make every effort to ensure that the content, approach, and goals of the NetCourses meet their needs.

Broadening student participation to include non-college-bound students can occur in several ways. As stated in Chapter III, there were proportionately more non-honors courses offered in the 1998-99 school year than in the 1997-98 school year. Nonetheless, more vocational courses could be made available in the future to appeal to students not going to college. Recruitment efforts could target alternative or vocational schools as potential members of the VHS consortium. Schools themselves can also provide support mechanisms for students who may need help to succeed in VHS.

## **Defining the Successful VHS Student**

Data from surveys and case studies show that teachers, coordinators, and administrators believe that the successful VHS student exhibits characteristics of self-motivation and good time management. Indeed, the 1998-99 VHS faculty handbook states:

Although all students should have access to the VHS catalog, we recommend that the school site coordinator and guidance counselors select students who can work independently and handle responsibility.

Some schools have requested that prospective VHS students present a recommendation from a previous teacher to demonstrate this capability. Others require an interview with the site coordinator and/or a guidance counselor.

Although caution in student selection is justified, recent research suggests that there is a set of students who are on the edge of independence, but are not yet independent learners, who may greatly benefit from the VHS experience. In a study conducted by the Center for Applied Special Technology, evaluators compared the work of 500 students, half with on-line access and half without (Center for Applied Special Technology, Inc., 1996). The students were in fourth- and sixth-grade classes in seven urban school districts. The results of the study suggest that “online use can be an important tool for students in becoming independent, critical thinkers who can find information, organize it, evaluate it, and then effectively express it.” Furthermore,

Students in the experimental group reported significantly increased use of computers in four different areas – gathering information, organizing and presenting information, multimedia projects, and help with basic skills.

Restricting VHS enrollment to those students who can work independently and handle responsibility makes a certain amount of sense. Otherwise, students who are not prepared for the type of learning environment that VHS offers may be at greater risk for failure. The policy also reduces the administrative and teaching burden of the VHS program. However, the policy also may narrow the range of students that can benefit from VHS.

## **Successful Scalability and Project Sustainability**

VHS is growing at an unanticipated pace and is expected to exceed the enrollment projections set in the initial Challenge Grant proposal of 6,000 students during the 5 years of the grant. In fact, if the currently projected growth to 300 VHS courses is realized

during the final year of the grant, 6,000 students could be enrolled in the 2000-01 school year alone.

With 2 years of funding left in the grant, VHS has made significant preparations for rapid growth and for its long-term future, but more information, experience, and work are needed before the project's sustainability is assured. VHS staff made presentations to school superintendents and worked on forging partnerships with foundations, corporations, and state education agencies to prepare for continuing the project after the Challenge Grant ends. At present, it is not clear, from a financial standpoint, how VHS can sustain itself. However, certain important steps have been taken.

### **Automation and Outsourcing**

Scaling up the project led to some changes in how VHS central staff handle administrative tasks. Automation of administrative tasks, such as grading, can help manage growth to ease the burden on an already stretched staff. VHS will be switching to automated grading and automated warning notifications to VHS students for the 1999-2000 school year.

Outsourcing is also an option for managing growth that VHS staff have exercised in different areas. The vital link with the VHS server is now contracted to Interliant, a server hardware company, which is also responsible for the administrative software used on the servers. Outsourcing to Interliant has created a faster and more robust Web site, able to handle the larger amount of traffic that more participants will place on the server.

Two other areas where outsourcing is expected to help manage the growth of VHS are facilitating the TLC and monitoring netcourse delivery. The TLC facilitators are now available to the prospective VHS teachers enrolled in the TLC, to answer questions and suggest improvements. This arrangement reduces the workload of VHS staff. For the 1999-2000 school year, VHS staff are also being assisted by faculty advisors, who are expected to help monitor VHS teachers' curriculum, instruction, and interaction with students, as well as to provide suggestions for improving the netcourses.

### **The Cost of Sustainability**

When Massachusetts and Georgia approached VHS to increase the number of participating schools in their states, the cost of preparing a large number of teachers belonging to a single state needed to be allocated among the schools for that state. In Georgia, the state Department of Education decided to support participating VHS school

districts with state grants. In Massachusetts, the state Department of Education set aside federal dollars to help pay for both the TLC and site coordinator training in up to 75 participating schools. By the middle of the summer of 1999, 62 Massachusetts schools had agreed to participate in the October 1999 TLC. Each school will receive \$7,000 from the state of Massachusetts, of which \$5,000 will be used to fund the central VHS operations. The remaining \$2,000 could be used by the schools to purchase hardware and software, to pay VHS teachers for curriculum development during the summer, to free up some faculty time, or otherwise to support the VHS project at the school.

Currently, whenever a disproportionate number of schools from a single state ask to participate, VHS charges for the TLC and the site coordinator training. Eventually, VHS would like to charge all schools this same subscription fee. If VHS manages to grow to 300 schools by the 2000-01 school year, then, at a projected subscription rate of \$6,000 per school, the fees from participating schools would generate \$1.8 million. But what proportion of the total administrative cost of VHS these fees will cover is not yet known.

### **Reducing Costs per Student**

The cost equation looks different, depending on one's perspective. From the point of view of central VHS administration, costs increase as the number of participating students grows. These centralized costs cover registration, managing drops and adds, tabulation and reporting of students' grades, managing traffic on the servers, contending with special issues or problems that inevitably arise with some students, and so on. Costs probably do not rise in a linear fashion, but doubling or tripling the number of students certainly will increase administrative costs to some degree.

However, because schools pay for the teachers' and coordinators' time, reaching the maximum number of students allotted for each school (or per VHS teacher at that school) is an important factor in determining whether a school is obtaining the maximum benefit from its participation in VHS. As stated in Chapter II, the average number of students in a VHS course has been steadily rising, but with that number currently under 15, schools could enroll as many as 33% more students and still be within their allotted capacity (20 students per VHS teacher). The majority of site coordinators (68%) said that there are considerably more students at their school than those currently involved who could benefit from VHS. If teachers are willing to teach VHS courses with 20 students enrolled, then VHS could serve as many as a third more students. For participating schools, whose costs remain more or less fixed whether there are 15 or 20 VHS students

at the site, increasing student participants by one-third translates into a reduction of per-student costs of 25%, which is significant.

At the same time, it is not clear whether it makes sense for schools to increase VHS enrollments above 20 students. If the site coordinator is able to handle 40 students, then there would be a reduction in per-student costs (because the cost of the coordinator would remain fixed even if another VHS teacher participated from that school). However, one of the biggest attractions of participating in VHS is the large number of new courses that are made available when a school agrees to join the VHS consortium. As reported in Chapter III, the capability of schools to offer courses that otherwise would not have been available is recognized by all participants as an important benefit of the project. The expansion of curricular offerings that results from a school's participation in VHS is covered by the cost of providing a VHS teacher (at 20% time), site coordinator (at 20% time), and, in some cases, a subscription fee. Assuming that the expansion of curricular offerings is a factor in attracting schools, and thus increasing subscriptions, then increasing the number of participating schools will also increase the pool of VHS course offerings. For schools, the benefits of participating in VHS during year 2 included adding 37 courses to their course catalog. In the 1999-2000 school year, while the personnel commitments of participating schools will remain the same, their course catalog will increase by nearly 100 courses. This is the case regardless of how many students at the school participate in VHS. Providing one VHS teacher, teaching one VHS course, "buys" a school exactly the same number of new course offerings as providing more than one VHS teacher.

### **The Unique Role of VHS**

As noted in Chapter I, use of the Internet has grown very rapidly in recent years, and education is one of the more significant areas of growth. VHS was created at an opportune time to take advantage of this phenomenal growth, and it became the first group or institution to offer a wide selection of credit-bearing high school courses to a national audience.

At this time, a variety of other organizations also offer courses that high school students can take for credit. These organizations include many colleges and universities; university "spin-offs" (such as CLASS, the Independent Study High School of the University of Nebraska); private-sector organizations (e.g., APEX, a start-up that offers Advanced Placement courses); and a variety of state-funded and locally funded projects (e.g., the Florida Virtual High School, based in Orange County). The number of groups

and institutions that offer virtual courses for high school students seems likely to increase in the future, because of the continuing growth of the Internet. Thus, one issue that will face VHS as it continues operation is distinguishing itself from these other groups to establish and preserve a “market niche” in the world of virtual education.

The niche that VHS can particularly call its own is characterized by:

- The participation of a consortium of schools that both originate and “receive” courses.
- The use of current teachers, almost all of them in public schools, as the teachers of the virtual course offerings.
- A special emphasis on offering semester-length elective courses, the great majority of which are unlikely to be available to students except through VHS.
- The use of site coordinators at every school.
- A very substantial emphasis on quality control (through such mechanisms as the TLC and the VHS faculty advisors).

To date, VHS is unique in successfully combining this set of characteristics, thereby making its prospects for growing and succeeding look good.

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## **Appendix A**

### **Methodology**

## **Appendix A METHODOLOGY**

The Virtual High School evaluation is a multi-year longitudinal study of the Virtual High School (VHS) project. The evaluation design is goals-based, measuring the extent to which the program has attained clear and specific objectives. Although such a design focuses primarily on the intended outcomes of the program, the evaluation also reports on outcomes that were not specifically addressed or anticipated in the original evaluation plan.

Data collection methods include surveys, case studies, reviews of documents, and interviews with VHS consortium staff. The principal data sources are surveys of VHS participants and case studies of four selected VHS schools.

### **Surveys**

The evaluation team mailed surveys to all the district superintendents (in districts with at least one VHS site), VHS school principals, coordinators in the VHS schools, and VHS teachers in the spring of 1999. The response rate for each of these eight surveys was about 85%.

In addition, VHS central staff conducted an on-line survey of VHS students at the end of the 1998-99 school year. The response rate for the student survey was too low to provide statistically reliable data (therefore, the data were not used in this report). Table A-1 shows the response rates for all the surveys.

**Table A-1  
Response Rates on 1999 VHS Surveys**

	<b>Superintendents</b>	<b>Principals</b>	<b>Coordinators</b>	<b>Teachers</b>	<b>Students</b>
<b>Universe</b>	29	30	30	38	473
Returned	25	27	26	31	216
Response rate	87.0%	90%	86.6%	81.6%	45.7%

## **Case studies**

Case studies were developed for four VHS sites. The sites were selected to provide a wide variation across regions and school types (e.g., rural vs. urban, more and less wealthy, etc.). Table A-2 presents characteristics of the case study schools along several dimensions that influenced the selection of the sites.

For the most part, the case studies were based on information from site visits to each VHS school by an SRI researcher in the spring of 1999. During these visits, at least one member of the evaluation team visited each of the schools and interviewed the principal, the superintendent of the school district, the VHS coordinator, and the VHS teacher(s) at the school. SRI researchers also conducted individual interviews with several VHS students at each case study school.

A case study was written for each school based on the visits conducted at each site. From the four case study reports, SRI researchers developed a cross-case analysis of major issues and findings. The cross-case analysis and the survey data were key sources of information for this report.

**Table A-2**  
**School Sample for VHS Case Studies**

<b>School</b>	<b>State</b>	<b>Poverty</b>	<b>Diversity</b>	<b>Size</b>	<b>VHS Course and Type</b>	<b>VHS Fall '98 Enrollment *</b>
Allen	TX	Very low on free/reduced-price lunch program  \$4,300 ppe	8% minority	1,700 (10-12)  District: 8,700	1. Earth 2525: A Time Traveler's Guide (Hon.) 2. Explorando Culturas Hispanas (Open)	School: 33  Courses: 12, 9
Hudson	MA	Free/reduced price lunch not available  ~7,000 ppe	7% minority	819 (8-12)  District: 2,658	1. AP Statistics (AP) 2. Astronomy: Stars and the Cosmos (Hon.)	School : 40  Courses: 18, 14
Miramonte	CA	About 10% on free/reduced- price lunch program  >\$7,000 ppe	20% minority	1,092 (9-12)  District: 4,200	1. Russian, Soviet, & Post-Soviet Studies (Open)	School:  Courses: 10
Westborough	MA	>\$7,500 ppe	8% minority	603 (9-12)  District: 2,400	1. Bioethics Symposium (Hon.) 2. Music Appreciation (Open)	School: 23  Courses: 14, 13

Course types: Hon = Honors; Open = Open to all; AP = Advanced Placement

\* Enrollments reflect figures that were reported at the beginning of the fall semester.