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## ***The Virtual School @ Liverpool***

In April 1999, elementary school principal Laura Lavine was approached by an administrator in the Liverpool Central School District with a request: to investigate setting up a virtual school for students in kindergarten through 12th grade. The school district had already spent millions of taxpayers' dollars to upgrade technology in every school building and was committed to instituting a voluntary laptop computer program for all 10th-graders in fall 2000. Lavine took a deep breath, sighed, and said yes. Then for three days, she felt lost as to how to approach the task because she had no idea what she was doing, what technology she needed, where to begin, or even whom to call. Then she got to work, beginning by searching the Internet.

### ***Taking learning online***

The Liverpool Central School District encompasses the village of Liverpool and portions of the towns of Clay and Salina. Nearly 60,000 residents live within the boundaries of the Liverpool Central School District, and approximately 9,000 students attend kindergarten through high school in traditional classroom settings. The total expenditure per pupil for the 1997 school year was \$9,570, slightly less than the New York State average of \$9,810 per pupil, and the district as a whole received higher standardized test scores when compared to the state average. The recent emphasis on technology can be attributed to the vision of John J. Cataldo, the current school district superintendent who has embarked on several projects designed to place Liverpool at the forefront of emerging technology. In addition to the development of the virtual school, Cataldo has reinvented the education process in the regular classroom by implementing a voluntary laptop computer program, in which 10th-graders are eligible to receive a laptop computer at a reduced cost and teachers are trained to incorporate computers in instruction. The school district also holds the honor of having the first high school in the nation equipped with a fuel cell, a technology similar to a battery that provides energy with little pollution. In maintaining the emphasis on technology, Cataldo introduced the idea of the virtual school.

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Cataldo was reading education journals when he came across an article about virtual schools. He read that a number of institutions of substance offered courses online, and some even offered full degree programs online. The number of students involved in such classes had increased to a significant level. He had always felt that a school district's mission should be broader than taking care of students in that district alone. And he believed districts needed to take decisive steps to thwart the encroachment of newly approved charter schools — private schools that use public funding to offer specialized education — into his student base. He saw a virtual school as one way to expand both the student base and the openness of the district at the same time. So the district began investigating instituting one (see Exhibit1). “The train has already left the depot,” he said. “Kids in New York State are already going to the schools in Concord (Mass.) for online classes. It's a question of whether we want to offer the same opportunity to our students.”

### ***Obey the law***

Public education and compulsory attendance are justified because education can be seen as a “public good” and individuals will not realize the full social return if they don't participate in their education — an emphasis on the public good that can be seen in Liverpool's goal of establishing an online school. Control of education is not one of the powers expressly delegated to the federal government by the Constitution and is reserved to the states. The state sets statewide education requirements, but it is up to local school districts to decide how those standards are implemented and if virtual classes are an acceptable alternative.

The New York State Constitution guarantees “a system of free common schools.” The Education Law of New York State declares that: “A person over five and under twenty-one years of age who has not received a high school diploma is entitled to attend the public schools maintained in the district in which such person resides without the payment of tuition.” It says education is provided free of charge only if students go to school in the district in which they live. Education law allows non-residents to be admitted to a different school district from the one in which they reside upon the consent of that district's board of education, with tuition set at an amount that represents the additional operating cost to the school district. The amount of tuition is computed in accordance with a formula established by the commissioner of education. That is not true of tuition for virtual schools, which is set by the school district that runs the program.

On the other hand, both children and parents have responsibility for minors to attend full-time instruction, provided there is no reason for exemptions. Minors may attend a public school or elsewhere if instruction is equivalent to the public school instruction. Parents can instruct their child at home as long as the instruction he or she receives is substantially equivalent in amount and quality to that of a public school. Some correspondence schools facilitate this choice, as do virtual schools.

### ***Reaching out***

One of the key aspects to the future success of the virtual school was directing it toward a specific market. There were already several virtual schools in operation that offer high school level courses. The Virtual School @ Liverpool decided to create a program that targeted a population not reached by current schools: students in kindergarten through 12th grade. This virtual school would be the first to reach out to students at the elementary level. In order to meet the needs of this potentially large population, Lavine and her team knew they should keep their customer in mind when developing and marketing their virtual school.

Lavine had small rural school districts in mind as her school's primary target population. More than 50 percent of school districts in New York State — and a total of 80 percent of school districts in the United States — are considered small rural school districts, with between 800 and 1,000 students in kindergarten through 12th grade. Lavine saw these schools as key customers for the virtual school because the schools' size would limit course offerings. These schools often lack the funding or level of student interest to warrant providing a wider course selection, including advanced placement or elective classes. Liverpool's virtual school could offer these students the opportunity to take courses that were previously unavailable in the traditional face-to-face school system. "If you are living in an area that doesn't have the capability of providing upper level courses, should you be precluded from taking them?"

Lavine didn't think online classes were a solution for everyone. But because she believes some online classes are superior to traditional face-to-face classes, they provide an alternative for students whose needs are not being met. Lavine recognized their program could be beneficial for learning-disabled students, children taught at home, and students who were homebound because of illness. So she thought it would be important for the virtual school to eventually offer required courses online, too. This would enable such students to have access to an education when they leave, either permanently or temporarily, a traditional classroom environment. The virtual school would allow ill students to take their courses online until they were able to return to school. Some parents prefer teaching their children at home. The virtual school could be used as an aid for such home-schooled children. In addition, students sometimes feel more comfortable participating online rather than in front of an entire class, where fear of embarrassment might set in. A virtual classroom, Lavine said, "can level the playing field for students and eliminate some of the factors that make them feel inferior in face-to-face classes."

Another important factor Lavine felt Liverpool could bring to the mix was a New York State quality education. New York was among the first states to mandate student testing and has long maintained high standards in education through its Regents diploma program<sup>1</sup>. However, in the past decade, New York has toughened its standards, now requiring all students to pass certain Regents exams. Lavine wanted all courses through The Virtual School @ Liverpool to meet those standards, which are among the strictest in the nation. That is a major selling point for in-state school districts, which need their students to take state-approved classes, Lavine said. But she added that she believed it could be a selling point for its online classes outside the state, where standards might not be as high.

For Brian Dombrosky, a senior at Liverpool High School, taking a virtual course offered a chance to take a class that he ordinarily would not be able to take because similar face-to-face classes were already filled, because it wasn't offered at the right time, or because of the school's schedule. Liverpool operates on a block schedule of 80-minute blocks for each class, so students are limited to the number of classes they can take each day. He also felt having a teacher available virtually 24 hours a day, seven days a week, would provide him more opportunities to get help than with his face-to-face classes, since his teachers' schedules also are limited by block scheduling. And as a student who hopes to major in computer programming in college, Dombrosky believed taking an

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<sup>1</sup> Since the late 1800s, New York State has required that students pass Regents examinations in certain subject areas to earn a higher-level Regents diploma upon graduation high school. In 1984 and again in 1992, the state toughened those requirements. Now, state law requires public school students to pass five Regents exams — in English, math, American history, global studies and a science — to receive any high school diploma starting in 2003.

online course would expose him to the kinds of programs he might be able to develop or improve upon as a software developer.

### ***Involving teachers***

Teachers are another important component in planning for a virtual school. Cataldo saw the virtual school as a way to prevent layoffs. For the previous several years, student populations had been decreasing as the so-called baby boomlet — the population boom caused by baby boomers having babies — aged and left for college. But Cataldo, who came to the school district in 1993, instituted a series of programs to prevent the need for layoffs, including moving from a half-day kindergarten to a full day, thereby doubling the number of kindergarten teachers used. He thought of the virtual school as another way to keep the district's trained professionals while increasing the number of students served.

The teachers Lavine contacted for the initial round of training were receptive to the idea, even if they said they were too busy that year, either at school or for personal reasons, to become involved. In fact, some teachers Lavine didn't invite to join the project contacted her and asked why she hadn't. Teachers involved in the virtual school would teach an online class as one of the classes in their course load or earn a stipend in addition to their regular salary for teaching an online class. Members of the teachers' union told Lavine they saw the virtual school as an opportunity for their members to grow and expand their knowledge through training.

One of the first teachers contacted by Lavine was Macy Bishop, an art teacher at Liverpool High School. At first, she had mixed feelings about the possibility of teaching art online. But she had been toying with the idea of teaching an art history class — something that few high schools offer — and thought that would be the perfect vehicle to test-drive the new concept. After taking an online class from an existing virtual school in Concord, Mass., Bishop gained a better understanding of how different a virtual class would be from face-to-face ones. She missed having face-to-face contact with her teacher and classmates, and found the class she took focused heavily on reading and was less spontaneous. Those factors also concerned Lavine, who knew that dropout rates for online classes are greater than for face-to-face classes.

Bishop brought those lessons with her when she planned her course and aimed to overcome them by including art assignments with reading, writing, and discussion assignments. She found it takes much more time to plan virtual classes than traditional classes — especially to learn the software involved — and discovered she needed to rethink her assignment instructions to be more specific. She also found it improved her grading system, because she provided her students with concrete examples of projects at each grade level. But the real test, Bishop believed, would be when other teachers were exposed to the idea of a virtual school, something that happened when she gave a presentation during a district-wide teacher training day. She said she received favorable feedback from other teachers, including a couple of science teachers who asked how to get involved.

### ***Staying in the black***

Setting up a virtual school is one task; keeping it running is a harder one. Lavine had to consider what costs were involved in setting up and running a virtual school, how to charge participants for taking online classes, and even if the district's taxpayers would support such a school.

### ***Sizing up the competition***

Liverpool is by no means the only school that offers virtual classes. Other initiatives fall into three categories: those run by private, for-profit corporations like Class.com or Apex Learning; state-wide,

publicly funded efforts, such as those in Florida and Kentucky; and grant-funded schools that are national in scope, like the Concord Virtual School.

Class.com (<http://www.class.com>) is a privately held company founded in 1988 that delivers online educational courses for high school students throughout the world. The courses are offered under the direction of a fully accredited, university-based, independent study high school as part of a full diploma program or for transfer to a student's current high school for credit. In fact, Kentucky's virtual school was created in partnership with Class.com. Most schools that offer virtual classes through Class.com charge between \$115 and \$250 per student for a semester-long class. Apex Learning (<http://www.apexlearning.com>) operates a similar virtual school. Microsoft co-founder Paul Allen began Apex Learning in 1997 and began by creating and offering several online advanced placement courses for high school students. It provides the online infrastructure, accredited courses, and support services to build and operate virtual high schools, online teacher development institutes, and online assessment and review tools, charging school districts for the service. Apex charges \$395 per student for a semester-long, high school level class.

One of the first state-wide efforts, the Florida Online High School, began in August 1997 as a state-funded joint project between Alachua and Orange County Public Schools with 15 educators who served in administrative, instructional, and developmental jobs. But it only provides classes to students in grades 9 through 12 who are residents of affiliated counties in Florida. The Kentucky Virtual High School is a statewide effort that offers online courses for high school credit, enrichment and college preparation through Kentucky's public school system. Course registration requires admission through a school district in Kentucky. And the Maryland Virtual High School for Science has similar state residency restrictions for taking its virtual classes.

Concord Virtual School (<http://vhs.concord.org>) began in 1997 with a \$7.4 million federal grant and now is a partnership of 88 high schools across the country offering online classes. Instead of charging tuition, the virtual school allows 20 students in a school district to participate free of charge if their own school district provides one teacher to teach one semester-long course. The NetCourses range from advanced academic courses to technical and specialized courses. Schools donate computers, Internet connectivity, and staff time. Each school also provides a site coordinator who is responsible for project management and support of teachers and students at their local school. However, the school's five-year grant expires in 2001, and the program is pondering whether to go to a cash-based model and how much to charge if it does.

A common feature in most of these efforts is that the virtual schools offer advanced placement classes, which give students who pass a national test college credit, and electives in areas that most high schools do not offer classes, such as marine biology. Few offer required courses like English or math online, as Liverpool hoped to do eventually.

### ***Community support***

Garnering taxpayer support is crucial in public school districts, which in New York State are funded by money from the state government and by property taxes paid by taxpayers in the district. People who live in a school district — both homeowners and renters — must approve school district budgets and referenda for special spending. In Liverpool, though, voters had already shown support for spending on technology in the schools. In 1994, voters overwhelmingly approved spending \$9.5 million to purchase more than 2,700 Apple Macintosh computers — enough to put five student computers and one teaching station in every classroom in the district's elementary and middle

schools. Two years later, in 1996, voters approved a \$3.97 million referendum to buy new computers for the Ninth Grade Annex, a separate building at the high school that houses ninth-graders. A year after that, in 1997, voters approved a \$17.7 million proposal to renovate Liverpool High School, a project that included installed high-tech connections in every classroom, a robotics lab, a fuel cell, and new computers. It seemed likely that the taxpayers would support a virtual school, as well.

In fact, school board President Paul Paventi said he has only heard positive feedback since news of The Virtual School @ Liverpool began to spread. “People understand that today, technology is where it’s at, where the future is,” he said. “It’s a way of life now.” And he has heard from people in other schools from as far away as Japan and China who are interested in Liverpool’s commitment to technology, particularly the virtual school.

Lavine wasn’t given a budget to stay within, although she knows she must eventually break even with the virtual school. She also hasn’t been given a deadline for achieving financial feasibility.

### ***Dollars and sense***

Lavine was thinking of patterning the finances of The Virtual School @ Liverpool along the lines of the for-profit, tuition-based models, although the district is a public and by definition a not-for-profit entity. Since Liverpool intended to eventually offer required courses online, Lavine wanted to ensure its students could take New York State approved courses. Thus, Lavine decided controlling the content of the courses was essential. That means creating all the courses in-house: using teachers in the school district to design them and then having the district’s curriculum experts examine them to ensure they meet New York State Regents standards. Such a move would mean a greater investment of teacher time and money in setting up the online classes. But as shown in Exhibits 2 and 3, interactive teaching has a higher cost of development and a lower cost of delivery, while traditional teaching has a lower cost of development and a higher cost of delivery. Once the online class is developed, it takes less time and effort to offer it a second time, since teachers need only make minor tweaks to the curriculum. And the cost of delivery is lower since school districts — neither Liverpool nor the other districts that have students taking Liverpool’s online courses — need to devote physical space to the class. Also, the teacher does not need to be present to instruct students, restricting the teacher’s time commitment to online interaction and grading.

The Liverpool plan also had a side benefit for financial planning, Lavine noted. Since the virtual school would provide classes that students in smaller, rural school districts could not afford to provide, Lavine believed those districts would be willing to pay for the online classes. And through two processes known as BOCES cooperative service agreements and cross-contracting, school districts might be able to recoup a percentage of the tuition they pay, based on the district’s wealth and state aid ratio. That would enable financially strapped rural school districts to afford online classes. Meanwhile, Lavine struggled with creating a pricing schedule that would enable school districts to enroll entire classes in online courses as well as allow home-schooled individuals afford the classes.

### ***The technology***

Once some of the initial decisions had been made, Lavine needed to focus on the nuts and bolts of setting up a virtual school: Should Liverpool look to create its own software or purchase a commercial software package? Should the district use internal resources to build and maintain its server or outsource that job?

### ***The software***

Lavine wanted a software program that offered discussion threads, chat rooms, private e-mail and the capacity to hold synchronous meetings on line. Blackboard and WebCT, two of many e-learning tools available, have several features in common, and both are Web-based learning tools. The courses themselves are HTML documents, which allow all users with web access to view the material. Liverpool was considering WebCT because another technological initiative in the district already used WebCT, and Lavine thought the virtual school could dovetail on that.

But Blackboard was another good choice for the online school, due to its scalability and customizable features such as e-mail, database compatibility, tools that allow instructors to provide more interactive courses, and online support from other databases related to coursework. There are five different levels of Blackboard. Depending on the needs of the user and how much a user is willing to spend, they can choose a level that is consistent with their needs. However, Blackboard had another factor which weighed heavily in its favor: It was the software program used by Onondaga-Madison-Cortland BOCES, the larger regional school district that provides support services, such as vocational education, to public school districts in New York State. Lavine knew that if she picked Blackboard, she could rely on BOCES for technical support.

### ***The hardware***

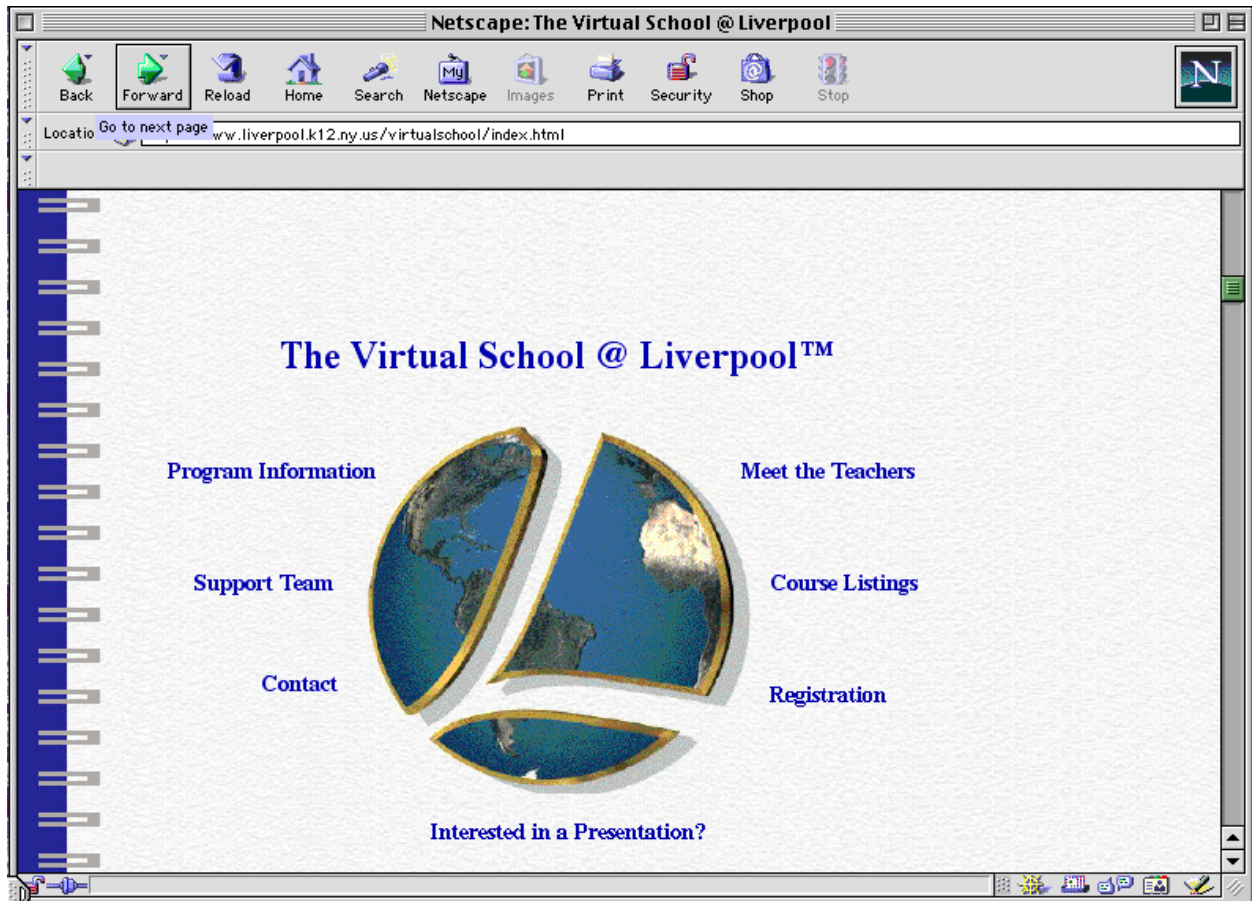
The virtual school is a new experiment for the Liverpool School District, an institution dedicated to education, not creating technological infrastructures. In fact, many of its other technological initiatives depend on assistance of outside firms, such as Liverpool High School's role as a Cisco training center for the Central New York region. So when it came to making a decision on whether to outsource server support, Lavine knew such a move would have many benefits. Outsourcing with a quality service provider brings in project management, technological expertise, requires less upfront start-up costs, frees up in-house resources and allows them to be redirected to more important initiatives in the core area of education, and provides immunity against technological obsolescence over time. Although internal design would allow for more custom options and flexibility, in-house development seemed riskier because it would take away the district's information technology staff from their main business of education, and it would be difficult to achieve the appropriate economy of scale to make such a move profitable. The Liverpool school district was looking to extend its reach into the education market, not, as Lavine put it, "go into the server business."

But the district struggled with setting the technical requirements of the virtual school. Should the district design its course offerings with the lowest-end users in mind or aim for higher-end users, acknowledging that some lower-end users would have to be sent video clips by e-mail because their modems would be too slow to download them? Exhibit 4 gives the example of Apex Learning's technical specifications. The technology landscape is changing on a daily basis, and the low-end standard today could be antique within six months. The cost of computing is dropping 25 percent per year, and the under-\$1,000 PC market now represents half of all PCs sold. In addition, companies such as Gateway and PeoplePC are offering computer packages that include Internet access for a low-cost monthly fee. Therefore, more people have access to PCs, and upgrading to the latest technology is no longer a financial hurdle for many middle-class families. Noted computer scientist Ray Kurzweil predicts that by 2019, a \$1,000 computer (in 1999 dollars) will be able to perform 20 million billion calculations per second and will be equivalent in sophistication to the human brain.

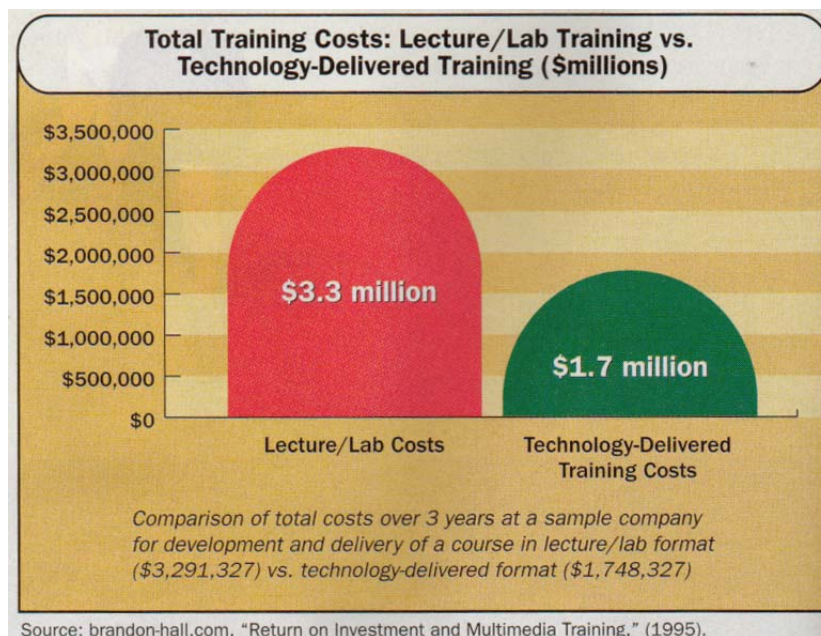
***Decision time***

The education and training sector in the United States represents \$772 billion, or 9 percent of the Gross National Product, second only to health care, according to brokerage and underwriting firm WR Hambrecht & Co. And the e-learning segment of that market is poised to explode, with WR Hambrecht predicting the market to more than double in size each year through 2002. Liverpool hopes to be at the forefront of that movement. Now that the legwork was done, Lavine had to make a host of decisions to make. How should The Virtual School @ Liverpool market itself, and to whom? What would an equitable price be for one of its online classes? What software and hardware should the district use?

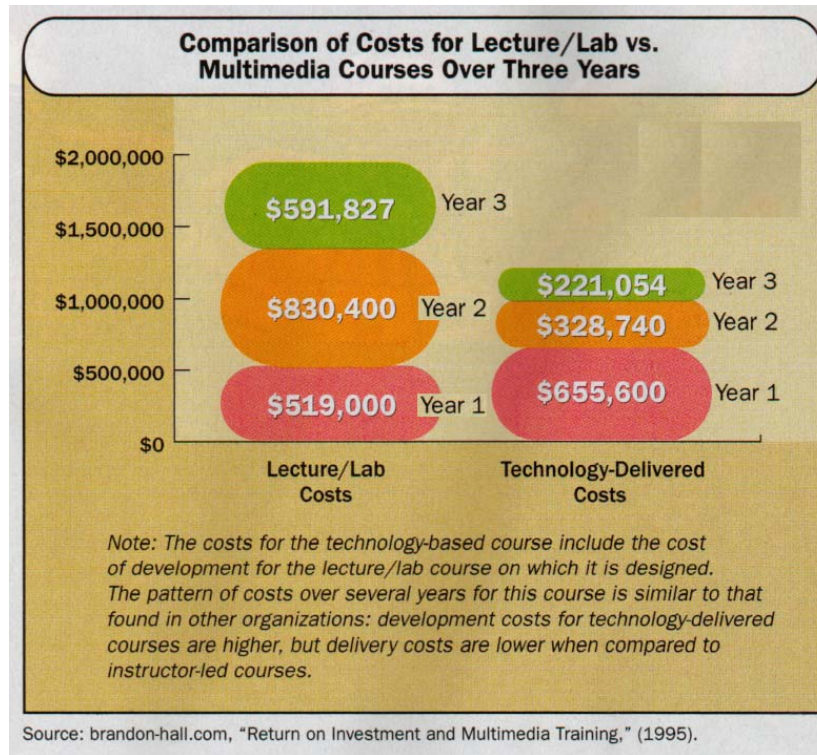
**EXHIBIT (1)**  
**THE VIRTUAL SCHOOL @ LIVERPOOL WEB SITE**



**EXHIBIT (2)**  
**TRAINING COSTS: LECTURE VS. LAB**



**EXHIBIT (3)**  
**TRAINING COSTS: COMPARISON OVER TIME**



**EXHIBIT (4)**  
**TECHNICAL SPECIFICATIONS: APEX LEARNING**

		Minimum PC Requirements	RECOMMENDED PC Requirements	Minimum Mac Requirements	RECOMMENDED Mac Requirements
<b>HARDWARE</b>	<b>Operating System</b>	Windows 95	Windows 98	Mac OS 8.1	Mac OS 8.6
	<b>Processor</b>	Pentium 90 MHz	Pentium II 233 MHz	PowerPC 601	PowerPC 604
	<b>Memory</b>	Students	64 MB RAM and 20 MB of available hard drive space	Students	64 MB RAM and 20 MB of available hard drive space
		Instructors		Instructors	
		16 MB RAM and 20 MB of available hard drive space		16 MB RAM and 20 MB of available hard drive space	
		32 MB RAM and 20 MB of available hard drive space		32 MB RAM and 20 MB of available hard drive space	
	<b>Audio</b>	Sound card and speakers or headphones	Sound card and speakers or headphones	Sound card and speakers or headphones	Sound card and speakers or headphones
<b>Internet</b>	Students	Reliable Internet connection at 56.6 Kbps and an Internet email account	Students	Reliable Internet connection at 56.6 Kbps and an Internet email account	
	Instructors		Instructors		
	Internet connection at 28.8 Kbps and an Internet email account		Internet connection at 28.8 Kbps and an Internet email account		
	Internet connection at 56.6 Kbps and an Internet email account		Internet connection at 56.6 Kbps and an Internet email account		
<b>Monitor</b>	Support for 800 by 600 pixel resolution and support for thousands of colors (16-bit color)	Support for 800 by 600 pixel resolution and support for thousands of colors (16-bit color)	Support for 800 by 600 pixel resolution and support for thousands of colors (16-bit color)	Support for 800 by 600 pixel resolution and support for thousands of colors (16-bit color)	
<b>Other Hardware</b>	CD-ROM drive, access to a printer, and access to a fax machine*	CD-ROM drive, access to a printer, and access to a fax machine*	CD-ROM drive, access to a printer, and access to a fax machine*	CD-ROM drive, access to a printer, and access to a fax machine*	
<b>SOFTWARE</b>	<b>Web Browser (choose one)</b>	Microsoft Internet Explorer 4.01, AOL 4.0, or Netscape Navigator 4.08. JavaScript and Cookies must be enabled.**	Microsoft Internet Explorer 5.0. JavaScript and Cookies must be enabled.	Microsoft Internet Explorer 4.01, AOL 4.0, or Netscape Navigator 4.08. JavaScript and Cookies must be enabled.**	Microsoft Internet Explorer 5.0. JavaScript and Cookies must be enabled.
	<b>Plug-ins</b>	Acrobat Reader 4.0, RealPlayer 7 (version 6.0.6.99), and Flash Player 4.0	Acrobat Reader 4.0, RealPlayer 7 (version 6.0.6.99), and Flash Player 4.0	Acrobat Reader 4.0, RealPlayer 7 (version 6.0.8.125), and Flash Player 4.0	Acrobat Reader 4.0, RealPlayer 7 (version 6.0.8.125), and Flash Player 4.0