

A Template For Analyzing Costs Associated With Educational Delivery Modes

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ABSTRACT

The purpose of this research was to develop, test, and apply a framework for determining cost of alternative educational course delivery modes. This study reviews and analyzes the costs associated with traditional education and compares it to those costs associated with video conference and online distance education at a single institution. The intended result of this study was to assist leaders in higher education in gaining a better understanding of the costs associated with three different delivery modes for undergraduate courses. Leaders should request and apply cost (and effectiveness) information when making decisions about the course delivery modes best suited to serve their academic communities. Whether the emergence of distance education spells the end of traditional campuses, as some maintain, or whether learning by distance represents, instead, a particularly powerful addition to a growing array of delivery options for higher education, the fact remains that distance education is already having a very real impact on higher education. Distance education through technology has created alternative models of teaching and learning, new job descriptions for faculty, and new types of providers of higher education. But many questions remain about the costs (and the effectiveness) of these delivery methods.

Keywords: Distance education; Online; Video conference; Classroom; Delivery modes; Education utilization; TBLS - Technology Based Learning Systems; CTLT - Center for Teaching and Learning with Technology

INTRODUCTION

The quality of distance education has become the crucial point for those involved in higher education. Some see distance education as a real threat to educational quality (Martin, 1999). Despite the promises and obvious advantages of distance education, there are concerns that need to be resolved, including the quality of instruction, hidden costs, misuse of technology, and the attitudes of instructors, students, and administrators in higher education. Each one of these factors has an effect on the overall quality of distance education (Valentine, 2002). It seems that distance education has not achieved parity of esteem and acceptance by faculty nor has it been integrated as a system into higher education. At least in these two respects, traditional education and distance education seem to continue to run along separate lines (Irele, 2005).

LITERATURE REVIEW

Many universities trying to improve the quality of instruction focus on student needs, as well as on controlling costs and responding to the competitive pressures of other institutions (Horgan, 1998). The development of distance education by both traditional and distance education institutions has raised many questions concerning the costs of teaching by distance in comparison with more traditional methods (Rumble, 2001). If institutions of higher education are going to implement various distance education delivery modes, it is imperative that they understand the cost-effectiveness of such programs. A basic understanding of the cost structures of technology-based teaching is essential to decision making (Bates, 2000).

When developing a cost system for an institution of higher education, the purpose of such a system is to determine the programs cost and the types of revenue these programs are capable of generating (Lenington, 1996). Rumble (2001) stated that with the rising demand for education and its escalating costs, the economics of education

must be able to quantify both the efficiency of expenditures on education and the benefits it provides. Universities desiring to save money by instituting and delivering courses via distance should undertake a careful cost/benefit analysis before moving to this option. It may not be the panacea it seems.

The quality of distance education may not as important an issue to administrators as the financial implications are. Many administrators see utilizing distance delivery of courses as a means of accommodating larger enrollments without expanding facilities and services and the increased costs these expansions entail (Feenberg, 1999). As administrators consider the relevance of providing distance education courses, realizing the actual costs of providing those courses may be financially detrimental. Rumble (2001) asserted that it is important that all elements are considered, and not missed, within the costing system in higher education. For instance, when planning potential costs for distance education, it is important that analysts view the entire costs from a broader perspective, instead of just in terms of individual budgets. When evaluating potential costs of distance education courses, instructors want to know whether it will take them more or less time to prepare for a distance course than a classroom one. Departmental heads want to know what effect distance education will have on the bottom line, such as whether instructors can teach more courses and handle more students per course. Institutional heads want to know what the impact will be on administrative costs. All parties are interested in knowing whether teaching at a distance is cheaper or more expensive than teaching face-to-face.

Each distance education delivery mode has particular costs and expenditures, whether it is online or video conference distance education. Colleges and universities that communicate with students, wherever they are by distance education, face different challenges, costs, and considerations, as compared to those institutions that use the traditional delivery system (Daniel, 1999).

Lenington (1996) wrote that some programs generate fiscal gains for an institution, while others lose money or simply break even. If proper evaluations of each delivery system are not in place, it is impossible to know why overall performance for the institution is not what it is expected to be. Understanding the benefits of distance education courses, as well as their costs, is an important part of the process of determining whether institutional investment in distance education is warranted (Bartolic-Zlomislic & Bates, 1999). Lenington (1996) voiced similar sentiments by suggesting that without estimated costs and expected performance, it is impossible to determine what contributions are being made to the whole institution and what changes should be made.

Bates (2000) noted that there are fundamental differences between the cost structures of traditional style teaching and technology-based teaching. But Lenington (1996) contended that the management of resources and skills are the same in higher education as they are in business and industry. Personnel, capital, and physical plant are all examples of how similar higher education and businesses and industries are in terms of resources. In order to provide a solid foundation for any business, including higher education, there must be proper management and attention to all resources.

There are possible disadvantages of beginning or starting distance education programs. Wilson (1998) suggested that "distant courses require three to four times more dollars to develop and three to eight times more faculty (time) and support personnel resources" (p. 3). Many colleges that are just starting distance-education programs look to Internet-based distance education rather than televised distance education in part because television systems are generally more costly than online networks (Carnevale & Young, 2001).

Rumble (2001) reported that there are few cost comparison studies of distance education programs. It is assumed that the cost of distance education must be enormous, because articles that set out to give a dollar figure shy away from presenting an actual number (Martin, 1999).

Distance Education Cost Studies

There have been various efforts and studies at identifying and quantifying the costs of distance education. Major efforts in this regard were the reports produced for the Alfred P. Sloan Foundation Consortium: *Online Education: Learning Effectiveness and Faculty Satisfaction* (1999) and *Online Education: Learning Effectiveness, Faculty Satisfaction, and Cost Effectiveness* (2000). Both studies were reported in *The Chronicle of Higher*

Education under the title: *Is Anyone Making Money on Distance Education?* (Carr, 2001). The pair of studies examined the financial costs and potential profitability of distance education at six universities. For the study, each institution developed a cost-estimate model.

Following are the findings.

- Drexel University compared the costs of an online master's program in information systems with its more traditional classroom program. The study found that the traditional style of taking classes generated \$342 more in revenues per student than the online program. But, when buildings, land, and capital equipment were factored in, the difference dropped to \$4 per student. It was concluded that when extra faculty and instructor pay, various technical support services, and needed technology were included, online programs become more expensive to deliver. However, when buildings, land, and capital equipment were taken into account for traditional style classroom costs, online delivery was more cost-efficient.
- Pace University developed a model for assessing the costs and revenues for a certificate program for telecommunications employees. The study revealed that the university lost approximately \$48,000 on the online program. Part of the reason the program did not break-even was that a discounted tuition rate was offered and enrollment was lower than expected. David Sachs, an assistant dean at Pace and the author of the report, stated "The costs go way beyond what you think they are going to be, but so do the benefits" (Carr, 2001, p. 41).
- Pennsylvania State University explored the finances of its World Campus, the division that produces online courses and also functions as a business within the academic culture. The findings revealed that at the World Campus, factors such as tuition, market demand, and growth were carefully monitored in order to ensure profitability.
- The Rochester Institute of Technology report revealed that online courses can be as cost-efficient as traditional courses, but that costs become more difficult to decipher as institutional operations continue to expand. One concern associated with broadening the online program was the provision of appropriate student support services.
- The University of Illinois at Urbana-Champaign study examined the costs of master's online courses in terms of fixed and variable costs. The findings were that the university barely broke even after all costs and revenues were factored together. Many people believed that online courses save or make a lot of money, but this may not be the case.
- The University of Maryland University College study analyzed the costs associated with its online MBA program and found that the differences between profitability depended on class size. A class of 15 resulted in a loss of \$22,399, while a class of 20 resulted in a profit of \$61,838.

The Sloan Foundation reports also highlighted the difficulty of defining all costs associated with the online program. "Costing is a very murky business," noted one of the authors, Tana Bishop, an associate dean at Maryland University College; however, she suggested that online courses will be profitable with time (Carr, 2001, p. A42). Concluding remarks in the reports voiced similar conclusions and pertained to all of the universities studied: although distance education programs were not losing a lot of money, they were not making a great deal of money either; and it was difficult to determine or distinguish the costs between the distance education programs and the traditional style classroom (Carr).

Failed Distance Education Ventures

Some distance education delivery programs in higher education have not been successful. One of the reasons that some institutions did not succeed in offering courses at a distance was their failure to consider learner support costs. Additionally, distance learning is not the cash cow many had thought it to be and should only be pursued by institutions that have experience in developing such courses (Lorenzetta, 2003).

The Wharton School of Business at the University of Pennsylvania spent approximately \$3 million on various online projects. The vice dean of executive education at Wharton noted that the distance education market was not the right one for the school. For many, "the reality is, most people recognize that education is a human process" (Shea, 2001, p. 25).

The for-profit online program, which was started in 1998 by New York University, closed down after reportedly incurring about \$25 million in start-up costs. The company joined a growing list of for-profit distance education ventures, including Virtual Temple affiliated with Temple University, which closed after failing to turn a profit or to attract the necessary investment (*Academe*, 2002). As Prester (2001) noted, “There is no conclusive evidence to show that online courses are cheaper or easier to implement than traditional classroom instruction” (p. 80).

The length of time required for a distance education program to turn profitable can be a factor that may make some institutions hesitant in starting such a program. Some studies have suggested that it could take up to 10 years or more before a distance education program becomes viable. Few colleges and universities are willing to accept waiting so long before getting a return on their investments (Cambre & Hawkes, 2000).

RESEARCH QUESTIONS

1. What are the calculations of costs associated with each educational delivery mode?
2. What are the estimated per pupil and per course costs for each of three modes of undergraduate course delivery?

Utility of the Study

Although the results of this research may be delimited in terms of application to a single institution, this shortcoming is offset by the opportunity to compare the three delivery modes in a consistent environment. In addition, the framework developed for determining cost could be used by other institutions of higher education for investigating the suitability of different delivery modes. Therefore, even though the results of the study may apply essentially to one institution, the procedures developed have potential greater utility, if they are applied to other settings with similar conditions.

Research Site

The site institution for this study has a long history of using all three methods of course delivery. The institution has been teaching classroom-based courses for 50 years, has used video conference-based course delivery for 9 years, and has used online-based course delivery for 5 years. This institution was selected because the students have the option of choosing the type of delivery mode they prefer and many students have experienced blended learning by availing themselves of more than one delivery mode. Additionally, the site was selected because the institution was convenient for the researcher and because the institution was willing to participate in the study.

Types of Data

Because the study investigated costs, it required information of two types to be collected and analyzed: the cost per student enrollment and the cost per course for each delivery mode were determined. The cost information was provided by program administrators.

Costs

For this study the ingredients method, as recommended by Levin and McEwan (2001), was used to estimate the costs of the three delivery modes. Four main categories were used as ingredients that have common properties in order to facilitate identification and specification of particular costs. The categories were these: 1) personnel, 2) facilities, 3) equipment and materials, and 4) other costs.

Personnel costs included expenditures for full-time and part-time faculty, administrators, proctors, training personnel, and technicians. Facilities costs included the annualized costs of physical space required for course delivery. Equipment and materials costs included annualized expenses for movable furnishings, instructional equipment, computers, audio-visual equipment, cable and modems, Internet infrastructure, furniture, books and other printed material, and other supplies. Other costs refer to annual expenses for all ingredients that did not fit

readily into the other three categories, including training sessions, insurances, telephone services, and Internet access.

A format for collecting the cost data was devised, tested, revised, and used.

Samples

For the aspects of the study, data were collected on costs.

Costs

With permission from the Provost and the Institutional Research Board at the site institution, relevant cost data were collected from four financial officers, who were responsible for keeping track of all the costs associated with each delivery mode and the institution. The Vice President for Financial Affairs, CFO and Treasurer whose responsibilities included oversight of institutional costs and revenues was of great assistance. He ensured that the appropriate individuals, all of whom reported to him and were responsible for the costs related to the different delivery modes, made the necessary data available in the prescribed format. These individuals included the Director of Telecommunications, who was responsible for costs related to the online delivered courses; the Director of Academic Computing, who was responsible for costs related to the video conference delivered courses; and the Director of Budget and Finance, who was responsible for costs associated with administrative and faculty personnel and operations for the institution.

DATA COLLECTION AND INSTRUMENTATION

Data Collection for Costs

The cost data were collected by using a structured, open-ended protocol to interview administrators.

The open-ended interview protocol was structured by the following questions and was administered to one or more administrators, as appropriate, to collect cost data.

Open-Ended Protocol Interview Questions

1. What expenditures did you make in implementing the course delivery?
2. What is the estimated useful life of the equipment?
3. Other than mentioned, are there any other related costs or expenses?

The questions for the protocol were developed to gain a better understanding of those costs associated with each delivery mode being studied: classroom, online, and video conference.

The protocol questions were piloted by requesting three faculty members, in economics and business department at the site institution, to review the protocol and to assess whether the questions and directions were clear. The faculty members all responded that they found the questions relevant to the study and that directions were clear and understandable.

Meetings were scheduled in the office of the Vice President for Financial Affairs, CFO and Treasurer at the campus of the institution. These institutional officers attended all the meetings to assist with the study:

- Vice President for Financial Affairs, CFO and Treasurer
- Director of Budget and Finance (Classroom)
- Director of Academic Computing (Online)
- Director of Telecommunications (Video Conference)

Meetings were held to discuss matters of costs pertaining to the study. A pre-interview form and estimated cost table were given to the administrators to ensure they would have the necessary cost documentation assembled prior to the interviews. In addition to the group meetings, each director was interviewed individually.

During the interviews, there was a review of the documentation for costs associated with each course delivery mode. Each officer provided information on the costs of the mode for which that officer was responsible. Each officer explained the costs in great detail. After the costs were explained, the researcher asked questions for further clarification and to ensure uniformity and consistency of data.

Prior to the interviews, all the interviewees were asked to sign the Human Subjects Application and Assurances form.

DATA ANALYSIS

The data collected for the research questions was aggregated from the various cost ingredients to estimate total cost per student and total cost per course for each of the three delivery modes. In order to compare the total cost per student for each of the three delivery modes, a standard of 20 students per course was used. Though each course delivery mode could accommodate more students, the same number of students per delivery mode was used to ensure that costs per student and per course were measured equally. For each mode, 20 was selected as the number of students to use, because this is the number the site institution considers as the ideal class size and imposes on all classes.

Estimated Costs per Student and per Course by Delivery Modes

Table 1 presents a summary of per student and per course costs for each of the three delivery modes - classroom, online, and video-conference. To simplify the text, the supporting tables illustrating the cost by ingredient for each delivery mode are demonstrated in Tables 2, 3, and 4.

On a cost basis, the classroom mode was the least expensive both in terms of per student cost (\$1,512) and per course cost (\$30,243), followed by video-conference (\$1,835 per student and \$36,705 per course), with online in last place (\$2,046 per student and \$40,921 per course).

Table 1: Estimated Costs per Student and per Course by Delivery Modes

Cost	Classroom	Online	Video Conference
Per Student Cost	\$1,512	\$2,046	\$1,835
Per Course Cost	\$30,243	\$40,921	\$36,705

Per student costs were computed using a standard of 20 students per course for each mode. The standard represented the number of students per course that the institution participating in the study liked to maintain irrespective of instructional delivery mode.

Table 2: Total Cost by Ingredient of Classroom Delivery Mode

Ingredient	All Schools	TBLS & CTLT	Total Cost
School and Direct Expenses			
Faculty	15,878,536		15,878,536
Overload	870,937		870,937
Visiting Profs & Adjuncts	3,662,691		3,662,691
Stipends	712,329	21,000	733,329
Fringe Benefits	7,458,343	2,048	7,460,391
Admin. Salaries	3,866,285	109,977	3,976,262
Fringe Benefits	1,603,486	48,115	1,651,601
OTPS	1,321,048	10,980	1,332,028
Total School and Direct Expenses	35,373,655	192,120	35,565,775
Indirect Expenses			
Instruction	321,038		321,038
Research, and Training	595,973		595,973

Table 2:continued

Ingredient	All Schools	TBLS & CTLT	Total Cost
Academic Support	4,460,170		4,460,170
Student Services	7,486,446		7,486,446
Institutional Support	13,288,504		13,288,504
Operations/Maintenance	12,684,751		12,684,751
Depreciation/Amortization	5,916,948		5,916,948
Debt Service	3,454,531		3,454,531
Total Indirect Expenses	48,208,361		48,208,361
Total Expenses			83,774,136
# of Traditional Sections			2,770
Average Cost per Course (Total Expenses/# Sections)			30,243
Average Cost per Student (Average Cost per Section/20 Students)			1,512

Note. TBLS = Technology Based Learning Systems
 CTLT = Center for Teaching and Learning with Technology

Table 3: Total Cost by Ingredient of Online Delivery Mode

Ingredient	All Schools	TBLS & CTLT	Total Cost
School Expenses			
Faculty	2,278,692		2,278,692
Overload	124,980		124,980
Visiting Profs & Adjuncts	525,622		525,622
Stipends	102,216	2,646	104,862
Fringe Benefits	1,070,326	258	1,070,584
Admin. Salaries	554,838	13,856	568,694
Fringe Benefits	229,748	6,062	235,810
OTPS	189,572	1,382	190,954
Total School Expenses	5,075,994	24,204	5,100,198
Capital Expenses			
Maintenance/Licensing		12,500	12,500
Maintenance on Hardware		3,000	3,000
Total Capital Expenses			15,500
Total Direct Expenses			5,115,698
Indirect Expenses			
Instruction	23,032		23,032
Research, and Training	36,761		36,761
Academic Support	320,032		320,032
Student Services	537,180		537,180
Institutional Support	953,499		953,499
Operations/Maintenance		53,503	53,503
Depreciation/Amortization		24,957	24,957
Debt Service		14,571	14,571
Total Indirect Expenses	1,870,504	93,031	1,963,535
Total Expenses			7,079,233
# of Traditional Sections			173
Average Cost per Course (Total Expenses/# Sections)			40,921
Average Cost per Student (Average Cost per Section/20 Students)			2,046

Note. TBLS = Technology Based Learning Systems
 CTLT = Center for Teaching and Learning with Technology

Table 4: Total Cost by Ingredient of Video Conference Delivery Mode

Ingredient	All Schools	TBLS & CTLT	Total Cost
School			
Faculty	1,067,006		1,067,006
Overload	58,524		58,524
Visiting Profs & Adjuncts	246,122		246,122
Stipends	47,864	1,239	49,103
Fringe Benefits	501,183	120	501,303
Admin. Salaries	259,805	6,488	266,293
Fringe Benefits	105,084	99,200	204,284
OTPS	88,768	647	89,415
Total School Expenses	2,374,356	107,694	2,482,050
Capital Expenses			
DL Room		206,000	206,000
Network (Fiber) Cable		123,552	123,552
Yearly Maintenance		31,000	31,000
Total Capital Expenses		360,552	360,552
Total Direct Expenses			2,842,602
Indirect Expenses			
Instruction	21,572		21,572
Research, and Training	40,046		40,046
Academic Support	299,712		299,712
Student Services	503,073		503,073
Institutional Support	892,960		892,960
Operations/Maintenance	795,321		795,321
Depreciation/Amortization	370,986		370,986
Debt Service	216,593		216,593
Total Indirect Expenses	3,140,263		3,140,263
Total Expenses			5,982,865
# of Traditional Sections			163
Average Cost per Course (Total Expenses/# Sections)			36,705
Average Cost per Student (Average Cost per Section/20 Students)			1,835

Note. TBLS = Technology Based Learning Systems
 CTLT = Center for Teaching and Learning with Technology

SUMMARY

To collect the cost data, those with oversight of the budgets for each mode were interviewed. The cost analyses showed that course delivery for a uniform 20 students per course was least expensive for the classroom mode, both in terms of per student cost (\$1,512) and per course cost (\$30,243). For the distance education courses, the cost for video conference delivery was less per student (\$1,835) and per course (\$36,705) than for the online delivery (\$2,046/student) and (\$40,921/course).

This research was necessarily limited to existing technology, rather than past or future technology. Bates (1999) noted that “technology is changing rapidly and is constantly being updated and improved, and costs associated with technology are likely to change in the future” (p. 19). Although technology and costs will continue to change, the analytical framework developed for this research can be useful for evaluating cost-effectiveness of alternative modes of course delivery.

RECOMMENDATIONS

Future Technology Needs

Technology is always evolving and there is always something new on the horizon. As a result, institutions must continue to make progress toward better utilizing of distance education technology. It is recommended that the site institution continually seek new and updated cost-effective technologies and technology-based approaches that will enhance the learning environment and delivery of course content.

According to Schrum (1999), future technology should address the needs of various forms of the learning environment. These include: 1) adaptive, to focus on the needs of teaching a course via distance education, as well as addressing the learning needs of the students; 2) interactive, so that instructors and students can interact and participate with one another more freely; and 3) reflective, so that feedback and the proper thought can take place without restrictions due to the technology inadequacies.

Each new technology for delivering education should be judged against the requirements of different learning environments, as well as the requirement of cost-effectiveness.

CONCLUDING THOUGHTS

Bates (1999) noted the importance of leadership in higher education in regard to technology-based course delivery. In preparing for the future, educational administrators should share a vision and be actively involved in supporting and facilitating the use of technology in teaching and learning. Institutions of higher education should consider:

1. Defining a vision for teaching and learning as one that encompasses technology as a delivery mode with that vision.
2. Identifying new target markets that can be reached through the use of technology.
3. Prioritizing target groups and appropriate programs for the use of technology-based learning.
4. Targeting cost-effectiveness areas of investment and resource allocation for technology-based teaching and learning.

A balance, based on demand and cost-effectiveness, of classroom and distance education should result in the best way to reach students and to meet their needs. Wilson and Weiser (2001) found that most universities were creating learning environments with students enrolled in both classroom and distance education courses. Students learn in unique ways and to satisfy these different patterns, new technologies should be considered for all students, not just distance learners. Abel (2005) noted that the mission of an institution to promote student learning should be supported by Internet-technology in order to create an improved educational product. Institutional leaders must come to terms with technology, by addressing proactively the educational, cultural, and strategic issues associated with this evolving phenomenon. Only then can institutions of higher education perform their missions effectively in the future, no matter what direction technology takes.

AUTHOR INFORMATION

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