

Higher Education Institution Factors and Technology-Mediated Distance Education Strategy Decisions

David S. Murphy
Lynchburg College

Abstract

Changes in student demographics, increased institutional costs and technological advances have increased interest in and use of technology mediated distance education in higher education. This paper develops a model of strategy development and education value and then tests the effect of three internal factors (institution type, size and location) on technology mediated distance education strategy classification. The null hypothesis of no effect of internal factors on strategy classification was tested using PEQIS publicly available data set through the use of ordinal regression. Implications for policy and practice, and for further theory development are future research are discussed.

Current demographic trends have not been kind to higher education institutions today nor will they be in the near future (Ross 2008). The number of traditional age college students is declining. Many institutions have responded to a decrease in tuition revenue by raising tuition rather than by reducing costs. Colleges and universities need to find ways to reduce their reliance on tuition-based revenue, reduce the need to raise tuition by reducing institutional costs, attract more non-traditional students, and attract students from outside their traditional market areas. Technology mediated distance education (TMDE) is one approach that may reduce education delivery costs and hence reduce pressure to increase tuition rates, and attract non-traditional students and students from more distant or even global markets.

Technology-mediated distance education (TMDE) frees institutions from the time and location constraints of face-to-face instruction. TMDE provides flexibility to higher education institutions (HEI) so that they can respond in a more timely fashion to challenges caused by changes in student demographics, demands for accountability and increased public scrutiny, reductions in state and federal funding (Duderstadt 1999; Duderstadt et al. 2002; Katz 1999; Schwitzer et al. 2001). Competition for students is increasing and some institutions are being driven towards TMDE so that they can compete with HEI that have already positioned themselves as providers of TMDE (Duderstadt 1999-2000, Winter).

Over the past decade technology TMDE has grown in importance with close to four million students taking at least one on-line course in the fall of 2007. The 2008 Sloan Consortium survey of distance education of 2,500 colleges and universities indicates the growth of distance education. Enrollment trends, as reported in the Sloan Study, are summarized in Table 1 below (Allen and Seaman, 2008).

However, the decision to offer TMDE has not been embraced by all HEI. Allen and Seaman (2007) reported that while about 59 percent of institutions surveyed felt that online education was critical to the long-term mission of their institutions, 27 percent were neutral and 13.5 percent felt that online-education was not mission critical. Thus, in spite of increasing enrollment in online education, over 40 percent of surveyed institutions do not feel that online education is mission critical.

The decision to offer online courses is a strategic one and one with significant long-term consequences. Oblinger, et al. noted in 2001 that, "Distance or distributed education is one of the most complex issues facing higher education institutions today . . . Few institutions will be untouched by the discussion and debate surrounding distributed education." This debate to a great extent may be focused on the quality issue. There may always be a faculty cohort that believes that modes of instruction that do not include direct, personal interaction between students and faculty is deficient. Nevertheless, given the pervasiveness and rapid growth of TMDE that complaint is not likely to impede its penetration in HEI.

This paper develops a theoretical model for the differences in strategic importance given to online education and the consequent strategic decisions and reports on a preliminary test of the theory.

Strategic Management Theory

HEIs, like all entities that compete for resources must choose and implement a strategy that provides them with a competitive advantage. The theoretical model used in this study was based on the competitive strategy model developed by Porter (1987, 1980) and Oster (1999). In this model competitive advantage results from the value that an organization provides is customers either in terms of low prices (cost leadership) or unique benefits (differentiation), the two generic competitive strategies.

The first strategy, cost leadership, is targeted at broad market segments. It seeks to provide a competitive advantage through cost reduction. The theory is that institutions with lower costs, and hence lower tuition, gain a competitive advantage in student recruitment if they are able to maintain their cost advantage. The key for HEI which pursue this strategy is to reduce costs without sacrificing value to key stakeholders (students, parents, faculty members, future employers and other buyers).

Cost reduction strategies may be difficult to implement in HEIs because many, if not most, of the costs are fixed; they do not vary over the short term and thus are not subject to administrative control. Faculty salaries are the best example of these fixed costs. Once contracts are signed faculty salaries are fixed for the subsequent academic year at least.

Cost reduction requires control over cost drivers, the activities that create costs. This requires the development of tight controls over all expenditures and especially variable costs. Card and Card (2007) note that this would include valuing frugality, minimizing overhead expenses, developing economies of scale, and a focus on standardizing the means of production. TMDE, to a greater extent than traditional course delivery strategies, may increase the standardization of the means of production (course delivery) and thus reduce costs.

Product differentiation strategies rely on the development of a unique product which appeals to a sufficiently large market segment to be economically viable. The key to this strategy is to design a product, educational program or service in this case, that satisfies the needs and wants

of a particular market segment. Unlike cost leadership strategies which result in lower consumer prices, product differentiation strategies often provide the perception of a premium product that commands a premium price. This strategy may be seen in HEIs that rely on highly selective admissions standards or that offer specialized programs. The expected relationships between education value, product, service and strategy are depicted in Figure 1 below.

The focus of Figure 1 is the perceived value of education. In this model value is a function of the perceived quality of education relative to its price (Gale, 1994). Value is determined by stakeholders, primarily students and their parents, as they balance the quality of an institution and its program offerings against the price. The "product" may be viewed as encompassing, but not being limited to, teaching, programs and course offerings, academic facilities, student placement, and institution reputation. Service, on the other hand, includes the non-academic offerings of the institution. These may include student services, advising, intramural athletics, and other ancillary services. Webber and Ehrenberg (2009) demonstrated that student service expenditures influence student persistence and graduation rates. Product and service affect both the quality and cost of education. The product and service mix is derived from the strategy adopted by an institution.

Mainardes, Ferreira and Domingues (2009) proposed a model that identified factors that lead to the development of HEI strategies. The immediate precursor to strategy development in their model is an identification of the competitive advantages of the HEI. The identification of competitive advantages, in turn, results from an understanding of an institutions external and internal environment, and the needs of stakeholders.

The Theory of Competitiveness (Porter 1979, 1980, 1987) and the Theory of Territorial Competitiveness (Storper 1997 and Cooke 2001) provide useful frameworks for analyzing the external environment. Porter (1979) identifies how rivalry level, threats of new entrants, threat of substitutes, customer bargaining power, and supplier bargaining power) affect strategy development. Later Porter (1991) added governmental influence as a sixth factor. Within HEI the three most salient factors in Porter's model are rivalry (often viewed as cross-application institutions) the threat of new entrants (competing programs and courses which may be developed at other institutions) and customer bargaining power (the ability of students to exercise choice). These factors primarily affect an institution's ability to develop a product differentiation strategy.

The Theory of Territorial Competitiveness (Storper 1997 and Cooke 2001) explains that the territory in which an organization operates helps define its strategy. Territory, for HEI, can range from a small geographic region to the world. Whereas one HEI may view its primary market, and hence the territory within which it must be competitive, as a narrowly focused geographic region, another may view the international marketplace as its functional territory and hence will develop competitive strategies for that larger market.

Several theories have been proposed that support an analysis of an institution's internal environment. Blois (1983) described core competencies as the factors that distinguish one organization from its competitors. Barney (1991) described how organizations gain competitive advantages by developing strategies based on internal resources and capabilities to neutralize external threats and avoid internal weaknesses. Miller (2002) noted that competitive organizations focus their efforts on their internal capabilities; they focus on what they are good at. These internal capabilities may include, but are not limited to, the ability to innovate or imitate, image, and market segmentation. A perceived core competency of excellence in classroom teaching may lead a HEI to develop a strategy that effectively eliminates TMDE as a course delivery option.

Stakeholders are the third factor which effects the development of a successful strategy. Freeman (1984) defined a stakeholder as any individual or group of individuals affected by an organization or alternatively who affect the ability of an organization to reach its goals. Clarkson (1995) stated that the survival and success of an organization is dependent on its ability to generate wealth, value and stakeholder satisfaction. Froomean (1999) argued that the long-term viability of an organization is dependent upon its ability to successfully manage its relationships with stakeholders. Finally, according to Grundy (2005), it is essential that organizations identify their stakeholders and their needs, and then manage their stakeholder relationships.

The nature and needs of students as the primary stakeholders of HEI are changing. In addition, Allen and Seaman (2008) data indicate that changes in the economy, rising fuel costs, and increasing unemployment mean that students will select more on-line courses. Moreover, as of fall 2007 about ten percent of all HEI with on-line offerings had programs that were specifically designed to serve personnel in the U.S. military.

Allen and Seaman (2007) developed a five-category, online learning framework to help explain the decision to engage or not in TMDE. The categories within their framework include not-interested, non-strategic online, not yet engaged, engaged, and fully engaged. Table 2 below identifies the proportion of institutions falling into each category. These online learning frameworks may be viewed as strategies employed by an institution under the umbrella of its mission.

Research Model

This exploratory study was designed to analyze some, but not all, of the linkages proposed in Figure 1. This study was a secondary data analytic research using the National Center for Education Statistics (NCES) public use dataset. The data came from the nationally representative survey of distance education, the Postsecondary Education Quick Information System (PEQIS) undertaken by NCES for the 2006-2007 academic year. Summary institution profile data from the 1,448 institutions included in this study are summarized in Table 3. Data limitations did prohibited an analysis of all of the components of the model in Figure 1.

The Allen and Seaman (2007) online education framework categories of not-interested, non-strategic online, not yet engaged, engaged, and fully engaged were operationalized as follows¹. The strategy category of "fully engaged" was not operationalized because of the inability to differentiate, given the PEQIS data set, between engaged and fully engaged institutions.

The strategic direction, as implied by on-line course offerings, by institution type and size are summarized in Table 5 below. Table 5b implies that size matters. Small HEIs, those with less than 3,000 students represent the most frequent institutions in the not-involved (not-interested) strategy group. Large institutions, those with enrollments of 10,000 or more students, are the most frequent institutions to be engaged in online education.

* The data used by Allen and Seaman are proprietary and The Sloan Consortium does not make the data available to outside researchers.

This study tests the hypothesis that internal factors, those most controllable by a HEI affect TMDE strategy. The PEQUIS variables, institution type, size and region, were used as surrogates for internal factors. The null hypothesis to be tested then is:

H0: Strategy is not a function of HEI internal factors (institution type, size, geographic location).

The hypothesis was tested using ordinal regression (the SPSS PLUM Ordinal Regression function). Ordinal regression is used with ordinal dependent variables, strategy in this case, and where the independents may be categorical factors or continuous covariates. Ordinal regression models are sometimes called cumulative logit models. Ordinal regression typically uses the logit link function which was used in this analysis, though other link functions are available. Ordinal regression is based on the premise that the observed categorical values of the outcome (dependent variable) result from a continuous underlying or latent variable and a set of thresholds that correspond to cutoff points between observed categories. The outcome, TMDE strategy, was defined as a four-response category (0 = not involved, 1 = not strategic, 2 = not engaged, and 4 = engaged).

The regression coefficients resulting from ordinal regression can be converted into odds ratios to motivate an explanation of the relationship between the outcome categories and the independent predictor variables. The odds ratio for an independent variable is defined as e^{β} where β is the estimated logit coefficient and e is the natural log (2.71828). In this study the odds ratio describes the probability of adopting a specific TMDE strategy associated with a one-unit change in the independent variable. An odds ratio greater than one is associated with an increased odds of selecting a TMDE strategy while an odds ratio of less than one indicates a decreased likelihood.

The regression equation took the form:

$$\ln(\text{Prob}(\text{Strategy}_i)/(1-\text{Prob}(\text{Strategy}_i))) = \beta_0 + \beta_1 \text{Type} + \beta_2 \text{Size} + \beta_3 \text{Location}$$

The results of the ordinal regression analysis are shown in Table 6. This model has a Chi-Square of 1,707.9 ($p < .000$) and a Pearson goodness of fit Chi-Square of 4,259.3 ($p < .002$).

The ordinal regression results indicate that HEI internal factors, as measured by institution type, size have a highly significant effect, $p < .01$, and region has a significant effect, $p < 0.10$ effect on strategy.

Results

The model tested the effect of institution type, size and geographic location on TMDE strategy. As shown in Table 5a about two thirds of private not-for-profit and 83 percent of the private for-profit two year colleges have adopted a "not involved" strategy. The model parameters, for these institutions were highly significant ($p < .000$) and the associated odds ratios were high indicating high probability that these institutions will maintain their strategic position.

The model parameters for public and not-for-profit four year institutions were also significant at $p < 0.10$ and $p < 0.000$ respectively. As shown in Table 5a about two thirds of the public four year institutions were classified as having adopted an "engaged" strategy. The strategy classifications of the not-for-profit four year schools are bi-modal with about 38 percent of the institutions classified as "not involved" and about 57 percent classified as "not engaged" or "engaged". It appears that many not-for-profit four year institutions are moving towards the "engaged" classification however the percentage "engaged", 31 percent, is significantly less than that of the public four-year institutions.

Size matters. Table 5b indicates that larger schools are more likely to adopt a stronger-form TMDE strategy. Only 21 percent of the small institutions, those with student populations less than 3,000 were classified in the "engaged" strategy class. The percentage of institutions in the "engage" strategy class increased to 51 percent for mid-sized institutions (3,000 to 9,999 students) and to 68 percent for the largest institutions (10,000 or more students). The parameter estimate for the mid-sized schools, $\beta = -0.261$, was significant at $p < .05$. The odds ratio of 0.77, an odds ratio less than 1.0, indicates that a reduction in size is associated with a decreased likelihood of participating in TMDE of almost 30 percent (calculated as $1/0.77 = 1.299$).

Surprisingly location also appears to matter. The HEIs in the study were fairly evenly distributed across the four geographic regions; about 23 percent of the institutions were from the North East, 24 percent from the South East, 25 percent from the Central states, and 28 percent from the Western states. There appears to be a breakpoint between the institutions in the North East and those in the other regions. Only 8.6 percent of the HEIs in the North East were classified in the "engaged" strategy type while 12.3, 12.9 and 11.7 percent of the institutions in the South East, Central and West regions were so classified. This is reflected in the significant coefficients for the North East and South East regions ($\beta = 0.258$, $p < 0.10$, odds ratio = 1.29, and $\beta = 0.27$, $p < 0.10$, odds ratio = 1.31 respectively). This seems to indicate that HEIs in the North East are less likely to adopt strong-form TMDE strategies than HEIs in the other regions.

The null hypothesis of no effect of internal institutional factors on strategy is rejected. It appears that institution type, size and location all effect strategy classification.

Implications For Policy And Practice

All HEIs operate in a highly competitive environment. They compete for financial resources at the state, national and private funding levels. In addition, they compete for students. This research indicates that smaller HEIs and those in the North East may be at a competitive disadvantage in recruiting students who are interested in TMDE. This may be especially important for smaller private institutions who either intentionally, as part of their marketing plan or as a response to changing demand and demographics, seek to attract non-traditional students and those from outside their traditional marketing region.

Often strategic decisions are made as a response to market conditions and not as part of a well-developed strategic plan. HEIs should analyze their TMDE strategic orientation and then determine if that strategic orientation is consistent with the institutions long-range strategic goals and objectives. After all, strategy should drive action, not the reverse.

Implications For Theory And Future Research

This paper postulated a model (Figure 1) of strategy and education value and then, using available panel data, tested the effects of internal

factors on strategy. The null hypothesis that internal factors (institution type, size and location) would not affect strategy was rejected. However, this preliminary study does not test the full model. Future research should investigate the effects of external factors (student demographics, economic conditions, etc.) as well as stakeholder factors and HEI mission on strategy development. The proposed linkage between strategy choice and education quality and cost should be addressed as should the interaction of perceived quality and education cost on perceived education value.

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Table 1: Total and Online Enrollments at Degree Granting Institutions

Year	Students Taking at Least One Online Course	Annual Online Enrollment Growth Rate	Online Enrollment as a Percentage of Total
Fall 2002	1,602,970	NA	9.6%
Fall 2003	1,971,397	23.0%	11.7%
Fall 2004	2,329,783	18.2%	13.5%
Fall 2005	3,180,050	36.5%	18.2%
Fall 2006	3,488,381	9.7%	19.6%
Fall 2007	3,938,111	12.9%	21.9%

Table 2: Institutions by Online Learning Framework Category

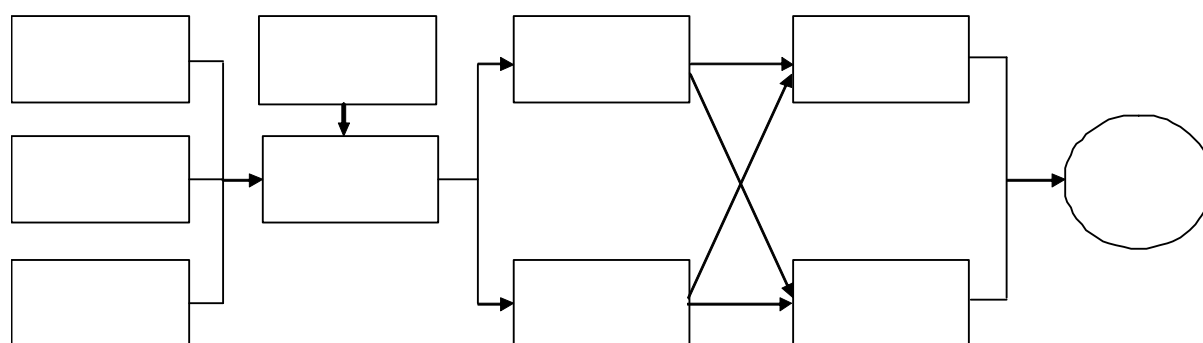
Framework Category	Percent of Institutions
Not Interested	18%
Non-Strategic Online	23%
Not Yet Engaged	5%
Engaged	18%
Fully Engaged	35%

Table 3: Summary Institution Profiles

	N	Percent
Institution Type		
Two year		
Public	509	35.2%
Private, not-for-profit	15	1.0
Private, for-profit	65	4.5
Total	589	40.7%
Four year		
Public	390	26.9%
Private, not-for-profit	419	28.9
Private, for-profit	50	3.5
Total	859	59.3%
Total	1,448	100.0%
Enrollment Size		
Less than 3,000 students	511	35.3%
3,000 to 9,999 students	487	33.6
10,000 or more students	450	31.1
Total	1,448	100.0%
Region		
Northeast	332	22.9%
Southeast	348	24.0
Central	365	25.2
West	403	27.8
Total	1,448	100.0%

Table 4: Online Education Framework Categories (PEQIS Variable)

Allen & Seaman Category	Operationalized As	Number	%
Not-involved (Not-interested)	Do not offer college-level, credit-granting courses (Q3 ≠ 1)	280	19.3
Non-strategic online	Offer hybrid or blended online courses (Q6 = 1)	35	2.4
Not yet engaged	Offer college-level, credit-granting online courses (Q3 = 1)	32.7	32.7
Engaged	Offer college-level degree or certificate programs online (Q10 = 1)	45.5	45.5
Fully engaged	Not operationalized		

Figure 1: Model of Strategy and Education Value**Table 5a: Strategy by Institution Type**

Strategy	2-Year			4-Year			Total
	Public	NFP Private	FP Private	Public	NFP Private	FP Private	
n	509	15	65	390	419	50	1,448
Not involved	8	10	54	34	161	13	280
Non-strategic	2	1	1	3	18	10	35
Non-engaged	249	3	6	95	109	12	474
Engaged	250	1	4	258	131	15	659

Table 5b: Strategy by Size

Strategy	Less than 3,000	3,000 – 9,999	Greater than 10,000	Total
N	511	487	450	1,448
Not involved	222	39	19	280
Non-strategic	23	9	3	35
Non-engaged	157	193	124	474
Engaged	109	246	304	659

Table 5c: Strategy by Region

Strategy	North East	South East	Central	West	Total
N	332	348	365	403	1,448
Not involved	95	61	61	63	280
Non-strategic	9	8	5	13	35
Non-engaged	104	101	112	157	474
Engaged	124	178	187	170	659

Table 6: Ordinal Regression Results

	β	e^{β}	p
Institution Type			
Two year			
Public	- 0.165	0.85	0.57
Private, not-for-profit	2.223	9.24	0.00***
Private, for-profit	3.432	30.94	0.00***
Four year			
Public	0.564	1.76	0.06*
Private, not-for-profit	1.105	3.02	0.00***
Private, for-profit	0 ^a		
Enrollment Size			
Less than 3,000 students	0.186	1.20	0.21
3,000 to 9,999 students	- 0.261	0.77	0.04**
10,000 or more students	0 ^a		
Region			
Northeast	0.258	1.29	0.08*
Southeast	0.270	1.31	0.06*
Central	0.157	1.17	0.26
West	0 ^a		
Notes:	^a = Redundant parameter set to zero * $p < 0.10$, ** $p < 0.05$, *** $p < .001$		


 A large, stylized logo for 'ABER' is centered on the page. The letters are white and bold, set against a large, light orange oval background that is tilted diagonally.