

POTENTIAL FOR IT-SUPPORTED ONLINE EDUCATION TO AFFECT THE STRATEGIC ENVIRONMENT OF HIGHER EDUCATION

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ABSTRACT

Information Technology (IT) has enabled enormous transformations in the value chains and strategies of firms in a wide variety of industries, forcing IT adoption in companies slow to react. Higher education is at a crossroads of adoption of IT facilitated online education, which could have a dramatic impact on the competitive environment for colleges and universities. This study addressed a necessary precondition for the successful adoption of IT facilitated online education. Students taking online classes were surveyed to determine if online education had the potential to decrease undesirable constraints inherent in traditional educational pedagogies. Results indicated that online education was viewed as facilitating student education by reducing constraints. Potential impacts in higher education are discussed.

Keywords: Online Education, IT in higher education, IT and higher education strategy, Strategy

INTRODUCTION

Information Technology (IT) has enabled enormous transformations in the value chains and strategies of firms in a wide variety of industries. Not only does technology permeate activities comprising the value chain, but technology is an integral component of many of the products produced and sold by firms. Technology also impacts the people involved in the value chain, altering or even removing their roles. Perhaps most importantly, when one firm in an industry incorporates IT into its value chain, competitors are often obliged to do likewise (2).

The higher education industry, consisting primarily of the junior college, college, university, professional school, technical school and trade school sub sectors of Sector 61 of the North American Industry Classification Survey, (12) is beginning to incorporate IT into its value chain and product offerings through online education (14). In the fourth quarter of 2000 alone, virtual universities were created in Canada and Arizona to deliver technology-facilitated educational offerings (5, 6). If higher education follows the trend of other industries, these new developments will become vital to competitive success in the future, yet administrators, like business executives will be slow to respond to these strategic challenges (2, 13). Although IT can take many formats in higher education, (e.g. computer aided instruction, CD training modules, downloadable tutorials, expert systems, etc) this paper will focus on online education and its potential.

Porter's (1980) Industry and Competitive Analysis (ICA) demonstrates that IT-facilitated online education is likely to have an effect on competitive forces within higher education. The potential for new entrants is higher with the advent of online education. An online student can take classes offered from distant locations, and can even take classes from multiple, different

locations. If geographic bounds are less important, brick and mortar educational institutions may choose to compete by offering online classes or programs in locations they formerly lacked the ability to cover, increasing competition with other existing institutions. With online institutions receiving regional accreditation (3), these virtual competitors that do not necessarily have a geographic focus have gained legitimacy.

Increased options for buyers (students) reduce traditional educational institutions' power with students, who have more information through the Internet, substitute products (the online classes), and potentially lower switching costs with the ability to shop locally for educational options. From a macro perspective, these things tend to shift power from university to student.

Although education is theoretically open to international competition, in reality 74% of US students attend a college in their home state (10). In most cases there are a limited number of options within a specified geographic area. The advent of online education increases the number of substitutes from traditional sources that begin to offer online classes, as well as from virtual universities that enter the market. Increased numbers of competitors in a market that is only slowly growing also tends to increase competition within the higher education industry.

Some of the implications for higher education include increased industry capacity stemming from both new entrants and scalability of online classes, inflation of marketing costs for traditional institutions, and competition based on differentiated offerings and service. The number of students (buyers) in the marketplace may remain fixed, but if international students view online education positively, market development could take place. Regardless, the *nature* of competition will be altered with widespread adoption of online education.

These factors alone would have a substantial effect on the competitive environment of higher education, but an analysis of the value chain (15) suggests additional substantive changes. Inbound logistics for the university change as online, off-campus students no longer live in dormitories, order from university cafeterias and bookstores, or need classroom space or support. Operations and outbound logistics necessarily change with the shift to online delivery of classes. The nature of developing courses may become less a solitary activity engaged in by professors and more a cooperative endeavor of teams of experts including instructional designers and web experts. Economies of scale may potentially come into play with the scalable nature of some online classes, changing staffing needs for the organization. Marketing and sales (recruitment) efforts may also need to be altered as educational institutions have new products to market in new geographic areas against new and more numerous competitors.

The changes just named should have an effect on the structure of higher education organizations as additional functions and modes of delivery need to be effectively managed. In fact, the type and nature of management control to be exerted and the ownership of online education materials are hotly debated topics (4). The changes named above should also have an effect on human resource practices as issues of training, compensation, and recruitment of qualified professors with requisite skills to thrive in the new competitive environment become paramount.

Taken together, potential changes in the strategic environment due to IT-facilitated online education are tremendous. IT innovation success may change the basis of competition within the higher education industry to the detriment of many traditional competitors (17). Changes such as lower entry barriers or increased buyer power (students) do not necessarily affect all competitors equally. Organizations that neither adopt these technologies nor develop strategies to defend their positions are at risk (7). Innovations in IT that are easily copied can work to the disadvantage of competitors who have relied on geography as a competitive tool.

Some predict that the economics of information is changing industries as a critical mass of consumers is reached (11). But the likelihood of widespread adoption of IT-facilitated online education and the corresponding changes in the strategic environment of higher education are dependent on the extensive use of online education by students. Although heavy penetration by online education is predicted (9) eventual student adoption is not certain. The purpose of this empirical study was to investigate a portion of the response set of students to online education in order to allow assessment of eventual student adoption of online education.

THE STUDY

In this study, graduate students in an online class were questioned about the likelihood that online education could alleviate certain constraints inherent in traditional face-to-face classes and the desirability of diminishing those constraints. Students participating in this study had experience in both online and face-to-face pedagogical formats.

The survey was developed to investigate the potential for online classes to decrease certain constraints on the educational process attributed to traditional classes. Well-known constraints associated with traditional classes are those of *time* and *place*. Students enrolled in face-to-face classes have to show up at a specific time and place to participate in the class. Online classes may be conducted asynchronously and at any location that has access to the Internet, so it would be expected that location and time constraints would be reduced in an online class.

A third constraint is that of *sequence*. Frequently, a class is listed as a prerequisite for another class because it covers a small amount of material that the student must know before taking the first class. Conceivably the small amount of material could be made available in an online module that students could take to avoid having to take an entire prerequisite class. To the extent that this is more likely or possible with online education, this constraint would be diminished by the implementation of those online classes or modules.

If small amounts of material can be modularized and offered online to allow students to avoid having to take entire prerequisite classes, conceivably an entire course could be divided into discrete modules that could be offered independently. A student could take only the modules that they want or need, and a course of study could be *customized* for students. Customized courses of study might be tailored to individual desires or needs, a desirable, student-centered outcome.

If classes or courses of study are customized for each student, it becomes extremely difficult to assure that every student who received a degree has gotten a substantially similar education. It is possible that a student would take only the customized courses they need for a specific aspect of

their job and receive a *certification* of proficiency for that material. This certification might be similar to the Microsoft or Novell certifications that are growing in popularity (1). Already, some students are asking why they need a degree when a certification will get them a desirable, highly paid job.

A sixth possible constraint is that of *source*. Most classroom materials originate from a professor who publishes a textbook. The textbook purchased by students includes a profit for every agent involved in the transaction. Online education has the potential to include materials from many sources on the web, including many free sources. Free materials might include government documents available online, online journal articles and materials made available by private companies. Relaxing the constraints on sources of educational materials may not only reduce costs to students, but may increase ease and speed of access to those materials.

Another potential constraint is the type of *evaluation* used for assigning grades. Although many different types of evaluation are possible in face-to-face classes, professors typically use only a few. Concerns over plagiarism and unwanted student cooperation may lead to the use of alternative means of evaluation (eg. portfolios, projects, threaded discussions) in online classes.

Three types of questions were asked about each constraint. A first question defined the constraint and asked how subjects evaluated the potential for online classes to decrease the constraint. The second question asked if the class that subjects were currently enrolled in decreased the constraint. This question was primarily intended for use by researchers to evaluate possible response bias from the students. The third question asked if reducing the particular constraint was a desirable thing. In addition, items except for those concerning time and place included a question asking the subjects perceived likelihood that the particular constraint would be decreased by the use of online classes in the next 20 years. Finally, the survey included items asking which constraint was most likely and least likely to be decreased by the use of online education, as well as another item intended to be used to gauge response bias from the subjects.

The sample consisted of 66 students enrolled in an online MBA class at a small southwestern university. Twenty-eight were female, and ages ranged from 21 to 52 years with a mean of 31.44. Average work experience was 10.2 years, and 68% of students had taken at least one online class, while 27% had taken two or more. Sixty-four students were employed full-time.

Students enrolled in an online core MBA class on management information systems were offered the opportunity to participate in the survey for a small amount of extra credit. 66 of 72 students enrolled in the class chose to respond. The survey was e-mailed to those students who expressed interest, and the completed surveys were e-mailed back to the instructor.

ANALYSIS

Descriptive statistics, including frequencies, were calculated for all items. Items regarding the potential of online classes to reduce a constraint, items regarding whether the current class had reduced a constraint, and items regarding the desirability of reducing a constraint were evaluated using two-tailed *t*-tests to see if the responses were significantly different from zero. Finally,

because of studies indicating that female students were more stressed than male students (16) and that employed females did twice as much childcare and three times as much housework as their husbands (8), ANOVA was employed to test for gender differences in the desirability of decreasing time and place constraints.

Results

Results are presented in the next three tables, with a discussion following.

Table 1. Subjects' evaluations regarding specific constraints.

<u>Constraint</u>	<u>Potential to reduce constraint</u>		<u>Constraint reduced in this class</u>		<u>Desirability of reducing constraint</u>	
	Mean	t-value	Mean	t-value	Mean	t-value
Time	1.61	15.9**	1.62	17.8**	1.61	18.1**
Place	1.76	21.7**	1.67	20.4**	1.59	14.7**
Sequence	1.35	14.9**	-.18	- 1.4	1.17	10.5**
Source	1.65	21.6**	.42	3.1 *	1.17	10.3**
Evaluation	1.00	8.3**	.26	1.6	.74	5.2**
Customization	1.52	16.4**	-.06	-.39	1.18	10.4**
Certification	.83	5.7**	-.68	- 4.9**	-.53	-3.4**

* p<.01, ** p<.001

Table 2. Likelihood in Percentages that Online Education will Diminish Specific Constraints.

<u>Constraint</u>	<u>Sequence</u>	<u>Source</u>	<u>Evaluation</u>	<u>Customization</u>	<u>Certification</u>
Likelihood (%)	64.4	72.0	57.6	64.4	49.2

Table 3. ANOVA: Differences in the Desirability of Reducing Time and Place Constraints by Gender.

<u>Constraint</u>	<u>Gender</u>	<u>N</u>	<u>Mean</u>	<u>F-value</u>
Time	Male	38	1.45	4.58*
	Female	28	1.82	
Place	Male	38	1.37	6.23*
	Female	28	1.89	

p <.05

Table 1 shows results of items regarding the potential for online classes to reduce specific constraints, whether the class subjects were currently enrolled in reduced the specific constraint, and whether reducing that constraint was desirable. Responses were coded from -2 (Strong No or Strong Negative) to +2 (Strong Yes or Strong Positive) with 0 representing the neutral point. Table two shows subjects mean responses to the likelihood items. These questions gauged the

subject's evaluations of the likelihood that online education would diminish specific constraints in the next 20 years. Table three shows the results of the ANOVA used to examine differences in the desirability of reducing time and place constraints by gender.

DISCUSSION

The constraints examined in this study included those associated with the fixed time and place of traditional classes. Also examined were constraints relating to the sequencing and sources of materials, evaluation methodologies, the potential for customized classes, and certification of achievement rather than degree offerings. The ability of online education to reduce or eliminate constraints associated with traditional classes and the desirability of reducing those constraints should have an impact on the desirability and adoption of this type of distance education. Subjects responded that reducing constraints of time, place, sequence, source, evaluation and customization were desirable. Responses were significantly different from a neutral response at a $p < .001$ level. Table 1 indicates the strength of these perceptions, with evaluations of desirability of reducing time and place constraints strongly positive, while the desirability of reducing constraints of sequence, source, evaluation, and customization were rated as strong. Interestingly, subjects also indicated that reducing the constraint of certification was not desirable at a $p < .001$ significance level. Responses for men and women were different for the constraints of time and place ($p < .05$), with women indicating a higher desirability for reducing these constraints. Given the studies cited earlier suggesting that female students may be under more severe time pressures than male students, these results were expected.

Subjects also responded that online education had the potential to alleviate constraints of time, place, sequence, source, evaluation, customization, and certification. Given the subjects experience with online classes, these evaluations are an important indicator of the potential of online classes.

Items asking whether the current class had diminished the constraints were included for evaluating potential response bias. Since the instructor had designed the course and its contents, a priori expectations for responses to these items were established. The current class was expected to reduce constraints of time and place, with the possibility of positive responses for the constraint of source. Subject responses were generally consistent with expectations, providing support for a lack of response bias on the other items.

In summary, this study looked at one format by which IT can support higher education and validated the potential of IT-facilitated online education to reduce undesirable constraints inherent in traditional educational pedagogy. Elimination or reduction of undesirable characteristics of higher education could provide a competitive advantage to those institutions engaged in online education. If the predicted increases in online education occur, significant impacts on the strategic environment for higher education are almost certain. Online education should bring about changes in the competitive environment that serve to increase the power of customers at the expense of higher education institutions. In addition, changes in the value chain logistics, marketing and human resources are indicated and will not be positive for all competitors. Changes in resource allocation and reward systems are never easy, but will be

necessary to facilitate institutional participation in this new type of pedagogy. Higher education administrators should be aware of this shift and prepared to respond to it. Changes ranging from recruiting to fund raising will be necessary to adjust to the new competitive environment and colleges that recognize the new reality and adapt first will be at a competitive advantage.

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