

# **Towards the Harnessing of ICTs in the Delivery of Content for Higher Learning Institutions**

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## **Abstract**

In the new millennium, web-based learning is heralded as the focal point of education in new economy. The providers of tertiary education are universities. The setting of this study is on the delivery of fully and partial online tertiary education programs at the undergraduate and graduate level.

This study examines the prerequisites that universities have to fulfill to ensure successful delivery of online education content, as well as explore if there are any variations in the profile of students who pursue online degrees as compared to those who are studying in traditional universities. Insights were provided from current students themselves as well as the administrators of these tertiary institutions. This included the strategies utilized by universities to differentiate themselves from other educational institutions that provide alternative forms of education delivery.

The study adopted a primarily quantitative approach. Respondents of the study came from both the undergraduate and graduate level, to explore if there are any differences in the issues faced by both sets of students.

## **Introduction**

With the advancement of Information and Communication Technologies (ICTs), in particular the Internet, Universities have sought to provide online learning, to their target audience. Otherwise known as e-learning, this provides an additional channel for Universities to cater to their target market.

One of largest online initiatives is Universitas 21, an international venture, consisting of a network of 18 research-intensive Universities. These varsities come from all corners of the world, such as Canada (McGill University), Britain (University of Nottingham), Australia (University of Melbourne), New Zealand (University of Auckland), China (Shanghai Jiao Tong University), Hong Kong (University of Hong Kong) and Singapore (National University of Singapore).

## **Research Objective**

The study is based on a study, which was done by Perreault et al (2002) on the barriers to the delivery of distance-learning courses. The questions from the questionnaire were adapted from the study.

## **Significance of the Study**

Given the prevalence of technology in the world today, web-based learning will be the future of education, regardless of whether it is formal or informal learning. Even if online means are not meant to totally replace face-to-face delivery of courses, they are used to complement the knowledge transfer process. Tertiary education providers such as polytechnics and universities are increasingly using the Internet in their course delivery. Examples of these are the online delivery of certain lectures, downloading of lecture course notes as well as the facilitation and marking of exams.

Based on the findings derived from the study, educationalists will be able to comprehend the various problems faced by current students and the critical success factors for full and partial delivery of educational content. From there, they can work towards resolving these issues of concern and thus increase the quality of education rendered to current and future batches of students.

## **Research Questions**

The study aims to provide a guide for understanding the problems associated with online education. This paper sets its sights on answering the following research questions:

1. What are the problems faced by tertiary students when they read subjects that have an online component?
2. What are the important factors to the successful delivery of online educational content?

## **Literature Review**

### **The rise of the Internet as a modus operandi**

The Internet has assisted this type of partnership to develop what was known as distance education. The presence of these programs was mutually beneficial to the parties involved. It serves to increase the reputation of a university's international profile, as well as act as a means of governments of promoting diplomacy and internationalism (Kremmer 2004).

The Internet has been utilized by universities not only as a marketing medium, but also as a means of delivering tertiary education. In the formulation of e-business strategies for online learning, education institutions have to be sensitive to the need to nurture a trusting relationship to overcome geographic and cultural distances from the student's home country to the university's home country as well as the perceived threats of an online environment (Hoffman, Novak and Peralta 1999). Universities have to

recognize that a tertiary education is a high involvement purchase and therefore winning and keeping the customer's trust is essential.

Online-based learning had become more common in recent years with the development of the Internet since the 1990s. With the advancement of information technology, widespread usage of the Internet and the commoditization of knowledge, tertiary institutions are pressured into updating their approach to students in order to stay relevant (Clark 1996). Examples of such changes are the provision of virtual office hours by University of California's (UCLA) Department of Chemistry and Biology to offer students 24 by 7 communication (Kreiger 1996). All these mean that universities have to be up-to-date with the preferences of their students, as they are also their customers. Various universities use online learning, either as a complement (for example the National University of Singapore's Master of Business Administration), or a substitute (for example the Universitas 21 Global's Master of Business Administration) to the traditional forms of learning.

### **Benefits of Web-based learning**

For even traditional universities to find the need to shift the focus from only face-to-face programs to ones that are enhanced by web-based content, there are definitely inherent areas of benefits that these e-learning initiatives would possess. Amongst these are the computer-based classroom management systems as well as online project management collaboration interfaces, which allow the lecturer to monitor student participation and for students to work in project teams across geographic boundaries and different time zones (Cooper 2000).

To fully cater to the needs of students, web-based learning needs to be student centered (Garves 2000) and provide a viable alternative to classroom education for pure online courses or provide an added benefit as a complement to traditional face-to-face university programs. This seeks to provide people with added flexibility in terms of being able to lessen the amount of time spent in class (Institute of Higher Education Policy 1999) and instead provide increased learning opportunities for traditional and non-traditional students (Cooper 2000).

### **Challenges to the Online-delivery of education**

As the online delivery of courses relies on the Internet together with the system interface of the hosting university, it is obvious that the robustness and reliability of the technologies-in-question are key issues (Perreault et al. 2002). These issues, if left unresolved would lead to a negative perception towards e-learning as well as the perceived competency of the providing university. Some students might be computer literate, but nevertheless it is possible for them to be ill prepared for web-based learning if they are not equipped with the relevant skills or have an insufficient skill base. As such, students might overestimate the ability to cope with full or even partial subjects that are taught through the Internet. To assist students, lecturers sometimes double up to provide technical support, in the form of an online help desk and purely technologically related student tutorials (White 2000). Using electronic means, it is possible for students to contact their lecturers using the phone, faxes, and email (Loeding and Wynn 1999).

Universitas 21 Global and other institutions such as Republic Polytechnic even have Voice-Over Internet Protocol to be at the forefront of communication advancement.

The increased reliance of technology such as email causes problems to academics conducting these courses. At a time when technology is prevalent, students would expect answers from their lecturers almost instantaneously. This in turn causes stress to academics, as they consider the need to be accessible to students 24 by 7. This doubled by the need to provide personalized feedback and the sheer volume of emails, creates an environment that provides extreme stress for the delivery of these courses. These stress levels are not only confined to lecturers of online courses, but also lecturers in programs that are conducted by the traditional universities, as even these universities are also shifting the emphasis to using electronic means of maintaining teacher-student contact.

Student to student interaction is also an important issue in the success of online education initiatives. One of the main student considerations especially that of graduate students is the ability for networking. This is the reason why a common disappointment for purist online learning programs is the lack of face-to-face interaction with both the professor and other students (Wynn 1999). Online universities that can overcome this deficiency would have a good advantage, not only against their direct competitors (other online universities), but also against their indirect competitors (traditional universities).

## **Methodology**

### **Data Collection**

The research was conducted at Singaporean tertiary institutions and was used to examine whether there are any differences in the undergraduate and postgraduate students in the using of online education. With students respondents gathered from the same school within the University, it is assumed that the specific technologies, technical support and the technical competence of the lecturers are equal, to give rise to ease of comparison. The sampling method used was quota sampling. The questionnaire was adapted from the study by Perreault et al (2002) on the barriers to the delivery of distance-learning courses. It consisted of aspects including (1) problems and issues relating to web-based learning and (2) factors relating to the online delivery of educational content.

### **Response Rates & Demographics**

For the study, 100 students were interviewed from the undergraduate student population of the selected universities with 60 usable respondents received, resulting in a response rate of 60.0%. 100 graduate students were interviewed with 40 usable responses gathered. The response rate was thus 40.0%.

Of the undergraduate respondents, 66.7% (N=40) of them were female. 55% (N=33) of the respondents were below 21, whilst the other 45% (N=27) of the undergraduates fell in the 20-29-age band.

The graduate responses consisted of 55% (N=22) females. 35% (N=14) of the graduate students were in the 20-29-age band. 50% (N=20) were between 30-39. The remaining 15% (N=6) were aged between 40 and above.

### **Findings & Discussions**

When using electronic means of educational delivery, the reliability and the complexity of the electronic interface becomes an obvious factor. Even a small technical glitch or a lag in the delivery system is enough to antagonize the users, be it the lecturers or students. All or 100% of the undergraduate (N=60) and graduate (N=40) respondents identified that they had done subjects within their respective academic curriculum that has at least a partial online component. However, none or 0% of the respondents had experienced any subject that was fully delivered online.

**Table 1. Percentage of Undergraduate Respondents Indicating Problems Associated with Technology (N=60)**

<b>Technology-related issues</b>	<b>Problematic</b>	<b>Somewhat problematic</b>	<b>No problem</b>
Reliability of technology	5.0%	45.0%	50.0%
Technology support provided	11.7%	60.0%	28.3%
Student competence	5%	15%	80%
Instructor competence	10%	20%	70%

**Table 2. Percentage of Graduate Respondents Indicating Problems Associated with Technology (N=40)**

<b>Technology-related issues</b>	<b>Problematic</b>	<b>Somewhat problematic</b>	<b>No problem</b>
Reliability of technology	40.0%	45.0%	15.0%
Technology support provided	25.0%	55.0%	20.0%
Student competence	5.0%	27.5%	67.5%
Instructor competence	10%	60%	30%

Most undergraduates were split between the reliability of technology as 50% (N=30) found that the technology used to be reliable, while 45% (N=27) to be somewhat problematic. However, graduate respondents were closely split between the reliability of technology as being problematic 40% (N=16) and somewhat problematic 45% (N=18).

Both sets of students had a majority that found that technology support rendered in the university to be somewhat problematic. The difference though was that the undergraduates had the second highest responses for “No problem” (28.3%, N=17), whereas the graduate students rated “Problematic” as the variable with the second highest response (25.0%, N=10).

Student competence was ranked highly by the undergraduate and graduate students, 80% (N=48) and 67.5% (N=27) respectively. However, there was a difference in the factor on competitor influence as 70% (N=42) of the undergraduates felt that there was no problem in instructor competence, whereas 60% (N=24) of the graduate students felt that there was some problem in instructor competence.

A majority of undergraduate students had no problems in accessing the resources (50%, N=25), whereas a slight majority of the graduate students (45%, N=18) found that gaining access to resources was somewhat problematic. However, both sets of students mainly found no issues in Student and Teacher communication and in test administration.

There was a vast difference in the perceptions towards the collaboration of online projects, as 55% (N=33) of the undergraduate students found no problems, whilst 50% (N=20) of the graduate students found online project coordination problematic.

**Table 3. Percentage of Undergraduate Respondents Indicating Problems Associated with Instruction (N=60)**

<b>Instruction-related issues</b>	<b>Problematic</b>	<b>Somewhat problematic</b>	<b>No problem</b>
Student access to resources	10%	40%	50%
Student-teacher communication	5%	15%	80%
Team projects	35%	10%	55%
Administering tests	0%	10%	90%

**Table 4. Percentage of Graduate Respondents Indicating Problems Associated with Instruction (N=40)**

<b>Instruction-related issues</b>	<b>Problematic</b>	<b>Somewhat problematic</b>	<b>No problem</b>
Student access to resources	15%	45%	40%
Student-teacher communication	15%	25%	60%
Team projects	50%	20%	30%
Administering tests	0%	5%	95%

There seemed to be a positive bias in the responses for the important factors in e-learning. Out of the 360 total responses in the 6 factors for the undergraduate category, there were only 6 responses that fell within the “Not Important” and “Unsure” columns. This was also the same for the graduate category as only 10 of the 240 responses fell in the “Not Important” and “Unsure” columns. Please refer to Tables 5 and 6.

**Table 5. Percentage of Undergraduate Respondents Perceptions of benefits associated with electronic delivery of programs (N=60)**

<b>Factor</b>	<b>V. Important</b>	<b>Important</b>	<b>Not Important</b>	<b>Unsure</b>
Flexibility for student	40%	50%	10%	0%
New opportunity for learning	45%	50%	5%	0%
Cost efficiency for students	65%	35%	0%	0%
Lecturers as facilitators	95%	5%	0%	0%
New teaching approach	50%	40%	0%	10%
Student-centered learning	90%	5%	5%	0%

**Table 6. Percentage of Graduate Respondents Perceptions of benefits associated with electronic delivery of programs (N=40)**

Factor	V. Important	Important	Not Important	Unsure
Flexibility for student	95%	5%	0%	0%
New opportunity for learning	90%	10%	0%	0%
Cost efficiency for students	90%	5%	5%	0%
Lecturers as facilitators	60%	20%	10%	5%
New teaching approach	70%	25%	5%	0%
Student-centered learning	95%	5%	0%	0%

It was therefore imperative that more important emphasis be allocated to examine the distribution between the “Very Important” and “Important” categories to comprehend the different perceptions between the undergraduate and graduate students.

Most of the responses indicated that student flexibility and new opportunity for learning was more important to graduate students than to undergraduate students. The graduate students rated student flexibility (95%, N=38) and new opportunity for learning (90%, N=36) as very important, whilst the same categories were both rated by undergraduate students (50%, N=20) each.

Though both undergraduate and graduate students ranked cost efficiency of online education delivery as very important, a difference could be seen from the responses, which was 65% (N=39) to 90% (N=36) respectively.

A reverse trend could be seen in the importance of lecturers as facilitators as 95% (N=57) of the undergraduates ranked this category as very important, as compared to the graduate students, of whom 60% (N=24) ranked the facilitation of lecturers as important.

Graduate students were more convinced of the importance of the web-based learning being a new teaching approach as the ratio of the frequency between “Very Important” and “Important” was 14:5 as compared to the undergraduates who had a frequency ratio of 10:8 instead.

However, there was no such difference in views in the “student-centered learning” category as both had ratings in the “Very Important” column of 90% and above.

## **Discussion**

Web-based learning presents both advantages as well as potential barriers. Based on the majority, undergraduate and graduate respondents perceived the same technologically related problems except for instructor competence. However, on more careful examination of the frequency distribution, it can be said that graduate students experienced a greater incidence of technological problems.

In terms of instruction problems, undergraduate and graduate students were almost similar on all fronts except for “Student access to resources” and “Team projects”, in which the graduate students again had more occurrences of problems, especially in the team projects category.

Graduate students had rated all factors associated with electronic delivery of programs as very important. This was almost the same for undergraduate students, who had ranked all factors as very important except for “Student flexibility” and “New opportunity for learning”. These factors, together with the cross-examination of the frequency distribution between the undergraduate and graduate students, showed that graduate students had a greater perception of importance towards online learning as compared to undergraduate students. It could then be predicted that graduate students would be more willing to undertake courses with an online learning component.

However, one possible limitation to the study, which could also serve to provide an explanation, is that it is very much possible that students ranked the importance on e-learning and the current role it plays in relation to their existing courses. However, it does not necessarily mean that they would fully support online learning initiative for all graduate courses. The need for networking and the absence of face-to-face interaction also surfaced during the in depth interview. Negative perceptions towards online learning are a barrier that was not previously mentioned in the study. Whilst it might be acceptable in the curriculum of traditional universities to have a few totally online courses, employers and students alike seem uncomfortable with a totally online approach towards educational content delivery. This can thus be classified as a barrier for online learning.

## **Conclusion**

### **Limitations of the study**

Whilst the study provided an insight to the differences in the problems faced in e-learning by undergraduate and graduate students, the quantitative nature of the study, as well as the structure of the study meant that explanations could not be drawn to account for these differences. Another limitation would be the number of respondents, as a larger number of respondents would allow for greater generalization of the findings.

### **Managerial Implications**

Based on the responses, administrators and instructors of the school can bear the findings in mind when providing partial web-based learning courses to both undergraduate and graduate students. For a start, traditional universities should try to improve the value that online education has as a complement in the current curriculum structure. Next, they should look towards providing students with an option of having certain courses that are fully available online in order to give students a totally new form of learning even within the confines of a traditional university setting. This would also empower students with the know how of having virtual project collaboration, which is so relevant in today’s business setting. Not to mention, it would also give the more busy students, especially the graduate students an opportunity to better manage their work-life balance.

## **Research Implications**

Amongst the research implications is the possibility of understanding the nature of the problems faced by students in a more comprehensive study. The infusion of the qualitative and quantitative approaches to a future study would be able to provide explanation as well as enable generalization and understanding to the findings of the paper.

Another possible area worth exploring would be the identification of whether differences exist in the demographics, work profile and the technical competencies of students who are in traditional universities, as compared to online universities. This could also include their psychographics, which would also entail the priority of formal learning in their family, social and work lives.

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