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The Use of ICT and e-Learning in Higher Education in Japan

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***Abstract*--**Japan is known to be a technological powerhouse, being noted for its automobiles, consumer electronics, laptop computers, portable gaming devices, and more recently healing animal robots. Japan is also noted for its popular culture; manga, anime, novels, films, character goods, game programs, cosplay cafes, karaoke and so on. It may be natural for people outside Japan to assume that e-learning in Japan must be well advanced and innovative. In reality, the application of technologies in education in Japan is far behind of other developed countries. Especially in higher education, apathy of students towards their study prevails and teachers continue ignoring such student attitudes. E-learning, which is supposed to revolutionalize the way people learn as it has potentials to enable more student-centered learning, has not been realized in Japan and mostly used to perpetuate the teacher-centered teaching in a different format.

***Keywords*--**e-learning, Higher Education, ICT in Education, Japan

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I. INTRODUCTION

IN Europe, those products which have Japanese brand names on are ubiquitous; automobiles, portable gaming devices, televisions, laptop computers, digital cameras, video cameras, to name a few. Some wacky inventions come from Japan; toilets that check your blood sugar and body fat, a computer mouse that can recognize the pattern of veins in the user's hand, biodegradable plastics, water fuelled cars, and so on. In the eyes of people in Europe, Japan appears to be a technology super power with creative and innovative people. In fact, in terms of the number of patent applications, Japan is number one in the world.

The strength of Japan does not only lie in its technological exports. Japanese popular cultures, including manga, anime, novels, films, character goods, gaming software, cosplay cafes, sushi, and karaoke are very popular among Western youths. Many people in Japan call those cultural exports as Japan's "soft power." The term, "soft power," was first coined by Harvard University professor Joseph Nye, who writes "[Soft power] is the ability to get what you want through attraction rather than coercion or payments. It arises from the attractiveness of a country's culture, political ideals, and policies."[1] Though Nye originally applied this concept to the U.S., Japanese found this concept applicable to refer to its own power. Recently, the Prime Minister Taro Aso, who is known as an avid manga fan, announced to build a national anime and manga hall with a huge budget of 11.7 billion yen and earned public outcry. The intention here is not to describe how powerful Japan is, but to show that Japan can be perceived as very innovative in its technological and cultural productions by other countries.

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Though Japan as a whole has shown much economical success in the past, its education system has much to be desired. In this paper, I will focus on higher education, especially the use of information and communication technologies (ICT) to innovate higher education.

II. HIGHER EDUCATION IN JAPAN

A. Higher education system in general

Japanese undergraduate postsecondary education system is basically composed of universities and junior colleges. As of 2008 there are 765 four-year universities among which 86 are national universities, 90 are public universities, and 589 are private universities [2]. In other words, more than three quarters of universities in Japan are private schools. The total number of universities has been steadily increasing over the past 10 years from 586 in 1996, mostly owning to the increase in the number of private universities. As of 2007, 76% of high school graduates go to higher education institutions, including specialized training colleges and 47% of them go to four-year degree granting institutions. This percent is among the highest in the world.

Though the number of universities has increased over years, the size of college age cohort has been shrinking. The declining birth rate is a serious issue among higher education institutions in Japan as the number of available seats in all the universities now meets or even exceeds the number of prospective students; in other words, most students who seek higher education are able to enroll. In fact, in 2008 47% of private universities and 68% of private junior colleges could not fill their enrolment capacities. In other parts of the world, the demand for college and universities usually exceeds the supply. However, in Japan that is no longer the case and many lesser known institutions are having tremendous difficulties in recruiting new students. In fact, a few universities have been forced to merge with other universities, or in some cases be closed down due to the failure in recruiting enough students to get the subsidy from the government.

In Japan, distance education programs have been regulated differently from campus-based programs of higher education. In 2008, 229,734 students were seeking degrees at a distance in 41 universities who provide distance learning undergraduate programs, accounting for 9.1% of total higher education enrollees [2]. As regular higher education institutions in Japan mostly cater to the needs of full-time students enrolling directly from high school, a majority of adult learners opt to enroll in distance education programs. Out of the 41 universities, 37 are universities that have both on-campus education and distance education programs, while four universities were distance learning institutions.

Distance education via the mail system (correspondence education) was first recognized by the MEXT in 1950. Though the majority of distance education institutions in Japan used print-based materials for instruction, one unique distance education institution was established in 1983. The institution utilized radio and television broadcasting as the major mode of instructional delivery and it was named as the University of the Air (in Japanese it is called "*Hoso Daigaku*") which is renamed as the Open University of Japan in November 2007. The university enjoys a very unique status in Japan. It is not classified as a national university as Tokyo University and Kyoto University are, but the Japanese government sill provides the bulk of its financing.

B. The Open University of Japan

For the first five years of its existence, only students in the Tokyo metropolitan area could receive the broadcasts of the university lectures. The University began broadcasting nationwide via digital satellite in 1998 though only those who installed a special antenna and receiver could receive the signal. The main textbooks utilized as study materials for the courses offered by the university are still print-based. There are also 57 local study centers and support offices around the country; at least one in every prefecture. The university requires all students to take at least 20 hours of classroom instruction and final exams at the study center nearby their home. The study centers also provide video/audio recordings of lectures so that students who have missed the broadcast of a lecture can come to the study center to view or listen to the recordings. Those recordings cannot be taken out of the study centers, and those who want to obtain those recordings have to pay a large sum. The university sells those recordings to other universities, which use them to supplement their course offerings.

Currently the Open University of Japan has about 85,000 students. Among them, 56% of the undergraduate students and 36% of the graduate students are female. In terms of their age groups, 48% of the undergraduate students are in their 30s and 40s and 32% of the students are over 50s. As for graduate students, 54% of them are in their 30s and 40s, and 31% are over 50s. About 52,000 out of 85,000 students are enrolled in degree programs full-time, and the average student spends 6.5 years before graduating [3]. The university offers more than 350 courses each semester that can lead to undergraduate degrees in life and social welfare, psychology and education, society and industry, human and culture, and nature and environment. Its graduate programs, started in 2001, offer master's degrees in life helath science, human development science, clinical psychology, social management science, cultural information, and natural environmental science. Unlike other universities in Japan, the university does not require undergraduate applicants to take an entrance exam, but requires one for admission into its graduate programs.

Though many other mega distance education institutions in the world such as the U.K. Open University evolved into a new institution fully utilizing interactive technologies such as the Internet, the Open University of Japan is still stuck in the mode of one-way broadcast instructional delivery for its most part. The Open University of Japan offers virtually no interaction between students and the faculty members who design and teach the courses except some courses offered at study centers. It does not even use teaching assistants or tutors to work directly with students. Undergraduate students are assessed mostly with machine-graded multiple choice tests midway through their courses and only those who pass the tests are allowed to continue. The old model of correspondence schools, in which students study in solitude with little interaction with professors and no interaction among other students still persists in the Open University of Japan today.

III. TEACHING AND LEARNING IN JAPANESE HIGHER EDUCATION

It is difficult to quantify and show the difference between Japan and North America or Europe in teaching and learning styles. However, having extensively experienced in both U.S. higher education institutions and those of Japan, I can attest that Japanese higher education can be characterized by low level of engagement by professors and students in classroom-based teaching and learning. Students are expected to do little homework, and teachers are not expected to motivate students to learn.

According to a nationwide survey on the attitude and opinion of college students in Japan conducted by the University of Tokyo in 2007, in which 48,233 students from 127 colleges and universities completed the questionnaire, on average only 44% of basic courses and 59% of advanced courses seemed to bear some importance to students. The most commonly cited reasons are: They taught me the basics of the discipline (55%); They taught me the practical knowledge and skills for the future (50%); and They made me think about myself and what I would like to do in the future (37%).

Over 82% of the classes are lecture-based. Only 30% of the respondents experienced some opportunities to express their opinions and comments in a class and 38% of the respondents had opportunities to participate in group works (see Table 1). 79% of the respondents said they attended classes regularly though they did not find the classes interesting and 78% said they tried to get a good grade. But, they rarely ask questions to their teachers or study outside classes (see Table 2). In other words, most Japanese students are passive learners rather than active learners who actively engage themselves in the process of learning.

64% of the respondents study for classes less than five hours a week and only less than three percent of them study more than 25 hours per week for classes while 12% of them spent more than 25 hours per week for part-time jobs. 29% of the respondents do not read books at all and only 16 % read more than three books per month. 62% of the respondents have answered that they are not interested in the classes they are taking and 56% of them do not have enthusiasm in life (see Table 3). It seems that a majority of Japanese college students are apathetic and not motivated to study. There are a multitude of reasons for Japanese college students' apathy towards university education. First of all, in Japan most potential employers only care about the name of the university, not about students' classroom-based achievement at the university.

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TABLE I WHAT WAS YOUR EXPERIENCE ABOUT CLASSES? DO YOU THINK IT IS NECESSARY? [4]

	Have you experienced?			
	Hardly	**Rarely**	**Sometimes**	**Often**
The class is designed to stimulate students' interest.	6.7	33.5	54.2	4.6
The class is designed to make its content easy to understand.	4.5	30.0	58.6	5.7
There is a tutorial support.	30.8	32.0	27.8	6.0
Attendance is considered important.	2.2	10.6	49.8	36.5
Quizzes and reports are assigned in addition to final exams.	1.6	9.1	52.7	35.5
The assignments are returned with appropriate comments.	34.3	38.3	21.7	4.2
There is an opportunity to express my own opinion in class.	25.7	42.2	26.6	4.2
There is an opportunity to actively participate in class.	24.2	36.7	30.3	7.3

	Is it necessary?		
	Not necessary	**Somewhat necessary**	**Very necessary**
The class is designed to stimulate students' interest.	1.8	37.0	55.7
The class is designed to make its content easy to nderstand.	1.4	26.1	66.8
There is a tutorial support.	17.0	58.3	17.2
Attendance is considered important.	13.0	55.0	26.0
Quizzes and reports are assigned in addition to final exams.	9.8	67.1	17.2
The assignments are returned with appropriate comments.	7.5	47.1	39.4
There is an opportunity to express my own opinion in class.	14.9	59.9	19.2
There is an opportunity to actively participate in class.	12.8	58.6	22.5

TABLE II WHAT IS YOUR GENERAL ATTITUDE TOWARD CLASSES? [4]

	Does not apply	Seldom apply	Somewhat apply	Well apply
I attend the classes regularly even if they are not interesting to me.	5.6	14.4	36.3	43.0
I make effort to get a good grade.	3.8	17.3	45.0	33.2
I actively participate in discussions and group works.	14.5	38.8	34.8	11.1
I ask questions to teachers and consult the way to study with them.	28.9	43.5	21.0	5.8
I prepare for a class and review it well.	26.8	43.4	24.4	4.6

Therefore, there is not much incentive for students to perform well in classes. In addition, classes are usually offered not based on well-planned curricula to develop skills and competencies for working life, but based on professors' research programs. Until recently, teaching skills among professors were well neglected as only their accomplishments as researchers were counted towards their promotions and reputations.

TABLE III HAVE YOU FELT THE FOLLOWING? [4]

	hardly	rarely	sometimes	often
I do not have enthusiasm in life	14.2	28.0	43.6	12.6
I cannot follow the class.	15.1	33.9	37.8	11.6
I am not interested in the class.	9.3	27.3	44.9	16.9
I am worried about the graduation.	21.1	23.9	29.6	23.7
I want to enroll a different department/school/college.	39.9	24.4	22.4	11.7
I want to quit the university.	57.2	23.7	12.9	4.6
Financially it is difficult to continue the study.	59.7	25.9	10.0	2.7
Students around me are not well motivated.	24.1	34.3	28.1	11.8
I cannot find what I want to do.	24.6	27.2	29.7	16.7
The job hunting does not go as expected.	41.4	25.8	15.8	8.5

IV. HIGHER EDUCATION POLICY LANDSCAPE IN JAPAN

The Japanese government has recognized the importance of higher education as a major driver of economic competitiveness in the knowledge-driven global economy and has recently attempted a series of reforms in higher education systems in Japan. The first major one was implemented in April 2004, which transformed national universities into independent agencies with the hopes that the reform would make universities more responsive to social needs, more agile and more globally competitive. The reform strengthened the position of the university President to be more like a chief executive officer, responding to a board mostly consisting of external members.

In parallel to the above mentioned reform, in 2002 the Koizumi government introduced the measures for "special zones for structural reform," in which government regulations would be lifted for the purpose of economic revitalization. Due to the measure, private for-profit higher education institutions were permitted to operate, and now there are seven private for-profit higher education institutions exist, focusing on practical skills. Those for-profit universities tend to operate in a distance mode, taking full advantage of Internet and Web technologies. However, still the number of such universities is very small and there is still a question about its quality of instruction. These initiatives are connected to the Japanese government's recent moves towards deregulation. It is expected that these changes in the education system will affect the current and prospective students as well as the administrators of the educational institutions.

Recognizing the weaknesses of Japanese higher education which tends to emphasize selection processes based on knowledge-testing entrance exams instead of actual

academic performance of students during the course of study, institutions, MEXT increased the acceptance of up to 60 at a university, in 2007 the Central Council of Education put forth a report suggesting to strengthen undergraduate programs at universities. In the report, "*gakushiryoku* (i.e., the ability that a student who completes an undergraduate program is supposed to posess)" is emphasized and the importance of educational outcomes is discussed. The report states that basic academic skills such as reading and writing is necessary, but the ultimate goal of higher education is to acquire problem inquiry and solving skills. As so far Japanese higher education has focused on "what to teach" instead of "what quality a student should have upon graduation," this is a major realization by the government.

Thirteen capabilities in four areas: knowledge, skills, attitude, creative thinking, are defined as the "*gakushiryoku.*" The thirteen capabilities are shown in the table 4 below.

TABLE V BREAKDOWN OF "*GAKUSHIRYOKU*" [5]

Area	Capability	Description
Knowledge	Understanding of foreign cultures	To understand cultures of foreign countries
	Understanding of current affairs, nature and culture	To understand human cultures and current affairs
Skills	Communication skills	To be able to read, write, listen, and speak in Japanese as well as in a foreign language
	Quantitative skills	To be able to analyze, understand and express natural and social phenomenon utilizing symbols
	Information application skills	To be able to use and apply various information on the Internet
	Logical thinking skills	To be able to analyze and express information and knowledge
	Problem solving skills	To be able to find problems, gather/analyze/organize necessary information, and solve the problems
Attitude	Self management	To be able to behave under self-control
	Teamwork, leadership	To be able to collaborate in a team and show directions for achieving goals
	Ethics	To be able to behave according to the rules in the society and one's own conscience.
	Social responsibility	Have the awareness of being a citizen, and be able to exercise rights and duties appropriately and to actively contribute to the development of the society.
	Lifelong learning	To be able to continue self-directed study even after graduation
Creative thinking	The ability to utilize acquired knowledge/skills/attitude to solve problems	

V. THE USE OF ICT AND E-LEARNING IN HIGHER EDUCATION IN JAPAN

E-Learning in Japan has a strong political connotation as the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) has been promoting the development of e-learning in higher education institutions in Japan as part of the e-Japan Initiative since 2001. To further facilitate the adaptation of e-learning by higher education

credits, out of 124 credits required for a four-year undergraduate degree, earned through e-learning toward degree programs in March 2001. As for distance education institutions in 2000 all 124 credits started to be allowed to be earned through asynchronous two-way online education.

In January 2006, "IT New Reform Strategy" was put forth by the Japanese government, succeeding the "e-Japan Strategy." This strategy aims to complete the national reform through IT by the year 2010 to make Japan the frontrunner who leads IT revolution. In the field of education, the strategy aims to double the number of departments and programs who conduct e-learning and also to double the number of life-long learners who take e-learning courses.

The use of ICT in improving education is also mentioned in the report by the Central Council of Education. The use of ICT is encouraged to overcome limitations related to time and distance and to facilitate interactivity in education. It is also noted that the use of ICT is merely means to an end, not the end itself. It is encouraged to use ICT appropriately based on the learning outcomes the institution seeks to achieve.

Higher education institutions in Japan have slowly started to implement e-learning. According to the study conducted in 2008 by the National Institute of Multimedia Education [6], 73.1 percent of the higher education institutions surveyed have implemented ICT in teaching and learning while 16.9 percent of the institutions responding had no plan of implementing. As for the implementation of e-learning, 39.1% of the respondents said they were offering e-learning in combination with classroom instructions (i.e., blended learning). The top reasons why the institution has started to use ICT in education are: 1) to offer effective instruction to students (81.6%), 2) to offer education efficiently (60.7%), and 3) to respond to diverse needs in learning styles (60.4%).

Respondents were also asked about challenges the institution is facing in implementing ICT in education. The most cited challenge was the lack of personnel in content creation and system management (58.9 percent), the lack of skills concerning the use of ICT in education among faculty members (51.9 percent), the lack of know-how's concerning system development of e-learning (45.2 percent), difficulty in establishing the cooperative support system within the institution (37.2 percent), and the lack of understanding about the educational effects of the use of ICT (37.2 percent).

In terms of the development of actual contents of learning materials, 69.1 percent of those surveyed said faculty members create on their own without any institutional help. Only 36.1 percent said some institutional unit is responsible for the creation. In terms of the use of ICT tools, 48.1 percent of the universities and 27.1 percent of junior colleges said they had used an authoring tool to create educational content. As for the use of learning management systems (LMS), 52.8 percent of the universities and 46.4 percent of the junior colleges are using it.

V. MAJOR CHALLENGES OF E-LEARNING IN JAPAN

So, Japan has all the technologies and the government support to make itself the front-runner in e-learning

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implementation. But, in reality, it is far from it. According to the Economist Intelligence Unit [7], Japan is 18th in the e-readiness level behind of South Korea (16th) and Taiwan (17th). There has been a big gap between the government vision and the actual implementation of ICT in education as well as between research and application. In my opinion, these gaps exist due to the lacks in pedagogical innovation in educational institutions in Japan to take advantage of the technologies.

As discussed previously in the College Student Survey, in Japanese universities 82% of the classes are lecture-based in which teachers usually give lectures to convey a particular content and on exams students are expected to recite back what they have heard in class or read in textbooks. In the Confucius value system which Japanese culture and society has built upon, teachers are authorities students should not challenge. In a typical classroom at a Japanese university, students rarely engage themselves in intellectual inquiry, independent and critical thinking, or problem solving. The pedagogical emphasis tends to be placed upon the mastery of a specific body of knowledge instead of fostering the students' ability to reason and think critically and creatively and to articulate and defend their views.

Though it is a little dated study targeted towards middle and secondary schools, the SITES study conducted between 1997 and 1999 reported that among the sample of schools in 26 countries, Japan scored the lowest in terms of school principals' positive attitudes toward ICT usage and the extent of the emerging pedagogical practices in their schools [8].

As the government wants colleges and universities to implement ICT in its education as stated in its policy "IT New Reform Strategy" aiming to double the number of departments and programs who conduct e-learning, colleges and universities have started implementing ICT inside and outside their classrooms. However, in most cases, technologies are being used to reinforce the prevailing teacher-centered pedagogy, not to transform teaching and learning with a student-centered approach. Technologies are used merely to replicate lectures in classrooms with the advantage that students can have access to them whenever and wherever as long as they have the Internet connection or to enhance teachers' presence and aid information delivery by supplementing lectures with PowerPoint presentations.

In other parts of the world, especially in those English-speaking countries, a new pedagogy has been realized through the use of ICT. The new pedagogy emphasizes the role of students as knowledge generators and active participants in their own learning and the role of teachers as facilitators of students' learning. With the use of ICT, it has become easier to implement the new pedagogy inside and outside the classroom. However, in Japan, the use of ICT in education has been promoted without much consideration to pedagogical issues and the use of ICT has become the end itself, not the mean to achieve more effective teaching and learning.

VI. CONCLUSION

Clayton M. Christensen in his book titled *The Innovator's Dilemma* [9] states that "disruptive technologies" replace existing technologies and change the range of applications for technology while "sustaining technologies" which are incremental and increase the efficiency of technological applications. E-Learning and various ICT tools have the real potential to be disruptive technologies to transform teaching and learning, that threatens the existing ways of teaching and learning and the ways higher education institutions are organized and managed. According to Christensen, dominant firms would eventually fail if they refused to adapt to disruptive technologies.

Higher education institutions in Japan are like the dominant firms depicted in Christensen's book. Without realizing the disruptive technologies and not transforming themselves to adapt to them, the higher education institutions in Japan may be doomed. Transformation of teaching and learning through the use of ICT has to be occurred at many different levels: the government, each academic community, each institution, each department, each faculty member, and each student.

Japan has been good at improving qualities of products and services. Now is the time to realize disruptive technologies of teaching and learning and make efforts to transform itself to adapt to them. Otherwise, Japan may eventually become a loser in the battle of providing education for the future, which will be a huge cost to the future of Japan.

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