ANALYSIS AND COMPARISON OF RATIONALES FOR E-LEARNING OF ENGINEERING AND ENGLISH AT NATIONAL INSTITUTES OF TECHNOLOGY IN JAPAN

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A growing interest and increase in the use of e-learning technologies have become an interesting field in the past decade. In Japan as well, the MEXT has been encouraging various ICT implementations for education and is supporting trials though research grants. However, at National Institutes of Technology, there is not one complete system of rationales for its use, and seems that each college and subject or faculty is left to figure things out themselves. This study analyzes existing e-learning efforts for engineering and English language subjects. It is seen that true to their nature of being institutes of technology, engineering subjects are superior with more thought and purpose put into their efforts.

Key Words : e-learning, kosen, EFL (English as a Foreign Language), engineering, education

1. BACKGROUND

Since the end of the Second World War, Japan is known around the world for being technologically advanced. Unfortunately, its educational methodologies and use of technology for teaching is almost non-existent. Research by Professor Suzuki from Kumamoto University states that Japanese e-learning readiness is one of the lowest among developed nations, with still no concrete plans or trends known publically at the time of publishing (2009).

For this analysis and comparison of e-learning strategies, two specific examples were chosen based a unique teaching environment. Not is the author an English professor at a technical college in Japan, the Kosen education system is also quite different from other institutes of higher learning by focusing on fostering future engineers. The need arose to analyze and compare the differences in a Kosen board-wide e-learning plan, as well as the same for specifically English classes. Often compared to a combination of high school and university, Kosen are the Japanese term for National Institutes of Technology, which started in the 1960s after the number of engineers by trade in post-war society were low yet in need. Students study specialized engineering subjects with plenty of hands-on and workplace experience. They are naturally good at maths and sciences, yet are weak at humanities subjects such as English because of their strict engineering orienteered curriculum (Harden, 2011).

Kosens were originally created and run by the Japanese Ministry of Education, Culture, Sports, Science and Technology (henceforth referred to as MEXT) until they became a self-governing body in 2004. One of the reasons for this independence was due to the needed emphasis on e-learning which was usually run at a national level by MEXT, and by having Kosen run themselves, gave more freedom in the creation of such learning materials. However, there are few faculty members that have the capacity to create neither their own material, nor the support staff with knowledge in educational theory to create suitable materials individually (Nakayama & Santiago, 2004). Since the movement to self-government, it has been an ongoing struggle for all Kosen colleges to have the same levels of education and certification, as seen by continuous troubles from the implementation of the JABEE accreditation system.

2. ANALYSIS

(1) English E-Learning Endeavours

Professor Aoyama from the National Institute of Technology, Toyama College stated various rationales for the starting of e-learning for English subjects at Kosens in her 2009 report. She focused on three main rationales:

1. Increase familiarity with computer-based learning for students
2. English teachers can execute e-learning with the help of technical staff
3. Ease of creating educational materials and keeping them up to date

Thus in turn, The Council of College English Teachers (henceforth referred to as COCET) set out to create Kosen English Town, or KET – an online resource that aims to be used in combination with their unique COCET 3300 vocabulary list for Kosen students. Nakayama & Santiago's research states that English e-learning is executed for extra qualifications for workplace recognition and promotion, such as TOEIC and EIKEN. The rationale is for the LMS to be supplementary to an English teacher's existing curriculum or study plans.

Furthermore, Aoyama states that another of the main rationales for the creation of specifically COCET 3300-based e-learning material is to save on the amount of paper used by Kosen English teachers that hand out photocopies of worksheets and other printed materials in class (2004). This base of materials would also work for engineering subjects, as the vocabulary selected in COCET 3300 is specifically designated for Kosen students and their future work in engineering. It is also stated that by having a Kosen-wide base material that is not overly complicated will help in having equal levels of ability across all institutions. An online scoreboard with a nickname-based system is made public so students can compare and compete with each other on leaderboards for specific quizzes. Kosen and Japan's test result heavy society reflects this need for comparison, as it is also expected to help students study and practice for institutionalized tests.

(2) Engineering E-learning Endeavours

In comparison, 10 Kosens have collaborated together to develop what is known as the K-Skill Project, with one member institution being the National Institute of Technology, Hakodate College – which has been leading other e-learning training sessions and webinars for voluntarily interested staff which I have been a part of in previous faculty development activities. Currently, there exists a shortage of approximately 70,000 specialized engineers in the workplace as of 2009. These include programing engineers who need to be familiar with assembly or C-language, architectural engineers needing pipeline and water purification knowledge, as well as electrical and electronic engineers just to name a fraction of those in shortage (Yonamine, 2011). However, with this wide range of needs, a reliable level of safety for the lowest possible cost is required. With an existing imbalance of curricula and educational content among Kosen colleges, the K-Skill Project brings together 10 institutions to have matching levels of skill through collaborative online lessons, which can be accessed regardless of physical distance, or time of the day. This common curriculum is aimed at bridging the gap between what skills are required by workplace engineers and what is being taught to Kosen students.

The K-Skill Project lists three requirements of students by the industry as a basis for the creation and execution:

1. Unique perspectives and high level of technical skills for any situation
2. Communication and problem solving skills for interpersonal relations
3. Studious and analytical perspectives to further research in their fields

K-Skill Project members also narrow it down to three keywords at the basis of their plans: standardization, visualization, and quality assurance (Yonamine, 2011). By having research staff in varying fields at each of the 10 participating Kosen, catered material can be provided and instructed through e-learning regardless of campus or lack of content-familiar staff on site. The creation of an e-test can help students meet specialized certification standards needed by their future workplaces, all from the comfort of their campus computers. The results of the tests are also audited to guarantee fairness and quality. This endeavor was awarded the National e-Learning award in 2011 for its excellence not only in rational, but also for its rates of student achievements.

3. COMPARISON AND CONTRAST

Now, to compare the two rationales will help make sense of it all. Bates and Sangra list 5 important facets of rationale (2011):

1. Enhancement to quality of learning and instruction
2. Accomodating "Millenial"-styles of learning
3. Increase student flexibility and opportunities of learning
4. Develop "21st century" competencies and skills
5. Improve cost-effective methods of teaching

First, the KET online details are very limited, as Aoyama's 2009 document is very short and by looking at the current status of the COCET page and the KET section, not much has changed since its initial creation. The rationale was not to enhance the quality, but to simply decrease the need for handouts to be printed out (Aoyama, 2009). The scoreboard of online quizzes could be taken as a millennial-friendly learning style, much like gamifying education. Unstated was the increase in access in flexibility and opportunity, developing modern competencies, nor cost-effectiveness (unless the argument for cost of handouts is to be taken at face value). Although not clearly stated, increased flexibility and opportunity could be attained by having a central medium, in this case the KET site, for students from various Kosen to come learn at a central location with a fixed set of questions based on standardized lists and materials, like COCET 3300. This however does not link to skill development or costs.

The overall lack of detail and image of where the COCET run KET described by Aoyama in 2009 shows, and was likely predictable to have ended in its current state of lacking any form of update or renewal. Some KET internal links are even broken to this day. The rationale to have all Kosen English classes be at the same level is a very important one, given the lack of unity since its self-government, but very little was done without any concrete image to set in stone a base that could be renewed easily. Suggestions by McCool on how to cater e-learning projects for Japanese audiences include "high communication context, collective motivation, and non linear education" (2006). Not surprisingly, even though these suggestions were made three years before Aoyama's work, none of these seem to be reflected in COCET's attempt at rationalizing the start of e-learning via KET. The range of learning on the continuum is very narrow and linear in nature that not only Bates & Sangra (2011), but also McCool (2006) states. The oversimplification and lack of depth in content brought it to its doom.

Almost as a polar opposite example, the K-Skill Project did start with a very detailed plan and easy to understand rationale for its creation. Similar to the COCET KET, the goal was to bridge the gap between Kosens' individual education plans, but also fill in what was missing that was required for graduates in their future workplaces. This base rationale clearly aims to enhance the quality of teaching and learning by filling in these gaps, which is their selling point and likely reason for their e-learning award. This rationale is also defendable on the grounds that it will keep the already existing high reputation of Kosen graduates in the engineering workplace, and also keep the students to said standards too.

Although unstated directly, the K-Skill Project also enhances learning opportunities and flexibility for students involved. They don't have to buy extra study material to get a specific certification or qualification, and are able to access the modules online from even outside campus networks. This also ties into the needs of skills and competencies that the existence of the K-Skill Project is based on – to keep a specific high level of skills needed for the modern workplace. The only concern that is unstated or remains hidden is the cost-effectiveness. No mentions were made about cost of implementation, but simply that it will give students free study material and opportunities for certification. Is the K-Skill Project funded internally among the 10 participating colleges? Is it somehow connected through corporate sponsorships of the businesses that eventually hire Kosen graduates for their workplaces? All seem likely possibilities but none of that information is made publicly available as of yet.

Also mentioned in McCool's list of e-learning adaptations for Japanese audiences is its internationalization. The graduates of the K-Skills Project are aimed at being sent to overseas branches in the futures of their careers, even if the Project is based domestically within Japan. Having them able to remain as a valid technician and engineer on the global scale is another strong point for its creation as an e-learning program. Hopefully in the future, a collaboration with COCET to ensure that the technical skills learned in the Project can be related to actual English skills would make the graduates that much stronger overseas.

4. CONCLUSION AND DISCUSSION

Doctor Sakamoto from the Japanese National Institute of Multimedia Education stated in

his 2002 work that there was a need for a push to increase technological functions into the current education system, but that there was still concerns with familiarity and computer literacy as a hindrance. His survey also compared the percentage of use of various forms of technology and showed that not much had changed in a one year span between 1999 and 2000 (Sakamoto, 2002). With still very common use of fax machines in sending documents domestically, a need for more up-to-date data is visible to make for more accurate comparisons.

A year later in 2003, he deepens his analysis and lists a multitude of suggestions for improvement; from public and private institutions, businesses and society, as well as the national Japanese higher education systems as a whole. One of which being to "develop a standardized plan for creating, … and using teaching materials" (Sakamoto, 2003). His previous 1999-2000 comparison was further extended with the addition of 2001, which showed that perceived barriers of ICT adoption did slightly decrease, with the most significant change being in "media literacy", which lowered by approximately 5 percentage points each consecutive year, ending with a low of 56% surveyed (Sakamoto, 2003).

Given that Sakamoto surveyed various levels of higher education institutions across Japan, a similar study based on Kosen staff and students would seem to be required to further refine the current efforts by various faculties – both engineering and humanities departments. By bridging the gap between departmental entities, further developments and creation of e-learning materials should be seen and considered as a viable option in the near future.

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